Nuclear Spins and Moments

Cite as: Journal of Physical and Chemical Reference Data **5**, 835 (1976); https://doi.org/10.1063/1.555544
Published Online: 15 October 2009

Gladys H. Fuller

Nuclear Spins and Moments

Gladys H. Fuller*

Office of Standard Reference Data, National Bureau of Standards, Washington, D.C. 20234

A summary of nuclear-moment values and an index, arranged by Z and A, is presented. The summary value is based on the experimentally determined values of the nuclear moments which have been listed in tables according to the techniques used. Each table is preceded by a short introduction describing the experimental technique involved and the method of calculating the moment from the measured quantities. References are given for all data quoted. The date for the last systematic literature search is included with each table. This tabulation supplements and revises the earlier tables which appeared in Nuclear Data Tables, Volume A5, 433-612 (1969).

Key words: Evaluated data; nuclear electric hexadecapole moments; nuclear electric quadrupole moments; nuclear magnetic dipole moments; nuclear magnetic octupole moments; nuclear spins.

Contents

1. General Introduction

Measured values of nuclear moments, and of some of the auxiliary constants from which moment values are derived, are listed in this compilation. Since the auxiliary quantities determined by the various experimental techniques available today are quite different from each other, the experimental information is divided into eleven tables, each pertaining to a particular method or group of related methods. This division makes it possible to include information which is of interest to those concerned with a particular technique as well as values of the nuclear moments themselves.

Detailed descriptions of many of the methods have been presented by Ramsey [53Ra34]‡, Nierenberg [57Ni25], Kopfermann [58Ko90], Laukien [58La04], Townes [58To34], Cohen [59Co83], and by several authors in *Methods of Experimental Physics*, Volume 5, Nuclear Physics, Part B, edited by Yuan and Wu [63Yu02] and in *Hyperfine Interactions*, edited by Freeman and Frankel [67Fr15]. Brief introductions outlining the particular techniques are given with the individual tables.

In all tables, the values of the magnetic moments have been adjusted to a standard value of the magnetic moment of the proton by the compilers using the experimentally determined quantities and

*Guest worker.

‡ Alpha-numeric codes in brackets indicate literature references, the first two digits representing the year of publication, the letters representing the author.

adopted standard values of μ_p and frequency ratios. An extensive discussion of the evaluation of the fundamental constants is given by Taylor, Parker, and Langenberg [69TaPa]. The most recent adjustment of the fundamental constants appears in Cohen and Taylor [73CoTa].

The Summary of Nuclear Moment Values and Index presents a list of the nuclear moments for all nuclei for which measurements have been made and serves as an index to the specific tables in which more detailed information will be found.

In preparation of the tables, all data available up to the cutoff date listed in each table were reviewed. Unless important for the determination of the sign of a moment, older values have been omitted when superseded by more accurate results.

The abbreviations used and policies adopted concerning signs, standards, uncertainties, standard values, and corrections are explained in tabular style on the following pages.

Acknowledgments

We would like to thank Dr. K. Way for her encouragement and guidance in the inception of these tables. We would also like to acknowledge the great assistance and cooperation of the Nuclear Data Group at Oak Ridge National Laboratory in literature scanning and referencing; in particular, Frances Hurley is to be thanked for her careful work on the reference list. Special thanks are due Dr. W. B. Ewbank for many helpful discussions as well as for his role as ombudsman between the Nuclear Data Group and us.

We would especially like to thank Dr. D. Murnick and his co-workers at Bell Telephone Laboratories and Dr. D. Hoppes at the National Bureau of Standards for their assistance in the evaluation of material for Table J.

We wish to thank V. S. Shirley for many helpful discussions and the experimenters, too numerous to mention individually, who have helped by sending preprints or giving us permission to quote soon-to-be-published values.

The present compilation owes much to the earlier tabulations of J. Mack [50Ma50], H. E. Walchli [53Wa63], N. F. Ramsey [53Ra34], C. H. Townes [58To34], G. Laukien [58La04], I. Lindgren [65Li12], and V. S. Shirley [67Sh14].

Acknowledgements are in order for Constance Seymour, Office of Standard Reference Data, National Bureau of Standards and also for Ilse Putman, Office of Technical Information and Publications, NBS, who did the "on-line" keyboarding and editing of the text and tabular material directly into the NBS Typographic System developed by Carla Messina of OSRD, NBS.

We would also like to thank Academic Press for permission to copy the table of diamagnetic correction factors from *Nuclear Moments* by H. Kopfermann [58Ko90], and W. R. Johnson for sending early drafts of his tables of diamagnetic correction factors for neutral atoms [72Jo18].

I would like to pay tribute to Dr. V. W. Cohen, my collaborator these many years, who died August 17, 1974. He was a man of very high principles, a good teacher and mentor. He was also a very warm, generous and direct person. He will be greatly missed - GHF.

2. Policies

Level Energies	Energies, given to identify the levels for which moment information is presented, are taken from the Nuclear Data Sheets (through Volume B5) or Table of Isotopes [67LeHo].
Half-lives	Half-lives which are given to identify the levels and which, in the case of Table J, are used to compute μ from values of $\omega\tau$, have been taken from Marelius [68Ma49], Nuclear Data Sheets (through Volume B5), Table of Isotopes [67LeHo], or the author (in that order).
Signs	The sign of the nuclear moment given is that actually measured by the experimenter. When the sign cannot be determined, "±" appears before the value.
Uncertainties	Uncertainties quoted for the measured quantities are those given by the experimenter. The uncertainty in the last figure of a number is printed in italics immediately after the number. For example, 0.745 *25* means 0.745 ±0.025.
[ ]	Brackets enclose values of the nuclear spins for which there are no spectroscopic or resonance measurements but which are assumed in order to calculate magnetic moments from g-values. They have also been used to indicate the model-dependent values of Q, Ω, and Q_4 which are obtained by electron scattering.

( ) Parentheses enclose values measured by someone other than the author quoted.

Zero-spin values

Measured zero-spin values for even-even nuclei have been included in the tables. Experiments which gave rise to the now-accepted concept of zero spin for all even-even nuclei can be divided into two groups. The first group proves that the spins of several such nuclei are definitely zero by the absence of alternating intensities in the observed spectra of homonuclear diatomic molecules. The second group, which can only give an upper limit on the interaction constants when no hyperfine splitting is observed, indicates either that the spin is zero or that μ (or Q) is very small. The spin values of zero determined by this second group of experiments are marked by "♦" after the value.

Standard μ_p

μ_p=2.792776 *31*nm. This result is obtained by averaging the values given by the experiments of [51Je10, 51So34, 55Co36, and 56Tr19] which yield μ directly in nuclear magnetons. This leads to a value of μ'_p, not corrected for atomic diamagnetism, of 2.79270 *3* which has been used throughout in the calculation of moments measured relative to that of the proton in samples of water. The uncertainties in the calculated magnetic moments do not include any uncertainty in the value of μ'_p.

Conversion factors

γ_p[in rad•s^{-1}•T^{-1}]×(1.043953 *10*)×10^{-8}=μ_p[in nm]
μ_p[in Bohr magnetons]×(1836.109 *11*)=μ_p[in nm]
See [69TaPa].

Standard frequency ratios

Standard frequency ratios, ν(A)/ν_p, which were used to calculate values of the magnetic moments from relative measurements, are given below. With the exception of the optical pumping (OP) measurement for ^{199}Hg, these ratios were determined by nuclear magnetic resonance (NMR).

^{2}H	0.15350609† *2*	^{45}Sc	0.24291623 *10*
^{7}Li	0.38863618† *8*	^{50}V	0.0997015‡ *10*
^{11}B	0.3208377‡ *2*	^{55}Mn	0.24789167 *6*
^{14}N	0.07226261 *1*	^{73}Ge	0.03488401 *14*
^{23}Na	0.26451775† *7*	^{85}Rb	0.096552095‡ *54*
^{27}Al	0.26056752 *7*	^{127}I	0.200080‡ *14*
^{35}Cl	0.09797858 *5*	^{199}Hg	0.178788 *15* (NMR)
^{39}K	0.0466636‡ *7*		0.1782706 *3* (OP)
^{41}K	0.02561295 *12*		

†From a least squares adjustment of the g-factors for ^{2}H, ^{7}Li, and ^{23}Na with g_p=5.58540 fixed.
‡Weighted average.

Diamagnetic corrections

All magnetic moments are given with the diamagnetic correction, σ, applied. To obtain the corrected g- or μ-value, the uncorrected value was multiplied by the factor, $(1-\sigma)^{-1}_{DK}$, listed in the table below for that element. These values, which are taken from Kopfermann [58Ko90] p450, are based on calculations of Dickinson [50Di10]. The uncertainty in the value of the added correction is assumed to be 5%. New calculations, using Hartree-Fock relativistic electron wave functions, show that the earlier values of σ are too small. Diamagnetic correction factors for some closed shell and closed sub-shell ions can be found in Feiock and Johnson [68Fe05]. Average correction factors for neutral atoms have been calculated by Lin, Johnson and Feiock [72Jo18]. These values include the contribution of the closed-shell core of the atoms and an average shielding factor for the valence electrons in the ground state configuration. This average is made over the ground state multiplet assigning statistical weights to the subshells. The diamagnetic correction factors do not include possible large contributions for individual valence electrons. In view of these better, unpublished values, which were received after most of the moments had been reevaluated, values of $(1-\sigma)^{-1}_{LJF}$ based on the average neutral-atom diamagnetic correction factors of Lin, Johnson and Feiock [72Jo18] are included in the table below.

Table of Diamagnetic Correction Factors

	$(1-\sigma)^{-1}_{DK}$	$(1-\sigma)^{-1}_{LJF}$		$(1-\sigma)^{-1}_{DK}$	$(1-\sigma)^{-1}_{LJF}$		$(1-\sigma)^{-1}_{DK}$	$(1-\sigma)^{-1}_{LJF}$		$(1-\sigma)^{-1}_{DK}$	$(1-\sigma)^{-1}_{LJF}$
$_{1}$H	1.0000278†	1.00001775†	$_{25}$Mn	1.00191	1.002077	$_{49}$In	1.00493	1.005994	$_{74}$W	1.00877	1.01340
$_{2}$He	1.000060	1.00005994	$_{26}$Fe	1.00202	1.002203	$_{50}$Sn	1.00506	1.006203	$_{75}$Re	1.00893	1.01382
$_{3}$Li	1.000101	1.0001048	$_{27}$Co	1.00214	1.002332	$_{51}$Sb	1.00520	1.006419	$_{76}$Os	1.00909	1.01426
$_{4}$Be	1.000149	1.0001531	$_{28}$Ni	1.00226	1.002468	$_{52}$Te	1.00534	1.006639	$_{77}$Ir	1.00925	1.01471
$_{5}$B	1.000199	1.0002068	$_{29}$Cu	1.00238	1.002611	$_{53}$I	1.00548	1.006861	$_{78}$Pt	1.00942	1.01519
$_{6}$C	1.000261	1.0002672	$_{30}$Zn	1.00250	1.002749	$_{54}$Xe	1.00562	1.007092	$_{79}$Au	1.00958	1.01567
$_{7}$N	1.000325	1.0003332	$_{31}$Ga	1.00262	1.002888	$_{55}$Cs	1.00576	1.007325	$_{80}$Hg	1.00974	1.01612
$_{8}$O	1.000395	1.0004059	$_{32}$Ge	1.00274	1.003031	$_{56}$Ba	1.00590	1.007563	$_{81}$Tl	1.00992	1.01663
$_{9}$F	1.000464	1.0004844	$_{33}$As	1.00286	1.003177	$_{57}$La	1.00606	1.007810	$_{82}$Pb	1.01008	1.01717
$_{10}$Ne	1.000547	1.0005693	$_{34}$Se	1.00297	1.003327	$_{58}$Ce	1.00620	1.008075	$_{83}$Bi	1.0102	1.01772
$_{11}$Na	1.000629	1.0006495	$_{35}$Br	1.00309	1.003479	$_{59}$Pr	1.00635	1.008341	$_{84}$Po	1.0104	1.01829
$_{12}$Mg	1.000710	1.0007322	$_{36}$Kr	1.00322	1.003635	$_{60}$Nd	1.00651	1.008615	$_{85}$At	1.0106	1.01889
$_{13}$Al	1.000795	1.0008172	$_{37}$Rb	1.00334	1.003790	$_{61}$Pm	1.00666	1.008897	$_{86}$Rn	1.0107	1.01952
$_{14}$Si	1.000881	1.0009056	$_{38}$Sr	1.00346	1.003950	$_{62}$Sm	1.00683	1.009188	$_{87}$Fr	1.0109	1.02016
$_{15}$P	1.000970	1.0009975	$_{39}$Y	1.00359	1.004114	$_{63}$Eu	1.00698	1.009487	$_{88}$Ra	1.0111	1.02082
$_{16}$S	1.00106	1.001093	$_{40}$Zr	1.00372	1.004282	$_{64}$Gd	1.00714	1.009789	$_{89}$Ac	1.0112	1.02151
$_{17}$Cl	1.00115	1.001191	$_{41}$Nb	1.00385	1.004456	$_{65}$Tb	1.00729	1.010094	$_{90}$Th	1.0114	1.02224
$_{18}$A	1.00124	1.001294	$_{42}$Mo	1.00398	1.004633	$_{66}$Dy	1.00746	1.01043	$_{91}$Pa	1.0116	1.0229‡
$_{19}$K	1.00133	1.001394	$_{43}$Tc	1.00413	1.004815	$_{67}$Ho	1.00762	1.01076	$_{92}$U	1.0117	1.0236‡
$_{20}$Ca	1.00142	1.001495	$_{44}$Ru	1.00427	1.005000	$_{68}$Er	1.00778	1.01110	$_{93}$Np	1.0119‡	1.0244‡
$_{21}$Sc	1.00151	1.001602	$_{45}$Rh	1.00440	1.005194	$_{69}$Tm	1.00794	1.01146	$_{94}$Pu	1.0121‡	1.0251‡
$_{22}$Ti	1.00161	1.001716	$_{46}$Pd	1.00454	1.005389	$_{70}$Yb	1.00810	1.01183	$_{95}$Am	1.0122‡	1.0258‡
$_{23}$V	1.00171	1.001834	$_{47}$Ag	1.00467	1.005586	$_{71}$Lu	1.00827	1.01220	$_{96}$Cm	1.0124‡	1.0265‡
$_{24}$Cr	1.00181	1.001956	$_{48}$Cd	1.00480	1.005789	$_{72}$Hf	1.00844	1.01259	$_{97}$Bk	1.0125‡	1.0274‡
						$_{73}$Ta	1.00860	1.01298			

† For a spherical sample of water the factor is 1.0000260 [66My01]
‡ Value obtained by graphic extrapolation

Hyperfine–structure anomaly

Values of magnetic moments calculated from ratios of hyperfine–structure constants do not include a hyperfine–structure anomaly correction. This correction can range from zero to about 1% [70FuCo]. Some authors include a 1% uncertainty in the value of the magnetic moment to take account of this possible correction.

Q–values

The value of the quadrupole moment given is that quoted by the experimenter. The uncertainty may be as much as 50% or more because of the difficulties in estimating the electric field inhomogeneity at the nucleus, arising from the molecular and electronic environment, and the effect of the polarization of the electron core. Values marked by an asterisk, *, indicate that the experimenter has made some Sternheimer or polarization corrections in computing the moment. For papers on Sternheimer corrections for specific atoms and ions, see [50St32, 51St93, 54Fo28, 54St11, 56St50, 57St39, 63St22, 66St23, 71St12, 71St44].

Compounds

In general, standard chemical notation is used with the exception of using an italicized number for the waters of crystallization and an italicized chemical symbol for an element which is replaced in a doped material. Some specific abbreviations have been used for the following compounds:

CMN – cerium magnesium nitrate
NES – neodymium ethyl sulphate
xIG – x iron garnet.

3. Abbreviations

A– ashta–, 10^{+18}, an abbreviation of the Sanskrit for eighteen

ABMR atomic beam magnetic resonance

a– atto–, 10^{-18}

$a;A,B$ magnetic dipole interaction constant, given in MHz; cm^{-1} respectively. See introduction to Table F, equation (2) for definition of a.

B_o resonance magnetic field for stroboscopic observation of perturbed angular correlation

b electric quadrupole interaction constant, given in MHz. See introduction to Table F, equation (3) for definition of b.

CEx Coulomb excitation

CMN cerium magnesium nitrate, $Ce_2Mg_3(NO_3)_{12}\cdot 24H_2O$

c magnetic octupole interaction constant, given in MHz. See introduction to Table F, equation (4) for definition of c.

DR optical double resonance

d day

ENDOR electron–nuclear double resonance

eqQ electric quadrupole coupling constant
Note: This quantity has the dimensions of energy. However, in microwave and radiofrequency experiments it is customary to refer to it in units of MHz and in atomic spectra experiments, in units of cm^{-1}. To obtain proper energy units one should multiply the given values by h or hc, respectively.

eq_4Q_4 electric hexadecapole interaction constant
Note: This quantity, which is an energy difference, is expressed for convenience in units of MHz in radiofrequency experiments. It is understood that one must multiply the values given by h to convert to energy units.

F total atomic angular momentum, $F=I+J$

F Fermi, 10^{-13}cm

f– femto–, 10^{-15}

G– giga–, 10^{+9}

G,G_2,G_4 angular correlation attenuation coefficients

g or g_I nuclear g–factor, μ/I

g_J electronic g–factor of the atom, μ_J/J

g_s electronic spin g–factor

gs ground state

H magnetic field strength. In most of the tables H has been given in gauss. The SI (Système International) unit for the magnetic field, the tesla, corresponds to 10^4 gauss

H_o external or applied magnetic field

H_{hf} hyperfine magnetic field

H_{int}, H_{eff} internal or effective magnetic field at the nucleus

H_{res} magnetic field at resonance

h hour

hfs hyperfine structure

I nuclear angular momentum or spin

J– jitu–, 10^{+15}, from the Swahili for giant

J total electronic angular momentum

K Knight shift correction

k– kilo–, 10^{+3}

k Boltzmann constant, $(1.38062\ 6)\times10^{-23}$ J/°K [69TaPa]

LX level crossing

M– mega–, 10^{+6}

M_{22} quadrupole matrix element for the 2+ state, $<2+||ME2||2+>$

m– milli–, 10^{-3}

m minute

m_I, m_J magnetic quantum number, projection on H of I and J, respectively

NES neodymium ethyl sulphate, $Nd(C_2H_5SO_4)_3 \cdot 9H_2O$

NMR nuclear magnetic resonance

n– nano–, 10^{-9}

nm nuclear magneton

OP optical pumping

P, P', P'' electric quadrupole interaction constants, given in cm^{-1} in paramagnetic resonance measurements

p– pico–, 10^{-12}

Q nuclear electric quadrupole moment

This quantity exists only for nuclei with $I \geq 1$ and is defined by

$$eQ = \int \rho r^2 (3\ \cos^2\theta\ -\ 1) dV$$

where ρ is the nuclear charge density, and r and θ are the radial and polar coordinates of a volume element, dV, referred to the nuclear center and axis of symmetry.

Q_o intrinsic quadrupole moment

Q_{rot} rotational quadrupole moment

Q_4 nuclear electric hexadecapole moment

This quantity exists only for nuclei with $I \geq 2$ and is defined by

$$eQ_4 = \int \rho r^4 (35 \cos^4\theta - 30 \cos^2\theta + 3) dV$$

where ρ is the nuclear charge density, and r and θ are the radial and polar coordinates of a volume element, dV, referred to the nuclear center and axis of symmetry.

q $-\partial E_z/\partial z$, the first derivative, evaluated at the nucleus, of the electric field along the axis of the molecule or atom

q_4 $-\partial^3 E_z/\partial z^3$, the third derivative, evaluated at the nucleus, of the electric field along the axis of the molecule or atom

SE spin exchange

s second

T- tera-, 10^{+12}

T temperature

T_o repetition period for stroboscopic measurements

$T_{1/2}$ half-life

t_{ave} mean time of observation

X magnetic field attenuation coefficient, defined in terms of the G's [62Go17]

xIG x iron garnet, $Fe_3x_2^{3+}(SiO_4)_3$

y year

β paramagnetic correction factor, $H = \beta H_o$

γ_p gyromagnetic ratio of the proton, $\gamma_p = \omega_{Larmor}/H = 4\pi\mu_p/h$

$\Delta, \Delta E$ energy splitting at low temperature, $\Delta = g\mu_N H/k$

$\Delta\theta$ total angular shift for static and transient fields, $\Delta\theta = \int_o^t \omega dt' = \omega\tau + \phi_t$

μ- micro-, 10^{-6}

μ nuclear magnetic dipole moment

This quantity exists only for nuclei with $I \geq 1/2$ and is defined by

$$\mu = -\int r \cos\theta \ \mathrm{div} M \ dV$$

where M is the total magnetic moment density due to the currents and spins in the nucleus, and r and θ are the radial and polar coordinates of a volume element, dV, referred to the nuclear center and axis of symmetry.

μ_B Bohr magneton, $he/4\pi m_e c = (9.27410\ 6) 10^{-24} J \cdot T^{-1}$ [69TaPa]

μ_B/μ_N ratio of Bohr magneton to nuclear magneton, $\mu_B/\mu_N = M_p/m_e = 1836.109\ 11$ [69TaPa]

μ_N nuclear magneton, $he/4\pi M_p c = (5.05095\ 5) \times 10^{-27} J \cdot T^{-1}$ [69TaPa]

μ_J electronic magnetic moment

ν resonant frequency, $\Delta E/h$; $\omega/2\pi$

$\Delta\nu$ hyperfine–structure splitting
This quantity in rf resonance literature is defined as $\Delta\nu=\Delta W/h$ in units of Hertz where ΔW is the energy separation between adjacent F–states in the absence of an external field. In optical spectroscopy it is defined by $\Delta\nu=\Delta W/hc$ in cm^{-1}(Kaysers).

σ diamagnetic correction factor, see Policies.

τ mean life, $T_{1/2} = \tau \ln 2 = 0.693\tau$

τ_c collision life–time, τ_c=mean free path/ recoil velocity

ϕ_t total transient–field angular shift

Ω nuclear magnetic octupole moment
This quantity exists only for nuclei with $I \geq 3/2$ and is defined by

$$\Omega=(1/2)\int r^3(5\cos^3\theta-3\cos\theta)\mathrm{div}M \; dV,$$

where M is the total magnetic moment density due to the currents and spins in the nucleus and r and θ are the radial and polar coordinates of a volume element, dV, referred to the nuclear center and axis of symmetry.

ω, ω_{Larmor} Larmor angular precession frequency, $2\pi\mu H/hI$ or $2\pi g H\mu_N/h$

ω_o quadrupole resonance angular frequency, $\omega_o=[3/4I(2I-1)]\omega_Q$ for integer I and $\omega_o=[3/2I(2I-1)]\omega_Q$ for half–integer I

ω_Q quadrupole interaction frequency, $\omega_Q=2\pi eqQ/h$

$\omega\tau$ angular shift of the angular correlation or distribution in the presence of a magnetic field

ω_p/ω_{cyc} ratio of the nuclear magnetic resonance frequency of the proton to the cyclotron frequency of the proton
This ratio is equal to the value of the magnetic moment of the proton in the nuclear magnetons.

ω_e/ω_p ratio of the cyclotron frequency of a free electron to the nuclear magnetic resonance frequency of the proton
The reciprocal of this ratio is equal to the value of the proton magnetic moment in Bohr magnetons.

4. Summary of Nuclear Moment Values and Index

Introduction

In this table, a value is given for every nuclear moment for which a measured value has been tabulated in the separate tables. The index letter, under the column headed 'Index', indicates the table in which the measured moment values and auxiliary quantities will be found. Since the individual tables list data for a particular measuring technique, the index also forms a code for the techniques by which moment information has been obtained.

In arriving at summary values of magnetic moments there has been no attempt to average all existing results since the spread of values is not always due to statistical fluctuations but often depends on the circumstances of the measurements. Certain techniques give more reliable results. These are listed below along with the major associated problems, enclosed in ( )'s.

ABMR by direct measurement, doublet separation, or triple resonance (configuration mixing)

ENDOR using materials for which the paramagnetic shielding is small (paramagnetic shielding)

OP (configuration mixing)

NMR using the most ionic materials or extrapolating to zero density or concentration (chemical shifts, Knight shifts for metals)

When the quoted experimental uncertainties and the differences between quoted values are of the same order to magnitude, a weighted average was made:

$$A = \sum_{i=1}^{n} e_i^{-2} (A_i) \; / \sum_i e_i^{-2},$$

where e_i is the quoted uncertainty in the quantity A_i. The uncertainty in the value A was then taken as the larger of the internal or external error:

$$e_{\text{internal}} = (\sum_i e_i^{-2})^{-1/2},$$

$$e_{\text{external}} = [(\sum_i e_i^{-2} (A_i - A)^2) \; / \; (n - 1) \; (\sum_i e_i^{-2})]^{1/2}.$$

The arithmetic average, with an uncertainty given by one standard deviation, was used when the quoted uncertainties in the individual measurements are smaller than ($\approx$ or $<$ 1/10) the differences between the quoted values.

No attempt has been made to estimate uncertainties arising from chemical shifts or configuration mixing. Although these could be as large as 1%, most are of the order of 0.01% or less. No uncertainty is assumed for μ_p. In the summary table the uncertainty is in the last significant figure. The values quoted include the diamagnetic correction which is also tabulated.

For several nuclei the μ-values obtained by two different methods are very consistent but large discrepancies exist between the two sets of values, for example between NMR and OP measurements. Both values are now listed and footnoted. For most purposes, an arithmetic average of the two values could be used. For relative NMR measurements, the NMR-value would give a better measure of the effective moment. (It is interesting to note that the discrepancy between the NMR and OP magnetic moment values for the II-B elements, Zn, Cd, Hg, varies almost linearly with Z.)

It is not simple to estimate the accuracy of a particular quadrupole moment because the value of a quadrupole moment derived from an interaction constant depends upon the assumptions made concerning the electronic configurations, the Sternheimer effect or polarization of the electron distribution by a nonspherical nuclear charge distribution (nuclear quadrupole moment), and the molecular binding. Uncertainties, arising from incomplete knowledge of the molecular binding, may be as large as 50%. Corrections for polarization effects can be of the order of 10-20%, although some have been calculated to be as large as 50%, for example for the 3d configuration of Sc. To obtain the summary value, an average of the data for a particular isotope of an element has been made. This average value is indicated by a superscript "s". The values of the quadrupole moment of the other isotopes of that element, marked by a superscript "r", were calculated using this average and the more accurately determined quadrupole moment ratios.

Magnetic octupole and electric hexadecapole moments have also been included in the summary list.

A few values of Q, Ω, Q_4 have been tabulated which have been derived from electron-scattering experiments. These are model-dependent and are indicated by brackets, [ ], surrounding the value.

Explanation of the Summary Table

Nucleus Chemical symbol with Z-, A-, and N-numbers

Level The energy of the nuclear level, in keV, given to identify the level for which nuclear moment information is presented

Values have been taken from the Nuclear Data Sheets (through B5), Table of Isotopes [67LeHo] or the experimenter's quoted value.

$T_{1/2}$ The half-life of the radioactive nucleus or excited level

Values have been taken from Marelius [68Ma49], Nuclear Data Sheets (through B5), Table of Isotopes [67LeHo] or the experimenter's value.

See Abbreviations for definitions of prefix-symbols used with units.

I Nuclear spin or angular momentum in units of $h/2\pi$

Values enclosed in brackets, [ ], were not determined by spectroscopic or resonance measurements but were assumed in order to interpret data.

μ Nuclear magnetic moments in nuclear magnetons, with diamagnetic correction

When ratios are given, the level–energy of the reference isotope, in keV, is indicated by a subscript.

Diam. Corr. The diamagnetic correction which was added to the last significant figure of the uncorrected magnetic dipole moment to get the value quoted in the previous column

For example, for Li^6, $\mu=\mu_{\text{uncorrected}}+$ Diam. corr. = +0.82195 + 0.00008 = +0.82203

Q Nuclear electric quadrupole moment in barns

Values marked by "s"are averages of the Q–values listed in the individual tables.

Those marked by "r" have been calculated by use of Q^* and measured Q–ratios.

Values marked by "*" include polarization or Sternheimer corrections.

Values enclosed in brackets, [ ], are derived from electron–scattering experiments and are model–dependent.

When two values of Q are listed, the first refers to the value determined by Coulomb excitation reorientation assuming constructive interference and the second, destructive interference of the matrix elements.

When ratios are given, the level–energy of the reference isotope, in keV, is indicated by a subscript.

Ω Nuclear magnetic octupole moment in nm–barns

Values enclosed in brackets, [ ], are derived from electron–scattering experiments and are model–dependent.

Q_4 Nuclear electric hexadecapole moment in barns[2]

Index Directory to tables in which will be found the experimentally determined values on which the Summary Values are based.

- Table A: Neutron, Proton, and Anti–Proton Moments
- Table B: Nuclear Moments by Paramagnetic Resonance
- Table C: Nuclear Moments by Microwave Spectroscopy
- Table D: Nuclear Moments by Quadrupole Resonance
- Table E: Nuclear Moments by Nuclear Magnetic Resonance
- Table F: Nuclear Moments by Atomic and Molecular Beams
- Table G: Nuclear Moments by Optical Spectroscopy
- Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques
- Table I: Nuclear Moments by Mössbauer Spectroscopy †
- Table J: Nuclear Moments by Nuclear Orientation, Perturbed Angular Correlations, and Nuclear Specific Heat Measurements
- Table K: Nuclear Moments by Coulomb Excitation Reorientation and Other Techniques

† For early data see [69FuCo]. See J. Stevens. J. Phys. Chem. Ref. Data **5**, 1093 (1976). for recent data and evaluation.

Summary of Nuclear Moment Values and Index

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{1}_{0}n_{1}$		12m	1/2	−1.91312					A
$^{\bar{1}}_{1}H_{0}$				−1.8					A
$^{1}_{1}H_{0}$			1/2	+2.79278[j]	8				A B F G H
$^{2}_{1}H_{1}$			1	+0.85742	2	+0.0028			E F G H
$^{3}_{1}H_{2}$		12y	1/2	+2.9789	1				E F G H
$^{3}_{2}He_{1}$			1/2	−2.1276	1				E F G H
$^{3}_{2}He^{+}_{1}$			1/2						F H
$^{4}_{2}He_{2}$			0						G
$^{6}_{2}He_{4}$		0.8s	0♦						F
$^{6}_{3}Li_{3}$			1	+0.82203	8	−0.0008[r]			E F H
$^{6}_{3}Li^{+}_{3}$			1						H
$^{7}_{3}Li_{4}$			3/2	+3.25636	33	−0.04[s]	[+0.09]		E F G H K
$^{8}_{3}Li_{5}$		0.8s	2	+1.6532	2				E H J
$^{9}_{4}Be_{5}$			3/2	−1.17745	18	+0.05	[−0.04]		E F K
$^{8}_{5}B_{3}$		770ms	[2]	±1.0355[p]	2				E J
$^{10}_{5}B_{5}$			3	+1.8006	4	+0.085*[r]	[<±0.03]		C D E F J K
$^{10}_{5}B_{5}$	720	0.7ns	[1]	+0.6					J
$^{11}_{5}B_{6}$			3/2	+2.6885	5	+0.041*[s]	[+0.08]		C D E F J K
$^{12}_{5}B_{7}$		20.4ms	1	+1.0028[g]		+0.018			E J
$^{13}_{5}B_{8}$		19ms	[3/2]	±3.1771[g]		±0.05			E J
$^{11}_{6}C_{5}$		21m	3/2	(−?)0.99		(+?)0.031*			F
$^{12}_{6}C_{6}$			0						G
$^{13}_{6}C_{7}$			1/2	+0.7024	2				E F G
$^{14}_{6}C_{8}$		5.6ky	0						G
$^{12}_{7}N_{5}$		12ms	1	±0.457					E J
$^{13}_{7}N_{6}$		10m	1/2	±0.3221	1				F
$^{14}_{7}N_{7}$			1	+0.40375	13	+0.01			C E F G H
$^{14}_{7}N_{7}$	5830	12.4ps	[3]	±1.5 to 2.6					J
$^{15}_{7}N_{8}$			1/2	−0.2831	1				E F G H
$^{15}_{8}O_{7}$		2.1m	1/2	±0.7189	3				F
$^{16}_{8}O_{8}$			0						G
$^{17}_{8}O_{9}$			5/2	−1.8937	7	−0.026*			B C E
$^{18}_{8}O_{10}$			0						C
$^{18}_{8}O_{10}$	1980	3.3ps	[2]	±0.4 to 0.7					J
$^{17}_{9}F_{8}$		66s	[5/2]	±4.722	2				E J
$^{18}_{9}F_{9}$	1125	153ns	[5]	+2.85					J
$^{19}_{9}F_{10}$			1/2	+2.6288	12				B C E F G H
$^{19}_{9}F_{10}$	197	89ns	[5/2]	+3.60		±0.11[s]			J
$^{20}_{9}F_{11}$		11s	[2]	+2.094	1	±0.06[r]			E J
$^{19}_{10}Ne_{9}$		18s	1/2	−1.887	1				F
$^{19}_{10}Ne_{9}$	238	17.7ns	[5/2]	−0.74					J
$^{20}_{10}Ne_{10}$			0♦						F G
$^{20}_{10}Ne_{10}$	1630	0.7ps	[2]			−0.25			K
$^{21}_{10}Ne_{11}$			3/2	−0.66176	36	+0.09			F G
$^{22}_{10}Ne_{12}$			0♦						G
$^{22}_{10}Ne_{12}$	1275	3ps	[2]			−0.21			K
$^{23}_{10}Ne_{13}$		38s	[5/2]	−1.08					F

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{20}_{11}Na_9$		408ms	2	±0.369					H J
$^{21}_{11}Na_{10}$		23s	3/2	+2.3861	15				F H
$^{22}_{11}Na_{11}$		2.6y	3	+1.746	1				F
$^{22}_{11}Na_{11}$	583	243ns	[1]	+0.55					J
$^{23}_{11}Na_{12}$			3/2	+2.21740[f] (+2.21755)	139	+0.10*			E F G H
$^{24}_{11}Na_{13}$		15h	4	+1.690	1				F
$^{24}_{12}Mg_{12}$			0♦						G
$^{24}_{12}Mg_{12}$	1368	1ps	[2]			−0.27			K
$^{25}_{12}Mg_{13}$			5/2	−0.8554	6	+0.22			B E F G
$^{26}_{12}Mg_{14}$			0♦						G
$^{27}_{13}Al_{14}$			5/2	+3.6413	29	+0.15*[b]	[±0.3]		E F G H K
$^{28}_{14}Si_{14}$			0♦						C E
$^{28}_{14}Si_{14}$	1779	0.5ps	[2]				+0.17		K
$^{29}_{14}Si_{15}$			1/2	−0.55526	49				C E
$^{30}_{14}Si_{16}$			0♦						C
$^{29}_{15}P_{14}$		4.2s	[1/2]	±1.235	1				E J
$^{30}_{15}P_{15}$		2.6m	1						F
$^{31}_{15}P_{16}$			1/2	+1.1317	11				B C E F G
$^{32}_{15}P_{17}$		14d	1	−0.2523	2				B
$^{32}_{16}S_{16}$			0						G
$^{32}_{16}S_{16}$	2237	0.25ps	[2]			−0.2			K
$^{33}_{16}S_{17}$			3/2	+0.6435	7	−0.055[s]			C D E
$^{34}_{16}S_{18}$			0♦						C
$^{35}_{16}S_{19}$		87d	3/2	+1.00 or −1.07		+0.038[r]			C D
$^{36}_{16}S_{20}$			0♦						C
$^{35}_{17}Cl_{18}$			3/2	+0.82181	94	−0.10*[s]	−0.016*[s]		C D E F
$^{36}_{17}Cl_{19}$		0.3My	2	+1.2853	14	−0.021*[r]			C E
$^{37}_{17}Cl_{20}$			3/2	+0.68407	78	−0.079*[r]	−0.013*[r]		C D E F
$^{35}_{18}Ar_{17}$		1.8s	[3/2]	+0.632[g]					F
$^{36}_{18}Ar_{18}$			0♦						G
$^{36}_{18}Ar_{18}$	1980	?	[2]			+0.11			K
$^{37}_{18}Ar_{19}$		34d	3/2	+0.95					G
$^{37}_{18}Ar_{19}$	1610	4.5ns	[7/2]	−1.33					J
$^{38}_{18}Ar_{20}$			0♦						G
$^{39}_{18}Ar_{21}$		265y	7/2	−1.3					G
$^{40}_{18}Ar_{22}$			0♦						G
$^{40}_{18}Ar_{22}$	1460	0.8ps	[2]			−0			K
$^{36}_{19}K_{17}$		245ms	2	±0.548	1				H J
$^{37}_{19}K_{18}$		1.2s	3/2	+0.2032	3				H
$^{37}_{19}K_{18}$	1380	10.5ns	[7/2]	+5.2					J
$^{38}_{19}K_{19}$		7.7m	3	+1.374	2				F
$^{39}_{19}K_{20}$			3/2	+0.39143[f] (+0.39147)	52	+0.049*[s]			E F G H
$^{40}_{19}K_{21}$		1.3Gy	4	−1.2981	17	−0.061*[r]			D F H
$^{41}_{19}K_{22}$			3/2	(+0.21487)[f]	28	+0.060*[r]			E F H
$^{41}_{19}K_{22}$	1290	7.3ns	[7/2]	+4.41					J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{42}_{19}K_{23}$		12h	2	−1.1424	15				F
$^{43}_{19}K_{24}$		22h	3/2	±0.163					F
$^{45}_{19}K_{26}$		20m	3/2	±0.1734	2				F
$^{40}_{20}Ca_{20}$			0[♦]						G
$^{40}_{20}Ca_{20}$	3740	41ps	[3]	+0.4[P]					J
$^{40}_{20}Ca_{20}$	4490	272ps	[5]	+1.6[P]					J
$^{41}_{20}Ca_{21}$		110ky	7/2	−1.5946	23				E
$^{42}_{20}Ca_{22}$	3190	5.5ns	[6]	−2.8					J
$^{43}_{20}Ca_{23}$			7/2	−1.3172	19	<±0.2			E F G H
$^{41}_{21}Sc_{20}$		0.59s	[7/2]	±5.43[P]	1				E J
$^{43}_{21}Sc_{22}$		3.9h	7/2	+4.62	1	−0.26[r]			F
$^{43}_{21}Sc_{22}$	3123	450ns	[19/2]	+3.14					J
$^{44}_{21}Sc_{23}$		3.9h	2	+2.56		+0.11[r]			F
$^{44}_{21}Sc_{23}$	69	153ns	[1]	+0.34		±0.18*			J
$^{44}_{21}Sc_{23}$	270	2.4d	6	+3.88	1	−0.20[r]			F
$^{45}_{21}Sc_{24}$			7/2	+4.7559	72	−0.22[S]			E F G
$^{46}_{21}Sc_{25}$		84d	4	+3.03		+0.12[r]			F
$^{47}_{21}Sc_{26}$		3.4d	7/2	+5.34	1	−0.22[r]			F
$^{47}_{21}Sc_{26}$	767	274ns	[3/2]	±0.35					J
$^{48}_{21}Sc_{27}$		1.8d	6						F
$^{45}_{22}Ti_{23}$		3.1h	7/2	±0.095		~±0.02[r] μ/Q positive			F
$^{46}_{22}Ti_{24}$	889	7ps	[2]			−0.2			K
$^{47}_{22}Ti_{25}$			5/2	−0.78846	127	+0.29[S]			B E F
$^{48}_{22}Ti_{26}$	983	3.6ps	[2]			−0.20			K
$^{49}_{22}Ti_{27}$			7/2	−1.10414	177	+0.24[r]			B E F
$^{50}_{22}Ti_{28}$	1550	1ps	[2]			~0			K
$^{47}_{23}V_{24}$		31m	3/2						F
$^{48}_{23}V_{25}$		16d	4	±1.6					F J
$^{48}_{23}V_{25}$	306	7.09ns	[2]	+0.38					J
$^{49}_{23}V_{26}$		330d	7/2	±4.5[P]					B
$^{50}_{23}V_{27}$		>40Jy	6	+3.3470	57	±0.06			B E
$^{51}_{23}V_{28}$			7/2	+5.1485	88	−0.05[b]			B E F G
$^{51}_{23}V_{28}$	320	173ps	[5/2]	+4.0					J
$^{49}_{24}Cr_{25}$		42m	5/2	±0.476	1				F
$^{50}_{24}Cr_{26}$	783	8.4ps	[2]			−0.3			K
$^{51}_{24}Cr_{27}$		28d	7/2	±0.934	2				F
$^{51}_{24}Cr_{27}$	749	7.5ns	[3/2]	±1.1					J
$^{52}_{24}Cr_{28}$	1434	0.90ps	[2]			[−0.08]			K
$^{53}_{24}Cr_{29}$			3/2	−0.4735[E] (−0.4744)	9	+0.03			B E F H K
$^{54}_{24}Cr_{30}$	834	8.9ps	[2]			−0.1			K
$^{51}_{25}Mn_{26}$		45m	5/2	±3.56[E]					F
$^{52}_{25}Mn_{27}$		5.7d	6	+3.059[E]	6	+0.6[r]			B E F J
$^{52}_{25}Mn_{27}$	383	21m	2	±0.0076					F
$^{53}_{25}Mn_{28}$		2My	7/2	±5.02[E]	1				B
$^{54}_{25}Mn_{29}$		312d	3	+3.278[E]	6	+0.4[r]			B E J
$^{55}_{25}Mn_{30}$			5/2	+3.449[E] (+3.4680)	7 66	+0.4[S]			B C E F G H
$^{56}_{25}Mn_{31}$		2.6h	3	+3.223[E]	6				F J

Summary of Nuclear Moment Values and Index – Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{54}_{26}Fe_{28}$	1408	1.0ps	[2]	+2.9					J
$^{54}_{26}Fe_{28}$	2950	1.22ns	[6]	±8.2					J
$^{56}_{26}Fe_{30}$	847	6.9ps	[2]	+1.2		−0.26			J K
$^{57}_{26}Fe_{31}$			1/2	+0.09042[E] (+0.09060)	18				B E F K
$^{57}_{26}Fe_{31}$	14.4	~10ns	[3/2]	−0.1550	3	+0.19*			I
$^{57}_{26}Fe_{31}$	136	8.8ns	[5/2]	+0.92					I J
$^{57}_{26}Fe_{31}$	367	7ps	[3/2]	<0.5					I J
$^{57}_{26}Fe_{31}$	707	3ps	[5/2]	<±1					J
$^{58}_{26}Fe_{32}$	811	6.4ps	[2]	+1.1					J
$^{59}_{26}Fe_{33}$		45d	3/2	±1.1					F J
$^{55}_{27}Co_{28}$		18h	[7/2]	±4.5					J
$^{56}_{27}Co_{29}$		77d	4	±3.83	1				B
$^{57}_{27}Co_{30}$		270d	7/2	+4.72	1	+0.5[r]			B E J
$^{57}_{27}Co_{30}$	1378	19.4ps	[3/2]	+3					J
$^{58}_{27}Co_{31}$		71.3d	2	+4.04	1	+0.2[r]			B E J
$^{58}_{27}Co_{31}$	54	10.2μs	[4]	+4.18					J
$^{59}_{27}Co_{32}$			7/2	+4.616	10	+0.38[S]			B E F G
$^{59}_{27}Co_{32}$	1292	564ps	[3/2]	+1.8					J
$^{60}_{27}Co_{33}$		5.26y	5	+3.79	1	+0.4[r]			B E J
$^{60}_{27}Co_{33}$	58	10.5m	2	+4.4		+0.3[r]			F
$^{58}_{28}Ni_{30}$	1450	0.67ps	[2]			−0.14			K
$^{60}_{28}Ni_{32}$	1330	0.80ps	[2]			[−0.10]			K
$^{61}_{28}Ni_{33}$			3/2	−0.7498	17	+0.16*			B E F G
$^{61}_{28}Ni_{33}$	68	5.2ns	[5/2]	+0.42					I
$^{62}_{28}Ni_{34}$	1170	1.57ps	[2]			+0.2			K
$^{63}_{28}Ni_{35}$	87.2	1.72μs	[5/2]	+0.752[g]					J
$^{64}_{28}Ni_{36}$	1350	0.78ps	[2]			+0.3			K
$^{60}_{29}Cu_{31}$		24m	2	+1.219	3				F
$^{61}_{29}Cu_{32}$		3.3h	3/2	+2.13					F
$^{62}_{29}Cu_{33}$		9.9m	1	−0.380	1				F
$^{62}_{29}Cu_{33}$	41	4.80ns	[2]	±1.3					J
$^{62}_{29}Cu_{33}$	390	11.5ns	[3]	±1.9					J
$^{63}_{29}Cu_{34}$			3/2	+2.2228[f] (+2.2262)	53	−0.211*[r]			B D E F G H
$^{64}_{29}Cu_{35}$		13h	1	−0.216					F
$^{64}_{29}Cu_{35}$	1590	20.4ns	[6]	+1.04					J
$^{65}_{29}Cu_{36}$			3/2	+2.3812[f] (+2.3849)	57	−0.195*[S]			B D E F G H
$^{66}_{29}Cu_{37}$		5.2m	1	−0.281	1				F
$^{66}_{29}Cu_{37}$	1154	596ns	[6]	+1.04					J
$^{63}_{30}Zn_{33}$		38m	3/2	−0.2816	7	+0.29[r]			H
$^{64}_{30}Zn_{34}$			0♦						G
$^{64}_{30}Zn_{34}$	992	2.7ps	[2]			[−0.14]			K
$^{65}_{30}Zn_{35}$		245d	5/2	+0.7692	19	−0.024[r]			H
$^{66}_{30}Zn_{36}$			0♦						G
$^{67}_{30}Zn_{37}$			5/2	+0.87524[d] (+0.8756)	218 22	+0.16[S]			E F G H
$^{67}_{30}Zn_{37}$	185	1.01ns	[3/2]	+0.4					J
$^{67}_{30}Zn_{37}$	605	340ns	[9/2]	−1.09					J
$^{68}_{30}Zn_{38}$			0♦						G
$^{70}_{30}Zn_{40}$	884	3ps	[2]			[−0.2]			K

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{66}_{31}Ga_{35}$		9.5h	0♦						F
$^{67}_{31}Ga_{36}$		78h	3/2	+1.849[f]	5	+0.22[r]			F
$^{68}_{31}Ga_{37}$		68m	1	±0.0117		±0.031[r]			F
$^{69}_{31}Ga_{38}$			3/2	+2.0145[f]	53	+0.19[S]	+0.14		C D E F G
				(+2.0161)					
$^{70}_{31}Ga_{39}$		21m	1						F
$^{71}_{31}Ga_{40}$			3/2	+2.5597[f]	67	+0.12[r]	+0.18		C D E F G
				(+2.5617)					
$^{72}_{31}Ga_{41}$		14h	3	−0.1321[f]	3	+0.59[r]			F
$^{67}_{32}Ge_{35}$	734	70ns	[9/2]	−0.94		Q/Q^{69}_{398}=1.22			J
$^{69}_{32}Ge_{37}$		38h	5/2	±0.73		±0.03[r]			F
						μ/Q positive			
$^{69}_{32}Ge_{37}$	398	3μs	[9/2]	−1.001	3				J
$^{70}_{32}Ge_{38}$			0♦						C
$^{70}_{32}Ge_{38}$	1040	1.3ps	[2]	+1.8		~0			J K
$^{71}_{32}Ge_{39}$		11d	1/2	+0.546	1				F
$^{71}_{32}Ge_{39}$	175	79ns	[5/2]	+1.02		Q/Q^{69}_{398}=0.22			J
$^{71}_{32}Ge_{39}$	198	20.2ms	[9/2]	−1.040	3	±0.3			J
$^{72}_{32}Ge_{40}$			0♦						C
$^{72}_{32}Ge_{40}$	835	3.14ps	[2]	+1.2					J
$^{73}_{32}Ge_{41}$			9/2	−0.87918	240	−0.18			C E F
$^{74}_{32}Ge_{42}$			0♦						C
$^{74}_{32}Ge_{42}$	596	12ps	[2]	+0.9		~0			J K
$^{75}_{32}Ge_{43}$		82m	1/2	+0.51					F
$^{76}_{32}Ge_{44}$			0♦						C
$^{76}_{32}Ge_{44}$	563	17.6ps	[2]	+0.7		−0.2;~0			J K
$^{70}_{33}As_{37}$		55m	4						F
$^{72}_{33}As_{39}$		26h	2	±2.2					F
$^{72}_{33}As_{39}$	215	80ns	[3]	+1.58					J
$^{73}_{33}As_{40}$	66.9	5.0ns	[5/2]	+1.6					J
$^{73}_{33}As_{40}$	427	5.8μs	[9/2]	+5.21	1				E J
$^{74}_{33}As_{41}$	274	26.8ns	[3]	+2.43	1				J
$^{75}_{33}As_{42}$			3/2	+1.439	4	+0.29			B C D E F G
$^{75}_{33}As_{42}$	265	11.9ps	[3/2]	+1.0					J
$^{75}_{33}As_{42}$	280	0.28ns	[5/2]	+0.9					J
$^{76}_{33}As_{43}$		26h	2	−0.905	2	±7 *8*			B F
$^{76}_{33}As_{43}$	45	2.60μs	[1]	+0.559	1				J
$^{77}_{33}As_{44}$	473	116μs	[9/2]	±5.52	1				J
$^{74}_{34}Se_{40}$			0♦						C
$^{75}_{34}Se_{41}$		120d	5/2			+1.0[r]			C
$^{76}_{34}Se_{42}$			0♦						C G
$^{76}_{34}Se_{42}$	559	11.1ps	[2]	+0.8					J
$^{77}_{34}Se_{43}$			1/2	+0.534	1				C E G
$^{77}_{34}Se_{43}$	249	9.4ns	[5/2]	+1.2					J
$^{77}_{34}Se_{43}$	440	24ps	[5/2]	+1.0					J
$^{78}_{34}Se_{44}$			0						C G
$^{78}_{34}Se_{44}$	614	8.6ps	[2]	+0.8					J
$^{79}_{34}Se_{45}$		60ky	7/2	−1.02		+0.8[S]			C
$^{80}_{34}Se_{46}$			0						C G
$^{80}_{34}Se_{46}$	666	8.05ps	[2]	+0.8					J
$^{82}_{34}Se_{48}$			0♦						C G
$^{82}_{34}Se_{48}$	655	11.3ps	[2]	+0.9					J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{76}_{35}Br_{41}$		17h	1	±0.548	2	±0.30*[r]			F
						μ/Q negative			
$^{77}_{35}Br_{42}$		58h	3/2						F
$^{78}_{35}Br_{43}$	181	100μs	[4]	+4.11	1				E J
$^{79}_{35}Br_{44}$			3/2	+2.1055	65	+0.37*[S]	+0.09*		C D E F G
$^{80}_{35}Br_{45}$		18m	1	±0.514	2	±0.22*[r]			F
						μ/Q positive			
$^{80}_{35}Br_{45}$	85	4.5h	5	+1.317	4	+0.84*[r]			F
$^{81}_{35}Br_{46}$			3/2	+2.2696	70	+0.31*[r]	+0.10*[r]		C D E F G
$^{81}_{35}Br_{46}$	540	35μs	[9/2]	±5.77	2				E J
$^{82}_{35}Br_{47}$		36h	5	+1.626	5	±0.84*[r]			F J
$^{79}_{36}Kr_{43}$	148	77.7ns	[5/2]	+1.12					J
$^{82}_{36}Kr_{46}$			0♦						G
$^{83}_{36}Kr_{47}$			9/2	−0.9703	31	+0.26[S]	−0.18		E F G
$^{83}_{36}Kr_{47}$	9.3	143ns	[7/2]	−1.8		+0.44[r]			I J
$^{84}_{36}Kr_{48}$			0♦						G
$^{85}_{36}Kr_{49}$		11y	9/2	±1.005	3	+0.43[r]			F G
$^{86}_{36}Kr_{50}$			0♦						G
$^{81}_{37}Rb_{44}$		4.7h	3/2	+2.05					F
$^{81}_{37}Rb_{44}$	85	32m	9/2						F
$^{82}_{37}Rb_{45}$	30	6.3h	5	+1.643	6				F
$^{83}_{37}Rb_{46}$		83d	5/2	+1.42					F
$^{84}_{37}Rb_{47}$		33d	2	−1.32					F
$^{85}_{37}Rb_{48}$			5/2	+1.3524[df]	45	+0.26*[S]			E F G H
				(+1.3527)					
$^{86}_{37}Rb_{49}$		19d	2	−1.691	6				F
$^{87}_{37}Rb_{50}$		47Gy	3/2	+2.7500[df]	92	+0.13*[r]			E F G H
				(+2.7506)					
$^{88}_{37}Rb_{51}$		18m	2	±0.51					F
$^{86}_{38}Sr_{48}$			0♦						G
$^{86}_{38}Sr_{48}$	?	460ns	[8]	−1.9					J
$^{87}_{38}Sr_{49}$			9/2	−1.093	4	+0.3			B E F G H
$^{88}_{38}Sr_{50}$			0♦						G
$^{86}_{39}Y_{47}$	243	28.5ns	[2]	−1.06					J
$^{89}_{39}Y_{50}$			1/2	−0.13733	49				E F G H
$^{90}_{39}Y_{51}$		64h	2	−1.63	1	−0.15			F
$^{91}_{39}Y_{52}$		58d	1/2	±0.164	1				F
$^{90}_{40}Zr_{50}$	3590	130ns	[8]	±10.8					J
$^{91}_{40}Zr_{51}$			5/2	−1.3028	48				E G
$^{91}_{40}Zr_{51}$	>2265	29.0ns	[15/2]	±5.3					J
$^{91}_{41}Nb_{50}$	2378	10.0ns	[17/2]	±10.6					J
$^{93}_{41}Nb_{52}$			9/2	+6.167	24	−0.22			B E G
$^{95}_{41}Nb_{54}$		35d	[9/2]	±6.3					J
$^{92}_{42}Mo_{50}$			0♦						G
$^{92}_{42}Mo_{50}$	2761	190ns	[8]	±11.2					J
$^{94}_{42}Mo_{52}$			0♦						G
$^{94}_{42}Mo_{52}$	2953	97.7ns	[8]	+10.5					J
$^{95}_{42}Mo_{53}$			5/2	−0.9135	36	±0.12			B E G
$^{95}_{42}Mo_{53}$	204	760ps	[3/2]	−0.4					J
$^{96}_{42}Mo_{54}$			0♦						G

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{97}_{42}Mo_{55}$			5/2	−0.9327	37	±1.1			B E G
$^{98}_{42}Mo_{56}$			0♦						G
$^{98}_{42}Mo_{56}$	787	3.5ps	[2]	+0.7					J
$^{100}_{42}Mo_{58}$			0♦						G
$^{100}_{42}Mo_{58}$	536	10ps	[2]	+0.7					J
$^{96}_{43}Tc_{53}$		4.3d	6	±4.6					E J
$^{99}_{43}Tc_{56}$		210ky	9/2	+5.681	23	+0.3			B E G
$^{99}_{43}Tc_{56}$	141	192ps	[7/2]	+5					J
$^{99}_{43}Tc_{56}$	181	3.59ns	[5/2]	+3.3					J
$^{98}_{44}Ru_{54}$	654	5.9ps	[2]	+0.8					J
$^{99}_{44}Ru_{55}$			5/2	−0.62		$\lvert Q/Q_{90}\rvert \leq 0.3$			B G I J
$^{99}_{44}Ru_{55}$	90	20.7ns	3/2	−0.28		$\geq \pm 0.1$			I J
$^{100}_{44}Ru_{56}$	540	11.9ps	[2]	+1.0					J
$^{101}_{44}Ru_{57}$			5/2	−0.68					B G
$^{101}_{44}Ru_{57}$	127	550ps	[3/2]	−0.31					J
$^{102}_{44}Ru_{58}$	475	17.6ps	[2]	+0.74					J
$^{104}_{44}Ru_{60}$	358	58ps	[2]	+0.8					J
$^{100}_{45}Rh_{55}$	74.8	215ns	[2]	+4.32	2				J
$^{103}_{45}Rh_{58}$			1/2	−0.0883	4				E G
$^{103}_{45}Rh_{58}$	93	1.13ns	[9/2]	±6.2					J
$^{103}_{45}Rh_{58}$	298	6.3ps	[3/2]	+1[b]					J
$^{103}_{45}Rh_{58}$	360	59ps	[5/2]	+1.2[b]					J
$^{104}_{46}Pd_{58}$	556	9.7ps	[2]	+0.7		−0.3;−0			J K
$^{105}_{46}Pd_{59}$			5/2	−0.642	3	+0.8			E F G
$^{106}_{46}Pd_{60}$	512	12.7ps	[2]	+0.73		−0.5;−0.3			J K
$^{106}_{46}Pd_{60}$	1128	2.5ps	[2]	+0.7					J
$^{108}_{46}Pd_{62}$	434	23.8ps	[2]	+0.77		−0.6;−0.4			J K
$^{110}_{46}Pd_{64}$	374	45.8ps	[2]	+0.70		−0.3			J K
$^{101}_{47}Ag_{54}$		9m	9/2						F
$^{102}_{47}Ag_{55}$		13m	5						F
$^{102}_{47}Ag_{55}$	?	7m	2	+4.2					F
$^{103}_{47}Ag_{56}$		66m	7/2	+4.45[a]					F
$^{104}_{47}Ag_{57}$		1.2h	5	+4.0					F
$^{104}_{47}Ag_{57}$	~20	27m	2	+3.7					F
$^{105}_{47}Ag_{58}$		40d	1/2	±0.101					F
$^{106}_{47}Ag_{59}$		24m	1	+2.9					F
$^{106}_{47}Ag_{59}$	~300	8.3d	6						F
$^{107}_{47}Ag_{60}$			1/2	−0.1135	5				E F G
$^{107}_{47}Ag_{60}$	325	5.9ps	[3/2]	+0.7					J
$^{107}_{47}Ag_{60}$	423	34ps	[5/2]	+0.9					J
$^{108}_{47}Ag_{61}$		2.4m	1	+2.80	1				F
$^{109}_{47}Ag_{62}$			1/2	−0.1305	6				E F G
$^{109}_{47}Ag_{62}$	88	40s	7/2	±4.3					F
$^{109}_{47}Ag_{62}$	309	5.2ps	[3/2]	+0.9					J
$^{109}_{47}Ag_{62}$	414	33ps	[5/2]	+0.9					J
$^{110}_{47}Ag_{63}$		24.4s	1	+2.72	1				E F J
$^{110}_{47}Ag_{63}$	116	253d	6	+3.604	17				B F J
$^{111}_{47}Ag_{64}$		7.5d	1/2	−0.145	1				F
$^{112}_{47}Ag_{65}$		3.2h	2	±0.054					F
$^{113}_{47}Ag_{66}$		5.3h	1/2	±0.159	1				F

Summary of Nuclear Moment Values and Index – Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{105}_{48}Cd_{57}$		55m	5/2	−0.738	4	+0.43[r]			H
$^{106}_{48}Cd_{58}$	633	6ps	[2]			−0.8			K
$^{107}_{48}Cd_{59}$		6.7h	5/2	−0.61443[d]	294	+0.68[r]			H
$^{108}_{48}Cd_{60}$	633	5ps	[2]			−0.8			K
$^{109}_{48}Cd_{61}$		470d	5/2	−0.82701[d]	395	+0.69[S]			H
$^{109}_{48}Cd_{61}$	469	8.9μs	[11/2]	−1.10	1				J
$^{110}_{48}Cd_{62}$			0♦						G
$^{110}_{48}Cd_{62}$	656	5.0ps	[2]	+0.7		−0.5;−0.3[b]			J K
$^{111}_{48}Cd_{63}$			1/2	−0.59428[d]	284				E F G H
				(−0.59500)					
$^{111}_{48}Cd_{63}$	247	84ns	[5/2]	−0.793	4	+1			J
$^{111}_{48}Cd_{63}$	397	49m	11/2	−1.1040	53	−0.85[r]			H
$^{112}_{48}Cd_{64}$			0♦						G
$^{112}_{48}Cd_{64}$	617	6.2ps	[2]	+0.7		−0.2			J K
$^{113}_{48}Cd_{65}$		>3Jy	1/2	−0.62167[d]	297				E F G H
				(−0.62245)					
$^{113}_{48}Cd_{65}$	265	14y	11/2	−1.0871[d]	52	−0.71[r]			H
$^{114}_{48}Cd_{66}$			0♦						G
$^{114}_{48}Cd_{66}$	558	9.0ps	[2]	+0.8		−0.32			J K
$^{115}_{48}Cd_{67}$		2.3d	1/2	−0.6478[d]	31				H
$^{115}_{48}Cd_{67}$	180	43d	11/2	−1.0400[d]	50	−0.55[r]			H
$^{116}_{48}Cd_{68}$			0♦						G
$^{116}_{48}Cd_{68}$	513	13.7ps	[2]	+0.8		−0.9[b]			J K
$^{109}_{49}In_{60}$		4.3h	9/2	+5.53	3	+0.85[r]			F
$^{110}_{49}In_{61}$		66m	2	+4.36	2	+0.36[r]			F
$^{110}_{49}In_{61}$	?	4.9h	7	+10.4 or		−0.21[r] or			F
				−10.7		+0.22[r]			
$^{111}_{49}In_{62}$		2.8d	9/2	+5.53	3	+0.84[r]			F
$^{112}_{49}In_{63}$		14m	1	+2.81	1	+0.089[r]			F
$^{112}_{49}In_{63}$	155	21m	4						F
$^{113}_{49}In_{64}$			9/2	+5.5229	271	+0.82[r]	+0.57		E F G H
$^{113}_{49}In_{64}$	393	1.7h	1/2	−0.210	1				F
$^{114}_{49}In_{65}$		72s	[1]	≤±1.7					J
$^{114}_{49}In_{65}$	190	50d	5	+4.7					F
$^{115}_{49}In_{66}$		600Ty	9/2	+5.5348	272	+0.83[S]	+0.56		C E F G H
$^{115}_{49}In_{66}$	335	4.5h	1/2	−0.244	1				F
$^{116}_{49}In_{67}$		14s	[1]	±2.786	14	±0.1			E J
$^{116}_{49}In_{67}$	70	54m	5	+4.3					F
$^{117}_{49}In_{68}$		45m	9/2						F
$^{117}_{49}In_{68}$	310	1.9h	1/2	−0.2515	12				F
$^{117}_{49}In_{68}$	660	60ns	[3/2]	+1.0		±0.64			J
$^{112}_{50}Sn_{62}$	1257	0.3ps	[2]			~0			K
$^{113}_{50}Sn_{63}$		118d	1/2	±0.88					F
$^{114}_{50}Sn_{64}$	~3100	700ns	[9,7?]	g=−0.081					J
$^{115}_{50}Sn_{65}$			1/2	−0.9178	46				E F G
$^{115}_{50}Sn_{65}$	619	3.3μs	[7/2]	<±1.0					J
$^{115}_{50}Sn_{65}$	726	159μs	[11/2]	−1.368	7	±0.8			E J
$^{116}_{50}Sn_{66}$			0♦						G
$^{116}_{50}Sn_{66}$	1290	0.4ps	[2]			[−0.1]			K
$^{116}_{50}Sn_{66}$	2369	350ns	[5]	−0.32					J
$^{117}_{50}Sn_{67}$			1/2	−0.9999	50				E F G
$^{118}_{50}Sn_{68}$			0♦						G
$^{118}_{50}Sn_{68}$	1230	0.5ps	[2]			−0.2			K
$^{118}_{50}Sn_{68}$	2320	21.7ns	[5]	−0.32					J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{119}_{50}Sn_{69}$			1/2	−1.0461	53				B E F G
$^{119}_{50}Sn_{69}$	24	18.5ns	[3/2]	+0.68		−0.07			I
$^{120}_{50}Sn_{70}$			0♦						G
$^{120}_{50}Sn_{70}$	1170	0.5ps	[2]			~0			K
$^{120}_{50}Sn_{70}$	2300	5.5ns	[5]	−0.30		±0.02			J
$^{121}_{50}Sn_{71}$		27h	3/2	±0.699	4	±0.08			F
						μ/Q negative			
$^{122}_{50}Sn_{72}$	1140	0.6ps	[2]			~0.3			K
$^{123}_{50}Sn_{73}$	~24	40m	3/2						F
$^{124}_{50}Sn_{74}$	1130	0.8ps	[2]			−0.1			K
$^{115}_{51}Sb_{64}$		31m	5/2	+3.46	2	−0.28[r]			F
$^{116}_{51}Sb_{65}$		15m	3						F
$^{117}_{51}Sb_{66}$		2.8h	5/2	+2.67	1	−0.42[r]			F
$^{117}_{51}Sb_{66}$	3130	340μs	[21/2?]	+1.22					J
$^{118}_{51}Sb_{67}$	~200	3.5m	1	±2.46	1				F
$^{119}_{51}Sb_{68}$		38h	5/2	+3.45	2	−0.29[r]			F
$^{120}_{51}Sb_{69}$		16m	1	±2.3					F
$^{121}_{51}Sb_{70}$			5/2	+3.3592	174	−0.28[abS]			B C D E F G I
$^{121}_{51}Sb_{70}$	37	3.5ns	[7/2]	+2.51	1	−0.4[r]			I
$^{122}_{51}Sb_{71}$		2.73d	2	−1.90	1	+0.66[r]			B F J
$^{122}_{51}Sb_{71}$	61	1.8μs	[3]	+2.98	2				J
$^{123}_{51}Sb_{72}$			7/2	+2.5466	132	−0.36[r]			B C D E F G
$^{124}_{51}Sb_{73}$		60d	3	±1.3					F J
$^{125}_{51}Sb_{74}$		2.77y	7/2	±2.61	1				E J
$^{126}_{51}Sb_{75}$		12.5d	[8]	±1.3					J
$^{127}_{51}Sb_{76}$		3.9d	[7/2]	±2.6					J
$^{128}_{51}Sb_{77}$		8.6h	[8]	±1.3					J
$^{116}_{52}Te_{64}$		2.5h	0♦						F
$^{117}_{52}Te_{65}$		61m	1/2						F
$^{119}_{52}Te_{67}$		16h	1/2	±0.25					F
$^{119}_{52}Te_{67}$	~300	4.5d	11/2						F
$^{120}_{52}Te_{68}$	560	9.3ps	[2]	+0.6					J
$^{122}_{52}Te_{70}$	564	7.6ps	[2]	+0.66					J
$^{123}_{52}Te_{71}$		>50Ty	1/2	−0.7359	39				E G
$^{123}_{52}Te_{71}$	159	190ps	[3/2]	±0.7					J
$^{123}_{52}Te_{71}$	248	117d	[11/2]	−1.00					J
$^{123}_{52}Te_{71}$	440	?	?	g=+0.2					J
$^{123}_{52}Te_{71}$	506	?	?	g=+0.03					J
$^{124}_{52}Te_{72}$	603	6.6ps	[2]	+0.5[b]		−0.5;−0.3			J K
$^{125}_{52}Te_{73}$			1/2	−0.8872	47				E G
$^{125}_{52}Te_{73}$	35.5	1.6ns	3/2	+0.60		−0.2			I
$^{125}_{52}Te_{73}$	145	58d	[11/2]	±0.9					J
$^{125}_{52}Te_{73}$	321	695ps	[9/2]	−0.91					J
$^{125}_{52}Te_{73}$	443	21ps	[3/2]	+0.5					J
$^{125}_{52}Te_{73}$	463	13ps	[5/2]	+0.6					J
$^{125}_{52}Te_{73}$	525	?	[7/2?]	negative					J
$^{126}_{52}Te_{74}$			0♦						G
$^{126}_{52}Te_{74}$	667	4.4ps	[2]	+0.6		−0.3;−0.1[b]			J K
$^{127}_{52}Te_{75}$		9.4h	[3/2]	±0.61					J
$^{127}_{52}Te_{75}$	89	109d	[11/2]	−0.91					J
$^{128}_{52}Te_{76}$			0♦						G
$^{128}_{52}Te_{76}$	743	3.2ps	[2]	+0.5		−0.1;+0.1[b]			J K
$^{129}_{52}Te_{77}$		69m	[3/2]	±0.67					J
$^{129}_{52}Te_{77}$	106	34d	[11/2]	−1.15					J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_s (b^2)	Index
$^{130}_{52}Te_{78}$			0♦						G
$^{130}_{52}Te_{78}$	840	2.0ps	[2]	+0.6		−0.2;−0.1			J K
$^{123}_{53}I_{70}$		13h	5/2						F
$^{124}_{53}I_{71}$		4.0d	2						F
$^{125}_{53}I_{72}$		60d	5/2	+3		−0.89[r]			C
$^{125}_{53}I_{72}$	188	35ns	[3/2]	±3					J
$^{126}_{53}I_{73}$		13d	2						F
$^{127}_{53}I_{74}$			5/2	+2.8091	153	−0.79[eS]	+0.18		C D E F G
$^{127}_{53}I_{74}$	58	1.92ns	[7/2]	±2.2[b]		−0.71[r]			I J
$^{127}_{53}I_{74}$	203	330ps	[3/2]	≥±1.1					J
$^{128}_{53}I_{75}$		25m	1						F
$^{129}_{53}I_{76}$		16My	7/2	+2.6174	143	−0.55[r]			C D E
$^{129}_{53}I_{76}$	27	15ns	[5/2]	+2.8		−0.68[r]			I
$^{130}_{53}I_{77}$		12h	5						F
$^{131}_{53}I_{78}$		8.1d	7/2	+2.738	15	−0.40[r]			C F
$^{131}_{53}I_{78}$	150	0.95ns	[5/2]	+2.8					J
$^{131}_{53}I_{78}$	1797	5.9ns	[9/2	−0.7					J
			or 11/2]	−0.9					
$^{132}_{53}I_{79}$		2.3h	4	±3.08	2	±0.08[r]			F
						μ/Q negative			
$^{132}_{53}I_{79}$	49.7	0.95ns	[3]	+2.2					J
$^{133}_{53}I_{80}$		21h	7/2	+2.84	2	−0.26[r]			F
$^{135}_{53}I_{82}$		6.7h	7/2						F
$^{129}_{54}Xe_{75}$			1/2	−0.7768	43				E F G H
$^{129}_{54}Xe_{75}$	40	700ps	[3/2]			±0.41[r]			I
$^{131}_{54}Xe_{77}$			3/2	+0.6908	39	−0.12[S]	+0.048		E F G
$^{132}_{54}Xe_{78}$			0♦						G
$^{132}_{54}Xe_{78}$	668	7ps	[2]	+0.9					J
$^{134}_{54}Xe_{80}$			0♦						G
$^{136}_{54}Xe_{82}$			0♦						G
$^{125}_{55}Cs_{70}$		45m	1/2	+1.41	1				F
$^{127}_{55}Cs_{72}$		6.2h	1/2	+1.45	1				F
$^{129}_{55}Cs_{74}$		31h	1/2	+?1.479	8				F
$^{130}_{55}Cs_{75}$		30m	1	+1.37 or −1.45	1				F
$^{131}_{55}Cs_{76}$		10d	5/2	+3.54	2	−0.57*[r]			F H
$^{131}_{55}Cs_{76}$	133	9.3ns	[5/2]	+2.1					J
$^{132}_{55}Cs_{77}$		6.2d	2	+2.22	1	+0.47*[r]			F H
$^{133}_{55}Cs_{78}$			7/2	+2.5779[d] (+2.5788)	148	−0.0030*[r]		<100	D E F G H
$^{133}_{55}Cs_{78}$	81	6.31ns	[5/2]	+3.44	2				I J
$^{133}_{55}Cs_{78}$	160	190ps	[5/2]	+1.5					J
$^{134}_{55}Cs_{79}$		2.2y	4	+2.989	17	+0.36*[S]			F H
$^{134}_{55}Cs_{79}$	11.2	47.0ns	[5]	+3.34	2				J
$^{134}_{55}Cs_{79}$	137	3.1h	8	+1.096	6				F
$^{135}_{55}Cs_{80}$		2My	7/2	+2.7280[d] (+2.7289)	156	+0.044*[r]			F H
$^{136}_{55}Cs_{81}$		13d	5	+3.70	2				F
$^{137}_{55}Cs_{82}$		30y	7/2	+2.8372[d] (+2.8382)	162	+0.045*[r]			F H
$^{138}_{55}Cs_{83}$		32m	3	±0.5					F

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{130}_{56}Ba_{74}$	356	63ps	[2]			+0.3[b]			K
$^{134}_{56}Ba_{78}$			0+						G
$^{134}_{56}Ba_{78}$	605	7ps	[2]	~±0.006?		+0.1[b]			J K
$^{135}_{56}Ba_{79}$			3/2	+0.8365[d] (+0.8372)	49	+0.18[S]			D E F G H
$^{135}_{56}Ba^{+}_{79}$			3/2						H
$^{136}_{56}Ba_{80}$			0+						G
$^{136}_{56}Ba_{80}$	818	1.5ps	[2]			+0.3[b]			K
$^{137}_{56}Ba_{81}$			3/2	+0.9357[d] (+0.9365)	55	+0.28[r]			E F G H
$^{137}_{56}Ba^{+}_{81}$			3/2						H
$^{137}_{56}Ba_{81}$	662	2.55m	[11/2]			≈−0.05			J
$^{138}_{56}Ba_{82}$			0+						G
$^{131}_{57}La_{74}$		59m	3/2						F
$^{132}_{57}La_{75}$		4.5h	2						F
$^{132}_{57}La_{75}$	?	25m	6						F
$^{133}_{57}La_{76}$		4.0h	5/2						F
$^{133}_{57}La_{76}$	535	49ns	[11/2]	±8					J
$^{135}_{57}La_{78}$		19.4h	5/2						F
$^{136}_{57}La_{79}$		9.9m	1						F
$^{137}_{57}La_{80}$		60ky	7/2	+2.69	2	+0.26*[r]			G
$^{138}_{57}La_{81}$		112Gy	5	+3.704	22	+0.51*[r]			E G
$^{139}_{57}La_{82}$			7/2	+2.778	17	+0.22*[S]			E F G H
$^{140}_{57}La_{83}$		40h	3	+0.73		+0.1*[r]			F J
$^{130}_{58}Ce_{72}$		25m	0+						F
$^{132}_{58}Ce_{74}$		4.2h	0+						F
$^{133}_{58}Ce_{75}$		5.4h	9/2						F
$^{133}_{58}Ce_{75}$	?	97m	1/2						F
$^{134}_{58}Ce_{76}$		72h	0+						F
$^{135}_{58}Ce_{77}$		17h	1/2						F
$^{137}_{58}Ce_{79}$		9.0h	3/2	±0.7					F J
$^{137}_{58}Ce_{79}$	255	34.4h	11/2	±0.69					F J
$^{139}_{58}Ce_{81}$		140d	3/2	±0.9					F J
$^{140}_{58}Ce_{82}$	2083	3.41ns	[4]	+4.3		±0.40*			J
$^{141}_{58}Ce_{83}$		33d	7/2						B J
$^{142}_{58}Ce_{84}$	650	6.2ps	[2]			−0.1			K
$^{143}_{58}Ce_{85}$		34h	3/2	~±1					F J
$^{133}_{59}Pr_{74}$		7.5m	5/2						F
$^{134}_{59}Pr_{75}$		18.5m	2						F
$^{135}_{59}Pr_{76}$		24m	3/2						F
$^{136}_{59}Pr_{77}$		13.5m	2						F
$^{137}_{59}Pr_{78}$		1.28h	5/2						F
$^{138}_{59}Pr_{79}$	?	2.0h	7						F
$^{139}_{59}Pr_{80}$		4.5h	5/2						F
$^{140}_{59}Pr_{81}$		3.4m	1						F
$^{141}_{59}Pr_{82}$			5/2	+4.16	3	−0.058[S]			B F G
$^{142}_{59}Pr_{83}$		19h	2	−0.24		−0.034[r]			F J
$^{142}_{59}Pr_{83}$	?	?	5						F
$^{143}_{59}Pr_{84}$		14d	7/2						F
$^{143}_{59}Pr_{84}$	57	4.17ns	[5/2]	+2.8					J
$^{134}_{60}Nd_{74}$		8m	0+						F
$^{135}_{60}Nd_{75}$		15m	9/2						F
$^{136}_{60}Nd_{76}$		55m	0+						F

Summary of Nuclear Moment Values and Index – Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{137}_{60}Nd_{77}$		37m	1/2						F
$^{138}_{60}Nd_{78}$		5.2h	0+						F
$^{139}_{60}Nd_{79}$		29.7m	3/2						F
$^{139}_{60}Nd_{79}$	232	5.5h	11/2						F
$^{140}_{60}Nd_{80}$		3.4d	0+						F
$^{141}_{60}Nd_{81}$		2.4h	3/2						F
$^{143}_{60}Nd_{83}$			7/2	−1.063	7	-0.48^{hS}			B F G
$^{144}_{60}Nd_{84}$	695	4.2ps	[2]	+0.26		−0.2;−0.6			J K
$^{144}_{60}Nd_{84}$	1314	90ps	[4]	+0.2					J
$^{145}_{60}Nd_{85}$			7/2	−0.654	4	-0.25^{hr}			B F G
$^{146}_{60}Nd_{86}$	454	21ps	[2]	+0.48		−0.7			J K
$^{147}_{60}Nd_{87}$		11d	5/2	±0.55		$\pm0.7^{r}$ μ/Q negative			B F
$^{148}_{60}Nd_{88}$	300	116ps	[2]	+0.45		−1.3			J K
$^{149}_{60}Nd_{89}$		1.9h	5/2	±0.35		$\pm1.0^{r}$			F
$^{150}_{60}Nd_{90}$	132	1.52ns	[2]	+0.64		−1.7			J K
$^{150}_{60}Nd_{90}$	397	55.9ps	[4]	+1.3					J
$^{141}_{61}Pm_{80}$		20.9m	5/2						F
$^{143}_{61}Pm_{82}$		265d	[5/2, or 7/2]	±3.8, ±3.9					J
$^{144}_{61}Pm_{83}$		360d	[5, or 6]	±1.7, ±1.8					J
$^{147}_{61}Pm_{86}$		2.6y	7/2	+2.62	2	+0.7			B F G
$^{147}_{61}Pm_{86}$	91	2.55ns	[5/2]	+3.4					J
$^{148}_{61}Pm_{87}$		5.4d	1	+2.0		+0.2			F J
$^{148}_{61}Pm_{87}$	137	43d	[6]	±1.8					J
$^{149}_{61}Pm_{88}$		53h	7/2	±3.3					F J
$^{149}_{61}Pm_{88}$	114	2.58ns	[5/2]	+2.1					J
$^{149}_{61}Pm_{88}$	188	3.24ns	[3/2]	+1.6					J
$^{149}_{61}Pm_{88}$	211	80ps	[5/2]	+2.2					J
$^{149}_{61}Pm_{88}$	270	2.59ns	[7/2]	+3					J
$^{151}_{61}Pm_{90}$		28h	5/2	±1.6		±1.9 μ/Q positive			F
$^{140}_{62}Sm_{78}$		15m	0+						F
$^{141}_{62}Sm_{79}$		11.3m	1/2						F
$^{141}_{62}Sm_{79}$	?	22.9m	11/2						F
$^{142}_{62}Sm_{80}$		1.2h	0+						F
$^{143}_{62}Sm_{81}$		8.8m	3/2						F
$^{145}_{62}Sm_{83}$		340d	[7/2]	±0.92					J
$^{147}_{62}Sm_{85}$		0.1Ty	7/2	−0.813	6	-0.18^{S}			B F G H
$^{147}_{62}Sm_{85}$	121	780ps	[5/2]	−0.3					J
$^{147}_{62}Sm_{85}$	198	1.31ns	[3/2]	−0.28					J
$^{148}_{62}Sm_{86}$	551	7.35ps	[2]	+0.3		−0.8			J K
$^{149}_{62}Sm_{87}$			7/2	−0.670	5	$+0.052^{r}$			B F G
$^{149}_{62}Sm_{87}$	22	7.6ns	5/2	−0.61		+0.4			I
$^{150}_{62}Sm_{88}$	334	48ps	[2]	+0.60		−1.3			J K
$^{151}_{62}Sm_{89}$	105	480ps	[5/2]	+0.5					J
$^{151}_{62}Sm_{89}$	168	760ps	[3/2]	+0.6					J
$^{152}_{62}Sm_{90}$	122	1.42ns	[2]	+0.69		−1.8			I J K
$^{152}_{62}Sm_{90}$	366	57ps	[4]	+1.2					J
$^{153}_{62}Sm_{91}$		47h	3/2	−0.0217	1	+0.9			F
$^{154}_{62}Sm_{92}$	82	3.02n	[2]	+0.61					J
$^{154}_{62}Sm_{92}$	267	165ps	[4]	+1.3					J
$^{154}_{62}Sm_{92}$	549	23.5ps	[6]	+1.9					J
$^{155}_{62}Sm_{93}$		24m	3/2			$\pm0.8^{r}$			F

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{145}_{63}Eu_{82}$		5.9d	5/2						F
$^{146}_{63}Eu_{83}$		4.65d	4						F
$^{147}_{63}Eu_{84}$		22d	5/2						F
$^{147}_{63}Eu_{84}$	625	765ns	[11/2]	+6.0					J
$^{148}_{63}Eu_{85}$		54d	5						F
$^{149}_{63}Eu_{86}$		93d	5/2						F
$^{149}_{63}Eu_{86}$	497	2.43μs	[11/2]	+6.1					J
$^{150}_{63}Eu_{87}$		12.5h	0$^+$						F
$^{151}_{63}Eu_{88}$			5/2	+3.4631[h]	240	+1.1[s]			B F G I
				[+3.466]					
$^{151}_{63}Eu_{88}$	21.7	9.4ns	7/2	+2.57	2	+1.8[r]			I
$^{152}_{63}Eu_{89}$		13y	3	−1.937	13	+3.0[r]			B F G
$^{152}_{63}Eu_{89}$	49	9.3h	0$^+$						F
$^{153}_{63}Eu_{90}$			5/2	+1.530	11	+2.8[r]			B E F G
$^{153}_{63}Eu_{90}$	97	200ps	[5/2]	+3.2					I
				or −0.5					
$^{153}_{63}Eu_{90}$	103	3.8ns	[3/2]	+1.5[b]					I J
$^{154}_{63}Eu_{91}$		16y	3	±2.001	14	+1.9[r]			B G J
$^{155}_{63}Eu_{92}$	105	400ps	[5/2]	+2.5					J
$^{145}_{64}Gd_{81}$		22.9m	1/2						F
$^{147}_{64}Gd_{83}$		38.5h	7/2						F
$^{149}_{64}Gd_{85}$		9.4d	7/2						F
$^{151}_{64}Gd_{87}$		120d	7/2						F
$^{152}_{64}Gd_{88}$	344	29ps	[2]	+1.0					J
$^{153}_{64}Gd_{89}$		242d	3/2						F
$^{154}_{64}Gd_{90}$	123	1.18ns	[2]	+0.84	1				J
$^{154}_{64}Gd_{90}$	371	39ps	[4]						J
$^{155}_{64}Gd_{91}$			3/2	−0.2584	18	+1.6[s]	−1.6		B E F G I
$^{155}_{64}Gd_{91}$	87	6.66ns	5/2	−0.93[i]	1	~±0.2[r]			I J
$^{155}_{64}Gd_{91}$	105	1.1ns	3/2	+0.4[i]		~±1[r]			I J
$^{156}_{64}Gd_{92}$	89	2.22ns	[2]	+0.72[i]		±1.2[r]			I J
$^{156}_{64}Gd_{92}$	288	115ps	[4]	+1.4					J
$^{156}_{64}Gd_{92}$	1513	190ps	[4]	+3.1					J
$^{157}_{64}Gd_{93}$			3/2	−0.3388	24	+1.7[r]			B F G
$^{157}_{64}Gd_{93}$	64	460ns	[5/2]			±3.0[r]			I
$^{158}_{64}Gd_{94}$	79.5	2.49ns	[2]	+0.73[i]	1	±1.3[r]			I J
$^{159}_{64}Gd_{95}$		18h	3/2	±0.44					F J
$^{160}_{64}Gd_{96}$	75	2.7ns	[2]	+0.63		±1.3[r]			I J
$^{151}_{65}Tb_{86}$		18h	1/2						F
$^{152}_{65}Tb_{87}$		18h	2						F
$^{153}_{65}Tb_{88}$		2.3d	5/2						F
$^{154}_{65}Tb_{89}$		21h	0$^+$						F
$^{154}_{65}Tb_{89}$	?	8.5h	3						F
$^{155}_{65}Tb_{90}$		5.6d	3/2						F
$^{156}_{65}Tb_{91}$		5.4d	3	±1.4		+1.4			F J
$^{157}_{65}Tb_{92}$		>30y	[3/2]	±2.0					B
$^{158}_{65}Tb_{93}$		150y	3	±1.75	1	+2.7*			B
$^{159}_{65}Tb_{94}$			3/2	±2.008	14	+1.3*			B F G J
$^{159}_{65}Tb_{94}$	58	130ps	[5/2]	±2					I
$^{160}_{65}Tb_{95}$		72d	3	±1.70	1	+2.3			B F J
$^{161}_{65}Tb_{96}$		6.9d	3/2						F
$^{151}_{66}Dy_{85}$		18m	7/2						F
$^{152}_{66}Dy_{86}$		2.4h	0$^+$						F

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{153}_{66}Dy_{87}$		6.4h	7/2	±0.7		±0.14*			F
						μ/Q positive			
$^{155}_{66}Dy_{89}$		10h	3/2	±0.28		±0.9*			F J
						μ/Q negative			
$^{157}_{66}Dy_{91}$		8.1h	3/2	±0.31		±1.2*			F
						μ/Q negative			
$^{158}_{66}Dy_{92}$	630	?	[6]	±2.2					J
$^{159}_{66}Dy_{93}$		144d	3/2						F
$^{160}_{66}Dy_{94}$	87	2.0ns	[2]	+0.73		−2			I J
$^{160}_{66}Dy_{94}$	966	2.2ps	[2]	+0.4					J
$^{161}_{66}Dy_{95}$			5/2	−0.482	3	+2.4*[s]		~+0.6	B F I
$^{161}_{66}Dy_{95}$	26	28.4ns	5/2	+0.67[i]		+2.4*[r]			I J
$^{161}_{66}Dy_{95}$	75	3.4ns	3/2	−0.38		+1.3*[r]			I J
$^{162}_{66}Dy_{96}$	80.7	2.25ns	[2]	+0.72					I J
$^{163}_{66}Dy_{97}$			5/2	+0.676	5	+2.5*[r]		~+0.7	B E F
$^{164}_{66}Dy_{98}$	73.3	2.39ns	[2]	+0.70		−2.0*[r]			I J
$^{165}_{66}Dy_{99}$		2.3h	7/2	±0.52		+3.3*[r]			F
$^{166}_{66}Dy_{100}$		82h	0♦						F
$^{154}_{67}Ho_{87}$		12m	1						F
$^{155}_{67}Ho_{88}$		50m	5/2						F
$^{156}_{67}Ho_{89}$		55m	1						F
$^{157}_{67}Ho_{90}$		14m	7/2						F
$^{158}_{67}Ho_{91}$		11m	5						F
$^{158}_{67}Ho_{91}$	67	29m	2						F
$^{159}_{67}Ho_{92}$		33m	7/2						F
$^{160}_{67}Ho_{93}$		26m	5						F
$^{160}_{67}Ho_{93}$	60	5.0h	2						F
$^{161}_{67}Ho_{94}$		2.5h	7/2						F
$^{162}_{67}Ho_{95}$		15m	1						F
$^{162}_{67}Ho_{95}$	~100	68m	6						F
$^{164}_{67}Ho_{97}$		29m	1						F
$^{164}_{67}Ho_{97}$	~46	38m	6						F
$^{165}_{67}Ho_{98}$			7/2	+4.12	3	+2.7		~+0.8	B F G J
$^{166}_{67}Ho_{99}$		27h	0♦						F
$^{166}_{67}Ho_{99}$	9	1.2ky	[7]	±4.1					J
$^{156}_{68}Er_{88}$	344	47.9ps	[2]	g_{ave}~±0.4					J
	453	7.83ps	[4]						
$^{157}_{68}Er_{89}$		20m	3/2						F
$^{158}_{68}Er_{90}$		2.3h	0♦						F
$^{158}_{68}Er_{90}$	193	433ps	[2]	g_{ave}~±0.4					J
	356	20.8ps	[4]						
	434	4.04ps	[6]						
$^{159}_{68}Er_{91}$		36m	3/2						F
$^{160}_{68}Er_{92}$		29h	0♦						F
$^{160}_{68}Er_{92}$	264	49.8ps	[4]	g_{ave}~±0.3					J
	376	7.77ps	[6]						
	465	4.04ps	[8]						
$^{161}_{68}Er_{93}$		3.2h	3/2	−0.369	3	+1.2*			F
$^{163}_{68}Er_{95}$		75m	5/2	+0.56		+2.2*			F
$^{164}_{68}Er_{96}$	92	1.6ns	[2]	±0.71					I
$^{165}_{68}Er_{97}$		10h	5/2	±0.65		±2.2[r]			F
						μ/Q positive			
$^{166}_{68}Er_{98}$	80.6	1.82ns	[2]	+0.63		−2.0*			I J K
$^{166}_{68}Er_{98}$	265	120ps	[4]	+1.2		−2.7			J K
$^{166}_{68}Er_{98}$	787	?	[2]			+2.0			K

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{167}_{68}Er_{99}$			7/2	−0.564	4	+2.83[S]			B F
$^{168}_{68}Er_{100}$	80	1.91ns	[2]	+0.65					I J
$^{168}_{68}Er_{100}$	264	120ps	[4]	+1.2		−2			J K
$^{168}_{68}Er_{100}$	~7800	?	[4]	~0					J
$^{168}_{68}Er_{100}$	~7800	?	[3]	±6					J
$^{169}_{68}Er_{101}$		9.4d	1/2	+0.513	4				F
$^{170}_{68}Er_{102}$	79	1.90ns	[2]	+0.64		−2.1*			I J K
$^{170}_{68}Er_{102}$	261	135ps	[4]	±1.2		−2			J K
$^{171}_{68}Er_{103}$		7.5h	5/2	±0.70	1	±2.3[r] μ/Q negative			F
$^{159}_{69}Tm_{90}$		9m	5/2						F
$^{160}_{69}Tm_{91}$		9m	1						F
$^{161}_{69}Tm_{92}$		37m	7/2						F
$^{162}_{69}Tm_{93}$		21m	1						F
$^{163}_{69}Tm_{94}$		1.8h	1/2	±0.08					F
$^{164}_{69}Tm_{95}$		2m	1						F
$^{164}_{69}Tm_{95}$	?	5m	6						F
$^{165}_{69}Tm_{96}$		29h	1/2	±0.138	1				F
$^{166}_{69}Tm_{97}$		7.7h	2	±0.092	1	±1.9* μ/Q positive			F
$^{167}_{69}Tm_{98}$		9.6d	1/2	−0.20					F
$^{168}_{69}Tm_{99}$		85d	3						F
$^{169}_{69}Tm_{100}$			1/2	−0.231	2				B F G H
$^{169}_{69}Tm_{100}$	8.4	4ns	[3/2]	+0.52		−1.3*			I
$^{169}_{69}Tm_{100}$	118	62ps	[5/2]	+0.74	1				J
$^{169}_{69}Tm_{100}$	139	320ps	[7/2]	+1.30	1	Q/Q_{118}=1.0			J
$^{169}_{69}Tm_{100}$	316	660ns	[7/2]	±0.15					J
$^{169}_{69}Tm_{100}$	379	36ns	[7/2]	±0.96	1				J
$^{170}_{69}Tm_{101}$		127d	1	±0.246	2	±0.59 μ/Q positive			F
$^{171}_{69}Tm_{102}$		1.9y	1/2	±0.229	2				F
$^{171}_{69}Tm_{102}$	117	55ps	[5/2]	+0.8					J
$^{171}_{69}Tm_{102}$	129	362ps	[7/2]	+1.2					J
$^{169}_{70}Yb_{99}$		32d	[7/2]	±0.6					J
$^{170}_{70}Yb_{100}$	84	1.58ns	[2]	+0.68	1	negative			I J
$^{171}_{70}Yb_{101}$			1/2	+0.4919[d] (+0.4930)	40				B E G H
$^{171}_{70}Yb_{101}$	67	900ps	[3/2]	±0.35					I
$^{171}_{70}Yb_{101}$	76	2ns	[5/2]	+1.01					I
$^{172}_{70}Yb_{102}$	78.7	1.6ns	[2]	+0.64[b]		+3			I J
$^{172}_{70}Yb_{102}$	260	132ps	[4]			−2			K
$^{172}_{70}Yb_{102}$	1174	7.95ps	[3]	+0.66	1	±4			J
$^{173}_{70}Yb_{103}$			5/2	−0.6776[d] (−0.6791)	54	+3.0			B E G H
$^{173}_{70}Yb_{103}$	79	38ps	[7/2]	−0.20					J
$^{173}_{70}Yb_{103}$	179	36ps	[9/2]	~+0.3					J
$^{173}_{70}Yb_{103}$	351	0.45ns	[11/2]	~−0.7					J
$^{174}_{70}Yb_{104}$	76.5	1.79ns	[2]	+0.68[b]	1				I J
$^{174}_{70}Yb_{104}$	252	?	[4]			−2			K
$^{175}_{70}Yb_{105}$		4.2d	[7/2]	±0.3[b]		~±6			J
$^{176}_{70}Yb_{106}$	82	1.76ns	[2]	+0.76	1				I J
$^{176}_{70}Yb_{106}$	270	?	[4]			~0			K

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{167}_{71}Lu_{96}$		54m	7/2						F
$^{169}_{71}Lu_{98}$		1.5d	7/2						F
$^{170}_{71}Lu_{99}$		2.0d	0♦						F
$^{171}_{71}Lu_{100}$		8.3d	7/2						F
$^{175}_{71}Lu_{104}$			7/2	+2.230	18	+5.6[S]			E F G H
$^{175}_{71}Lu_{104}$	114	100ps	[9/2]	+1.9					J
$^{175}_{71}Lu_{104}$	251	42ps	[11/2]	+1.9					J
$^{176}_{71}Lu_{105}$		20Gy	7	+3.18	3	+8.0[r]			F G
$^{176}_{71}Lu_{105}$	~300	3.7h	1	+0.318	3	−2.3[r]			F
$^{177}_{71}Lu_{106}$		6.8d	7/2	+2.24	2	+5.4[r]			F
$^{177}_{71}Lu_{106}$	971	155d	[23/2]			+13			J
$^{176}_{72}Hf_{104}$	88.4	1.40ns	[2]	+0.53					J
$^{177}_{72}Hf_{105}$			7/2	+0.7902	66	+4.5*			F G
$^{177}_{72}Hf_{105}$	113	500ps	[9/2]	+1.12	1				J
$^{177}_{72}Hf_{105}$	250	55ps	[11/2]	+2.6					J
$^{177}_{72}Hf_{105}$	321	660ps	[9/2]	−0.51					J
$^{178}_{72}Hf_{106}$			0♦						G
$^{178}_{72}Hf_{106}$	93	1.50ns	[2]	+0.58[b]					I J
$^{179}_{72}Hf_{107}$			9/2	−0.638	5	+5.1*			F G
$^{180}_{72}Hf_{108}$			0♦						G
$^{180}_{72}Hf_{108}$	93	1.50ns	[2]	+0.64[b]					J
$^{180}_{72}Hf_{108}$	309	71ps	[4]	+2.3					J
$^{181}_{73}Ta_{108}$			7/2	+2.35	2	+3*[S]			E F G
$^{181}_{73}Ta_{108}$	6.2	6.8μs	[9/2]	+5.1		+3*[r]			I
$^{181}_{73}Ta_{108}$	482	10.8ns	[5/2]	+3.29	3	positive			H J
$^{182}_{73}Ta_{109}$		115d	[3]	±2.6					J
$^{183}_{73}Ta_{110}$		5.0d	7/2						F
$^{182}_{74}W_{108}$			0♦						G
$^{182}_{74}W_{108}$	100	1.37ns	[2]	+0.51					I J
$^{182}_{74}W_{108}$	329	64ps	[4]	+0.7					J
$^{182}_{74}W_{108}$	1289	1.04ns	[2]	+1.4					J
$^{182}_{74}W_{108}$	1374	2.25ns	[3]	±0.10					J
$^{183}_{74}W_{109}$			1/2	+0.1169	10				E G
$^{183}_{74}W_{109}$	46	180ps	[3/2]	−0.1					I
$^{183}_{74}W_{109}$	99	700ps	[5/2]	+0.7					I J
$^{184}_{74}W_{110}$			0♦						G
$^{184}_{74}W_{110}$	111	1.26ns	[2]	+0.56					I J
$^{184}_{74}W_{110}$	364	43.5ps	[4]	+1.2					J
$^{185}_{74}W_{111}$		74d	3/2						F
$^{186}_{74}W_{112}$			0♦						G
$^{186}_{74}W_{112}$	123	1.01ns	[2]	+0.65	1				I J
$^{186}_{74}W_{112}$	399	25ps	[4]	+0.8		−3			J K
$^{186}_{74}W_{112}$	730	4.2ps	[2]			+0.7			K
$^{187}_{74}W_{113}$		24h	3/2						F
$^{183}_{75}Re_{108}$		70d	[5/2]	±3.1					J
$^{183}_{75}Re_{108}$	496	7.89ns	[9/2]	±5.3					J
$^{184}_{75}Re_{109}$		38d	[3]	±2.5					J
$^{184}_{75}Re_{109}$	188	165d	[8]	±2.9					J
$^{185}_{75}Re_{110}$			5/2	+3.172	28	+2.3[r]			C D E G
$^{186}_{75}Re_{111}$		90h	1	+1.73	1	~±0.4[r]			F G
$^{187}_{75}Re_{112}$		60Gy	5/2	+3.204	28	+2.2[S]			C E G
$^{187}_{75}Re_{112}$	206	560ns	[9/2]	+4.8					J
$^{188}_{75}Re_{113}$		17h	1	+1.78	1	~±0.4[r]			F G

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{184}_{76}Os_{108}$	?	?	[2]			−2			K
$^{186}_{76}Os_{110}$	137	840ps	[2]	+0.61	1	+1.5			J K
$^{187}_{76}Os_{111}$			1/2	+0.0643	6				E G
$^{188}_{76}Os_{112}$	155	710ps	[2]	+0.55		−0.4;−1.3			J K
$^{188}_{76}Os_{112}$	633	5.6ps	[2]	+0.9					J
$^{189}_{76}Os_{113}$			3/2	+0.6565	59	+0.8*			E G
$^{190}_{76}Os_{114}$	187	350ps	[2]	+0.68	1	+0.3;−1.0			J K
$^{190}_{76}Os_{114}$	548	28ps	[4]	+0.9					J
$^{192}_{76}Os_{116}$	206	280ps	[2]	+0.78	1	+1.2;−0.4			J K
$^{192}_{76}Os_{116}$	489	28ps	[2]	±0.7					J
$^{191}_{77}Ir_{114}$			3/2	+0.1454	14	+1.1[r]			B E F G
$^{191}_{77}Ir_{114}$	82	3.8ns	[1/2]	+0.546	5				I
$^{191}_{77}Ir_{114}$	129	131ps	[5/2]	+0.5					J
$^{191}_{77}Ir_{114}$	171	4.9s	[11/2]	±6.1	1				E J
$^{192}_{77}Ir_{115}$		74d	4	+1.90	2				E F J
$^{193}_{77}Ir_{116}$			3/2	+0.1583	15	+1.0[s]			B E F G
$^{193}_{77}Ir_{116}$	73	6.2ns	1/2	+0.468	4				I
$^{193}_{77}Ir_{116}$	139	90ps	[5/2]	+0.6					J
$^{194}_{77}Ir_{117}$		17h	1	±0.37					F J
$^{192}_{78}Pt_{114}$	316	35ps	[2]	+0.93[l]	1				J
$^{192}_{78}Pt_{114}$	612	20ps	[2]	+1.0[k]					J
$^{192}_{78}Pt_{114}$	785	12ps	[4]	±0.9[k]					J
$^{194}_{78}Pt_{116}$			0♦						G
$^{194}_{78}Pt_{116}$	328	35ps	[2]	+0.6		+0.6;+0.9			J K
$^{194}_{78}Pt_{116}$	622	44ps	[2]	+0.4					J
$^{195}_{78}Pt_{117}$			1/2	+0.6022	56				E F G
$^{195}_{78}Pt_{117}$	99	160ps	[3/2]	−0.60	1				I
$^{195}_{78}Pt_{117}$	210	67ps	[3/2]	+0.3					J
$^{195}_{78}Pt_{117}$	240	230ps	[5/2]	+0.22					J
$^{195}_{78}Pt_{117}$	259	4.1d	[13/2]	±0.60	1				E J
$^{196}_{78}Pt_{118}$			0♦						G
$^{196}_{78}Pt_{118}$	356	35ps	[2]	+0.55		+0.5;+0.6			J K
$^{197}_{78}Pt_{119}$		20h	1/2	±0.5[p]					F
$^{198}_{78}Pt_{120}$	408	19ps	[2]	+0.5		+1.2			J K
$^{190}_{79}Au_{111}$		40m	1	±0.066	1				F
$^{191}_{79}Au_{112}$		3.0h	3/2	±0.137	1				F
$^{192}_{79}Au_{113}$		4.1h	1	±0.0079	1				F
$^{193}_{79}Au_{114}$		18h	3/2	±0.139	1				F
$^{194}_{79}Au_{115}$		39h	1	±0.074	1				F
$^{195}_{79}Au_{116}$		192d	3/2	±0.147	1				F J
$^{196}_{79}Au_{117}$		6.2d	2	+0.588	6				F
$^{196}_{79}Au_{117}$	596	9.7h	12	±5.4					F J
$^{197}_{79}Au_{118}$			3/2	+0.14486	137	+0.59	∼ +0.01		B E F G H
$^{197}_{79}Au_{118}$	77	1.9ns	[1/2]	+0.42					I
$^{198}_{79}Au_{119}$		2.7d	2	+0.590	6				F
$^{198}_{79}Au_{119}$	367	123ns	[3]	±3.6					J
$^{198}_{79}Au_{119}$	?	49h	[12?]	±5.6	1				J
$^{199}_{79}Au_{120}$		3.2d	3/2	+0.270	3				F
$^{200}_{79}Au_{121}$	?	18.7h	[12]	±6.1	1				E J
$^{183}_{80}Hg_{103}$		8.8s	1/2	+0.52					E H J
$^{185}_{80}Hg_{105}$		50s	1/2	+0.50					E H J
$^{187}_{80}Hg_{107}$		2.4m	3/2	−0.59	1	−0.3			H J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{193}_{80}Hg_{113}$		6h	3/2	−0.6236	60	−1[r]			G H
$^{193}_{80}Hg_{113}$	140	11h	13/2	−1.052	10	+1.2[r]			G H
$^{195}_{80}Hg_{115}$		9.5h	1/2	+0.538	5				G H
$^{195}_{80}Hg_{115}$	176	40h	13/2	−1.038	10	+1.2[r]			G H
$^{197}_{80}Hg_{117}$		65h	1/2	+0.5241	51				G H
$^{197}_{80}Hg_{117}$	134	7.3ns	[5/2]	+0.96	1				J
$^{197}_{80}Hg_{117}$	299	24h	13/2	−1.0214	99	+1.4[r]			G H
$^{198}_{80}Hg_{118}$			0♦						G
$^{198}_{80}Hg_{118}$	412	22.0ps	[2]	+1.1					J
$^{199}_{80}Hg_{119}$			1/2	+0.50271[d] (+0.50415)	485				G
$^{199}_{80}Hg_{119}$	158	2.32ns	[5/2]	+1.0		±0.7			J
$^{199}_{80}Hg_{119}$	533	44m	13/2	±1.0083	97	+2			H J
$^{200}_{80}Hg_{120}$			0♦						G
$^{200}_{80}Hg_{120}$	368	42ps	[2]	+0.9					J
$^{201}_{80}Hg_{121}$			3/2	−0.55671[d] (−0.55830)	537	+0.44[s]	−0.13		D E F G H
$^{202}_{80}Hg_{122}$			0♦						G
$^{202}_{80}Hg_{122}$	439	26ps	[2]	+1.2					J
$^{203}_{80}Hg_{123}$		47d	5/2	+0.86	1	+0.5			G H
$^{204}_{80}Hg_{124}$			0♦						G
$^{204}_{80}Hg_{124}$	437	46ps	[2]	+0.8					J
$^{205}_{80}Hg_{115}$		5.5m	1/2	+0.597	6				H J
$^{193}_{81}Tl_{112}$		23m	1/2						F
$^{194}_{81}Tl_{113}$		33m	2	±0.135	1				F
$^{195}_{81}Tl_{114}$		1.2h	1/2	+1.57	2				F G
$^{196}_{81}Tl_{115}$		1.8h	2	±0.0699	7				F
$^{197}_{81}Tl_{116}$		2.7h	1/2	+1.56	2				F G
$^{198}_{81}Tl_{117}$		5.3h	2	±0.00121	1				F
$^{198}_{81}Tl_{117}$	544	1.8h	7	±0.64	1				F
$^{199}_{81}Tl_{118}$		7.4h	1/2	+1.62	2				F G
$^{200}_{81}Tl_{119}$		26h	2	±0.03568	35				F G
$^{201}_{81}Tl_{120}$		72h	1/2	+1.65	2				F G
$^{202}_{81}Tl_{121}$		12d	2	±0.0565	6				F G
$^{202}_{81}Tl_{121}$	950	560μs	[7]	±0.90	1				J
$^{203}_{81}Tl_{122}$			1/2	+1.6115	158				E F G H
$^{203}_{81}Tl_{122}$	279	280ps	[3/2]	+0.16					J
$^{204}_{81}Tl_{123}$		3.9y	2	±0.089	1				F
$^{205}_{81}Tl_{124}$			1/2	+1.6274	160				E F G H
$^{206}_{81}Tl_{125}$		4.2m	0♦						F
$^{204}_{82}Pb_{122}$	1274	260ns	[4]	+0.22		±0.3			J
$^{205}_{82}Pb_{123}$	1014	5.55ns	[13/2]	−0.98	1				J
$^{206}_{82}Pb_{124}$			0♦						G
$^{206}_{82}Pb_{124}$	803	6ps	[2]	~0					J
$^{206}_{82}Pb_{124}$	2200	123μs	[7]	−0.152	1				J
$^{206}_{82}Pb_{124}$	2385	29ps	[6]	+0.8					J
$^{206}_{82}Pb_{124}$	4027	200ns	[12]	−1.86	2				J
$^{207}_{82}Pb_{125}$			1/2	+0.5783[d] (+0.5881)	58				E F G H
$^{207}_{82}Pb_{125}$	570	129ps	[5/2]	+0.8					J
$^{208}_{82}Pb_{126}$			0♦						G
$^{208}_{82}Pb_{126}$	2615	15ps	[3]	+1.8		−1.1			J K
$^{208}_{82}Pb_{126}$	3198	298ps	[5]	+0.10					J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{199}_{83}Bi_{116}$		25m	9/2						F
$^{200}_{83}Bi_{117}$		35m	7						F
$^{201}_{83}Bi_{118}$		1.8h	9/2						F
$^{202}_{83}Bi_{119}$		1.6h	5						F
$^{203}_{83}Bi_{120}$		12h	9/2	+4.59	5	-0.71^{r}			F
$^{204}_{83}Bi_{121}$		12h	6	+4.25	4	-0.46^{r}			F
$^{205}_{83}Bi_{122}$		15d	9/2	~+5.5					F
$^{206}_{83}Bi_{123}$		6.3d	6	+4.56	5	-0.21^{r}			F G
$^{207}_{83}Bi_{124}$	2102	182μs	[21/2]	+3.4					J
$^{209}_{83}Bi_{126}$		>2Ay	9/2	+4.080	41	-0.38^{S}	+0.5		D E F G
$^{210}_{83}Bi_{127}$		5d	1	−0.0442	4	$+0.14^{r}$			F
$^{211}_{83}Bi_{128}$	405	318ps	[7/2]	+4.4					J
$^{201}_{84}Po_{117}$		18m	3/2						F
$^{202}_{84}Po_{118}$		51m	0♦						F
$^{203}_{84}Po_{119}$		42m	5/2						F
$^{204}_{84}Po_{120}$		3.5h	0♦						F
$^{204}_{84}Po_{120}$	~1700	140ns	[8]	±7.8	1				J
$^{205}_{84}Po_{121}$		1.8h	5/2	≈+0.26		+0.17			F
$^{206}_{84}Po_{122}$		8.8d	0♦						F
$^{206}_{84}Po_{122}$	?	212ns	[8]	±7.4	1				J
$^{207}_{84}Po_{123}$		6.0h	5/2	≈+0.27		+0.28	+0.11		F
$^{207}_{84}Po_{123}$	1115	47μs	[13/2]	−0.93	1				J
$^{208}_{84}Po_{124}$	1530	380ns	[8]	±7.3	1				J
$^{209}_{84}Po_{125}$		103y	1/2	+0.77	1				G
$^{209}_{84}Po_{125}$	>1327	~100ns	[17/2?]	+7.5	1				J
$^{210}_{84}Po_{126}$		138d	0♦						F
$^{210}_{84}Po_{126}$	1472	38ns	[6]	±5.6	1				J
$^{210}_{84}Po_{126}$	1552	110ns	[8]	+7.3	1				J
$^{210}_{84}Po_{126}$	~2800	24ns	[11]	+12.0	1				J
$^{210}_{84}Po_{126}$	4372	93ns	[13]	±7.1	1				J
$^{211}_{84}Po_{127}$	1064	16ns	[15/2]	±0.4					J
$^{211}_{85}At_{126}$		7.2h	9/2						F
$^{211}_{85}At_{126}$	1416	50ns	[21/2]	±9.4	1				J
$^{211}_{85}At_{126}$	4816	4.2μs	[39/2	±14					J
			or 41/2]	±15					
$^{212}_{86}Rn_{126}$	~1700	1.0μs	[8]	±7.2	1				J
$^{222}_{86}Rn_{136}$	186	320ps	[2]	+0.9					J
$^{223}_{88}Ra_{135}$	50	630ps	[3/2]	+0.42					J
$^{227}_{89}Ac_{138}$		22y	3/2	+1.1		+1.7			G
$^{229}_{90}Th_{139}$		7.3ky	5/2	+0.38		~+4.6			G
$^{231}_{91}Pa_{140}$		34ky	3/2	±1.98	2				B G
$^{233}_{91}Pa_{142}$		27d	3/2	+3.4		−3.0			F
$^{233}_{92}U_{141}$		162ky	5/2	+0.64	1	$+4.2^{S}$			B G J
$^{235}_{92}U_{143}$		710My	7/2	−0.43		$+4.9^{r}$			B G J

Summary of Nuclear Moment Values and Index — Continued

Nucleus	Level (keV)	$T_{1/2}$	I ($h/2\pi$)	μ (nm)	Diam. Corr.	Q (b)	Ω (nmb)	Q_4 (b^2)	Index
$^{237}_{93}Np_{144}$		2.1My	5/2	+2.4[l]		positive			B G J
$^{237}_{93}Np_{144}$	60	63ns	[5/2]	+1.3[k]		Q/Q_{gs}=+1.0			I J
$^{238}_{93}Np_{145}$		2.1d	2						F
$^{239}_{93}Np_{146}$		2.3d	5/2						B F
$^{239}_{93}Np_{146}$	75	1.40ns	[5/2]	+1.3[k]					J
$^{239}_{94}Pu_{145}$		24ky	1/2	+0.200[l]	2				B F G
$^{241}_{94}Pu_{147}$		13y	5/2	−0.68[k]	1	+5.6			B G
$^{241}_{95}Am_{146}$		460y	5/2	+1.59	2	+4.9			B F G
$^{242}_{95}Am_{147}$		16h	1	+0.383	5	−2.8			F
$^{243}_{95}Am_{148}$		8ky	5/2	+1.59	2	+4.9			G
$^{242}_{96}Cm_{146}$		160d	0[♦]						F
$^{243}_{96}Cm_{147}$		28y	5/2	±0.4					B
$^{245}_{96}Cm_{149}$		8.26ky	7/2	±0.5					B
$^{247}_{96}Cm_{151}$		15.4My	9/2	±0.4					B
$^{249}_{97}Bk_{152}$		314d	7/2	±5		±5			G
$^{253}_{99}Es_{154}$		20.5d	7/2	+4.0		+6			B F G J

[♦] No hyperfine structure observed
[*] Polarization or Sternheimer corrections included
[a] Weighted average
[b] Wide spread in tabulated values
[c] Atomic beam value of [59St46] adopted
[d] OP and NMR values discrepant. Values in ( )'s based on NMR values
[E] ENDOR and NMR values discrepant. Values in ( )'s based on NMR values
[f] ABMR and NMR values discrepant. Values in ( )'s based on NMR values
[g] No diamagnetic correction added. Not certain of corrections used by authors or if corrected.
[h] ABMR and ENDOR values discrepant. Values in [ ]'s based on ENDOR values
[i] Mössbauer and PAC values discrepant
[j] In the latest adjustment of fundamental constants [73CoTa], this value has been increased to 2.7928456 *11*.
[k] Relative value calculated from μ-ratio and μ^l
[l] Summary value upon which relative μ-values depend
[p] Preliminary value from meeting abstract, report, thesis or private communication
[r] Relative value calculated from Q-ratio and Q^s
[s] Summary value, average of tabulated values unless otherwise marked

5. Tables of Nuclear Moment Data

Table A: Neutron, Proton, and Anti-Proton Moments

Introduction

Since the methods used for the measurement of the moments of the proton, anti-proton, and neutron differ appreciably from those used for other particles, the available information is incorporated into a separate table. All methods involve an application of the principle of magnetic resonance.

Consider a particle with a spin quantum number $s=1/2$ with an associated magnetic dipole moment μ in a magnetic field H. The particle will become oriented in one of two possible states characterized by the magnetic quantum number $m=+1/2$ and $m=-1/2$. The behavior of the particle may be described semi-classically by saying that the spin vector precesses about H with a rotational frequency ν (Larmor frequency)

$$\nu=\gamma H/2\pi,$$

where the gyromagnetic ratio of the particle is $\gamma=2\pi\mu/sh$.

If, now, we introduce a weak magnetic field H_1 perpendicular to H and rotating about it with frequency ν, s will be forced to precess about H_1 as well as H and the particle will slowly change from the $m=+1/2$ to the $-1/2$ state and vice versa. It is this resonance between the applied rotation frequency of H_1 and the Larmor frequency of the particle that constitutes magnetic resonance.

Since the frequency can be measured with very high accuracy, the limitation in the determination of μ lies in the difficulty of measuring the field H. Absolute measurement of magnetic field is extremely difficult. Two alternate procedures have been adopted for the proton:

(1) The ratio of the proton precession frequency to the cyclotron frequency of either the free electron or the free proton is measured. The first yields the magnetic moment in terms of $eh/4\pi mc$, the Bohr magneton; the second, the moment in terms of the nuclear magneton, $eh/4\pi M_p c$.

(2) The proton precession frequency is measured in terms of the standard ampere which may be expressed in units of length, mass and time.

In computing the magnetic moment of the proton in nuclear magnetons from the measured quantities, the following conversion factors based on the fundamental constants in [69TaPa] have been used:

$$\gamma_p(\text{in rad}\cdot\text{s}^{-1}\cdot\text{T}^{-1})\times(1.043953\ \ 10)\times10^{-8}=\mu_p(\text{in nm}),$$

$$\mu_p(\text{in Bohr magnetons})\times(1836.109\ \ 11)=\mu_p(\text{in nm}).$$

Total diamagnetic corrections of +0.000073 nm for water samples or +0.000079 nm for oil samples, as given in [50Th06], have been added to the uncorrected proton moments. The uncertainties quoted in the table include the uncertainties in the conversion factors used.

Detailed descriptions of the techniques and measurements can be found in the original papers and in Laukien [58La04]. There is a good discussion of the various experiments for the measurement of the proton moment and their sources of error in Taylor, Parker and Langenberg's article on *The Fundamental Constants and Quantum Electrodynamics* [69TaPa] as well as in the earlier papers by Cohen and Dumond [66Co36, 65Co20].

The neutron magnetic moment is measured by passing a beam of polarized neutrons through a strong magnetic field and inducing a magnetic transition with a resonant rotating magnetic field. This transition causes a reversal of the polarization with a consequent decrease in the neutron intensity at the polarization analyzer-detector. The change in intensity serves to indicate the resonance condition. The uniform magnetic field is measured by a point-to-point determination of the proton precession frequency. This procedure yields a value of μ_n/μ_p subject to the correction for the chemical form of the hydrogen in the resonance probe.

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table A

I	Nuclear spin, in units of $h/2\pi$
μ	Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction
Refer.	Reference key
Quantity Measured	Directly measured frequency ratio, magnetic moment, or gyromagnetic ratio in appropriate units These values are given without diamagnetic correction unless otherwise indicated.
Method (Compound)	Method by which frequency ratio, moment, or gyromagnetic ratio was measured Compound used for measurement

Table A: Neutron, Proton, and Anti-Proton Moments

I	μ	Refer.	Quantity Measured	Method (Compound)
			Neutron	
1/2		37S09		Slow neutron scattering from ortho- and para- H_2
	−2 *1*	38P08		Non-adiabatic transitions in a rotating magnetic field
	±1.913002 *80*	48B29	ω_n/ω_p=0.685001 *30*	Neutron beam resonance; NMR (H_2O)
1/2		50H67		Reflection from magnetized iron
	negative	50S88	μ_p/μ_n negative	Neutron beam resonance; NMR (H_2O)
1/2		54S90		Neutron beam resonance
	−1.913159 *47*	56C57	ω_n/ω_p=0.685057 *17*	Neutron beam resonance and proton resonance over same field (H_2O)
			Proton	
1/2		27D01		Specific heat
1/2		29M01		Band spectra
1/2		30H02		Band spectra
	+2.785 *2*	39K12		Molecular beam magnetic resonance (H_2,HD)
	±2.79283 *11*	49T01	$g/g_J(Cs,{}^2S_{1/2})=15.1911\times10^{-4}$ $g/g_J(In,{}^2P_{1/2})=45.6877\times10^{-4}$ $\mu_p=(15.2106^a\ 6)10^{-4}\mu_B$	Atomic and molecular beam magnetic resonance (NaOH)
	±2.79249 *20*	50B73 51J10	ω_p/ω_{cyc}=2.79242 *20*	NMR (H_2O); decelerating cyclotron
	positive	50S88		NMR (H_2O)
	±2.79288 *6*	50T07	$\gamma_p=(2.67523\ 6)10^8 r\cdot s^{-1}T^{-1}$	NMR in magnetic field determined by force on straight wire carrying known current (H_2O); strong field measurement
	±2.79292 *6*	(65Co20)	$\gamma_p=(2.67534^{aC}\ 6)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79292 *7*	(65Hu13)	$\gamma_p=(2.67527^c\ 6)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79291 *4*	(69TaPa)	$\gamma_p=(2.675231^{fgh}\ 26)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79274 *4*	51G31	ω_e/ω_p=657.475 *8* $\mu_p=(15.20970\ 18)10^{-4}\mu_B$	NMR (oil); measured cyclotron frequency of free electrons
	±2.79275 *4*	(69TaPa)	$\mu_p=(15.21016^a\ 19)10^{-4}\mu_B$	
		52K32	$g_J(H,{}^2S_{1/2})/g_p$=658.2171 *6*	ABMR and NMR (oil) in same field
	±2.792787 *17*	(69TaPa)	$\mu_p=(15.210355^a\ 13)10^{-4}\mu_B$	
	±2.792764 *60*	51S34	ω_p/ω_{cyc}=2.792685 *60*	NMR (oil); omegatron
	±2.792763 *60*	(69TaPa)	$\omega_p/\omega_{cyc}=2.792690^f$ *60*	
		54Be11	$g_J(H)/g$=658.21734 *19*	Mic; NMR (cylinder of oil)
	±2.792784 *17*	(69TaPa)	$\mu_p=(15.2103347^{ai}\ 65)10^{-4}\mu_B$	

Table A: Neutron, Proton, and Anti-Proton Moments – Continued

I	μ	Refer.	Quantity Measured	Method (Compound)
	±2.79281 *4*	55C36	$\omega_p/\omega_{cyc}=2.79273$ *4*	NMR (H_2O); decelerating cyclotron
	±2.79275 *10*	56T19	$\omega_p/\omega_{cyc}=2.792675$ *100*	NMR ($H_2O+FeCl_3$); decelerating cyclotron
	±2.79315 *8*	56W41	$\gamma_p=(2.67549\ 8)10^8 r\cdot s^{-1}T^{-1}$	NMR in a field determined by the dimensions of and current in an iron-free coil (H_2O)
		57G89	$g_J(D)/g=658.2162$ *8*	Mic; NMR (cylinder of oil)
	±2.792788 *17*	(69TaPa)	$\mu_p=(15.210360^{ai}\ 23)10^{-4}\mu_B$	
	±2.79277 *3*	58Dr05	$\gamma_p=(2.67513\ 2)10^8 r\cdot s^{-1}T^{-1}$	Free precession in the field of a standard solenoid (H_2O)
	±2.79277 *2*	(65Co20)	$\gamma_p=(2.675192^{aC}\ 8)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79278 *2*	(65Hu13)	$\gamma_p=(2.675137^{C}\ 11)10^8 r\cdot s^{-1}T^{-1}$	See 68Dr06 below
		59H32	$\omega_e/\omega_p=657.4501$	NMR (H_2)
	±2.79277 *3*	(69TaPa)	$\mu_p=(15.210280^{ai}\ 12)10^{-4}\mu_B$	
		59L15	$g_J(H)/g=658.215909^{f}$ *44*	Mic ($H+H_2$+buffer gas)
	±2.792781 *17*	(69TaPa)	$\mu_p=(15.2099284^{fj}\ 10)10^{-4}\mu_B$	
	±2.79280 *2*	59L54	$\omega_e/\omega_p=657.462$ *3*	NMR (oil); measured cyclotron frequency of free electrons
			$\mu_p=(15.21000\ 7)10^{-4}\mu_B$	
	±2.79281 *2*	(69TaPa)	$\omega_e/\omega_p=657.4620$ *45*	
			$\mu_p=(15.21046^{a}\ 10)10^{-4}\mu_B$	
	±2.79290 *6*	61Bo11	$\omega_{cyc}(H_2^+)/\omega_d=1.65957$ *28*	cyclotron frequency of H_2^+ and NMR ($D_2O+CuCl_2\cdot 2H_2O$) in same field;
			$\omega_p/\omega_d=6.514411$ *3*	NMR ($D_2O+CuCl_2\cdot 2H_2O$; $H_2O+CuCl_2$) Used $M_p/M(H_2^+)=0.49986388$ *50*
	±2.79288 *10*	61Ca20	$\gamma_p=(2.67530^{a}\ 10)10^8 r\cdot s^{-1}T^{-1}$	NMR in known magnetic field
	±2.79283 *10*	(65Co20)	$\gamma_p=(2.67525^{aC}\ 10)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79288 *10*	(65Hu13)	$\gamma_p=(2.67523^{C}\ 10)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79277[b] *5*	63Sa04	$\omega_p/\omega_{cyc}=2.792676$ *50*	NMR ($H_2O+MnSO_4$); decelerating cyclotron
	±2.79277 *7*	(69TaPa)	$\omega_p/\omega_{cyc}=2.79270^{ft}$ *7*	‡Includes additional corrections
	±2.79280 *2*	63Sa05	$\omega_e/\omega_p=657.4621$ *25*	NMR (liquid paraffin); measured cyclotron frequency of free electrons
			$\mu_p=(15.21043^{a}\ 6)10^{-4}\mu_B$	
	±2.79281 *15*	(69TaPa)	$\mu_p=(15.21046^{a}\ 84)10^{-4}\mu_B$	
	±2.79277 *2*	63Vi04	$\gamma_p=(2.67513\ 1)10^8 r\cdot s^{-1}T^{-1}$	NMR in weak magnetic field (H_2O)
	±2.79276 *2*	(65Co20)	$\gamma_p=(2.675188^{aC}\ 8)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79278 *2*	(65Hu13)	$\gamma_p=(2.675132^{C}\ 8)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79276 *3*	(69TaPa)	$\gamma_p=(2.675144^{fg}\ 16)10^8 r\cdot s^{-1}T^{-1}$	
	±2.79286 *2*	65Ma25	$\mu_p=2.79279$ *2*	cyclotron frequency of $^4He^+$, $^{20}Ne^{2+}$, $^{20}Ne^+$; NMR ($H_2O+CuCl_2$)
		(69TaPa)	$\mu_p=2.792794^{f}$ *17*	
	+3.0 *3*	66Be50	$\gamma_p=-(2.9\ 3)10^8 r\cdot s^{-1}T^{-1}$	NMR in weak rotating rf field (H_2O)
	±2.792782 *17*	66My01	$g_J(H,{}^2S_{1/2})/g=658.21049$ *20*	MASER
			$\mu_p=(15.210326\ 4)10^{-4}\mu_B$	
		(69TaPa)	$g_J(H)/g=658.21053^{d}$ *20*	See 70Wi22 below

Table A: Neutron, Proton, and Anti-Proton Moments — Continued

I	μ	Refer.	Quantity Measured	Method (Compound)
	±2.79273	66Ya07	$\gamma_p=(2.675071)10^8$r•s^{-1}T^{-1}	NMR in strong field (H_2O)
	±2.79274[c]		$\gamma_p=(2.67510^{c})10^8$r•s^{-1}T^{-1}	
	±2.79277 *4*	(69TaPa)	$\gamma_p=(2.675105^{fg}\ 20)10^8$r•s^{-1}T^{-1}	
	±2.79267 *12*	67Mal7		Determined from existing time-of-flight and magnetic analysis data on $^{27}Al(p,\gamma)^{28}Si$ resonanace and $^{7}Li(p,n)^{7}Be$ threshold
	±2.79267[d] *13*	(69TaPa)	$\mu_p=2.79260^{df}$ *13*	
	±2.79281 *5*	67Pe09	$\omega_p/\omega_{cyc}=2.79274$ *5*	NMR (H_2O); omegatron (H_2^+; HD^+; D_2^+)
	±2.792773	68Dr06	$\gamma_p=(2.6751526)10^8$r•s^{-1}T^{-1}	Free precession in the field of a standard solenoid (H_2O)
		(69TaPa)	$\gamma_p=(2.6751465^{fg})10^8$r•s^{-1}T^{-1}	[Fredericksburg, Va. 1958]
		(69TaPa)	$\gamma_p=(2.6751555^{fg})10^8$r•s^{-1}T^{-1}	[Washington, D.C., 1960–1967]
		(69TaPa)	$\gamma_p=(2.6751526^{fg})10^8$r•s^{-1}T^{-1}	[Gaithersburg, Md. 1968]
	±2.792773 *30*	(69TaPa)	$\gamma_{p,ave}=(2.6751525^{fg}\ 99)10^8$r•s^{-1}T^{-1}	
	±2.79276 *3*	68Ha49	$\gamma_p=(2.675138\ 11)10^8$r•s^{-1}T^{-1}	Free precession in an air-core field-coil system (H_2O)
		(69TaPa)	$\gamma_p=(2.6751392^{fg}86)10^8$r•s^{-1}T^{-1}	
	±2.792782 *18*	68Kl02	$\omega_p/\omega_e=(15.2099441\ 11)10^{-4}$	NMR (H_2O+0.2M $CuSO_2$ in cylinder); cyclotron resonance of electron
			$\omega_p/\omega_e=(15.210329\ 9)10^{-4}$	
	±2.79278 *3*	68St27	$\gamma_p=(2.675162\ 14)10^8$r•s^{-1}T^{-1}	Free precession in field of Helmholtz coils (H_2O)
	±2.79275	(69TaPa)	$\gamma_p=(2.6751349^{fg})10^8$r•s^{-1}T^{-1}	
		69Te08	$\gamma_p=(2.67512)10^8$r•s^{-1}T^{-1}	Value adopted by BIPM for spherical sample of H_2O
	±2.792766 *15*	70Wi22	$g_J(H)/g_p(H)=658.210705^{j}$ *6*	MASER (atomic H)
			Anti-Proton	
	−1.8 *12*	62Bu19		Double scattering

[a] Includes diamagnetic correction
[b] Includes diamagnetic and paramagnetic corrections
[c] Corrected for standard BIPM ampere
[d] Includes corrections sent by experimenters to compilers 65Co20 or 69TaPa
[e] Value corrected for solution concentration, shape of holder, and shielding of electrons and neighboring molecules
[f] For spherical container of H_2O
[g] In terms of NBS as-maintained Ampere
[h] Includes corrections for better values of "g", the acceleration of gravity, and the diamagnetic correction
[i] Calculated using $\mu_e=1.001159639\mu_B$, $g_J=g_S(1-17.75$ ppm), $\sigma(H_2)=26.6$ *3* ppm, $\sigma(H_2O)=26.0$ *3* ppm, and σ(oil)=29.7 *6* ppm
[j] Calculated using $g_J(H)/g_p(H)=(g_S/g_p)(1-0.204$ ppm). See [69TaPa], page 324.

Table B: Nuclear Moments by Paramagnetic Resonance

Introduction

Paramagnetic resonance provides a means of studying the Zeeman levels of a paramagnetic system which may be ionic, atomic, or molecular. The sample can be in the form of a gas, crystal, or solution. To be paramagnetic the system must have one or more electrons which are magnetically unpaired.

When the sample is placed in an external magnetic field, the interaction of the electron with the field causes a splitting of the electronic states. The interaction of the electron with the nuclear magnetic moment causes each of these states to be split again into $2I+1$ levels (see figure 1). In practice, the sample is placed in a resonant microwave cavity in the region where the microwave magnetic field is perpendicular to the external magnetic field. The microwave frequency ν_0 is maintained constant and equal to the natural frequency of the cavity while the external field is varied slowly. When the energy difference between two levels, for which a transition is allowed, satisfies the condition $|E_2-E_1|=h\nu_0$, an absorption of microwave energy is observed.

The nuclear spin I is indicated by the multiplicity $(2I+1)$ of the spectrum. The magnetic moment can be calculated from the spacing of the resonance lines if wavefunctions for the electrons for the appropriate atom or ion are available. The ratio of the magnetic moments of two isotopes can be determined simply from the relative splitting factors of the respective resonance patterns. If the nuclear magnetic moment of one isotope is known from a technique such as nuclear magnetic resonance, which gives a rather precise value of the magnetic moment, the moment of the second isotope can be determined from the ratio with greater accuracy than by direct calculation.

A variation of the paramagnetic resonance method for the determination of g_I is the Electron–Nuclear Double Resonance (ENDOR) experiment described by Feher [56Fe43] and by Pipkin and Culvahouse [58Pi43]. In a strong field the ground-state energy level is split into states specified by m_J and m_I. Figure 2 represents a typical splitting for a case in which $J=1/2$ and $I=1$. The transition labeled A, $(m_J=+1/2, m_I=-1) \leftrightarrow (m_J=-1/2, m_I=-1)$, can be induced to saturation with a strong microwave signal. The transition labeled B, $(+1/2,0) \leftrightarrow (+1/2,-1)$, can be induced by an appropriate radio frequency signal, which then decreases the population of the $(+1/2,-1)$ state and increases the microwave absorption. Similarly, the transition labeled C, $(-1/2,-1) \leftrightarrow (-1/2,0)$, can be induced and detected. Since the difference between pairs of m_I transition frequencies such as these depends only upon the interaction of the nuclear moment with the external field, the nuclear g_I-value can be calculated directly.

The interaction of the nuclear quadrupole moment with an inhomogeneous electric field at the nucleus causes second-order shifts in the levels, from which the quadrupole coupling constant can be determined. The evaluation of the quadrupole moment from the coupling constant depends upon a calculation of the field inhomogeneity at the nucleus, which may be uncertain by a few percent. In addition, the nuclear electric quadrupole moment causes a polarization of the atomic core electrons (Sternheimer effect) which can affect the evaluation of the field gradient by tens of percent.

A very thorough discussion of the method and theory can be found in a recent book by Abragam and Bleaney [70Ab20]. Earlier helpful reviews include those by Low [60Lo05] and Bowers and Owen [55Bo56]. Data on observed g_J or splitting factors have been omitted intentionally since these are characteristic of the lattice as well as the nucleus in question. Paramagnetic resonance data on crystals are given by Bowers and Owen [55Bo56], Orton [59Or36] and Konig [66Ko25].

The last systematic literature search for information included in the table was in early 1971.

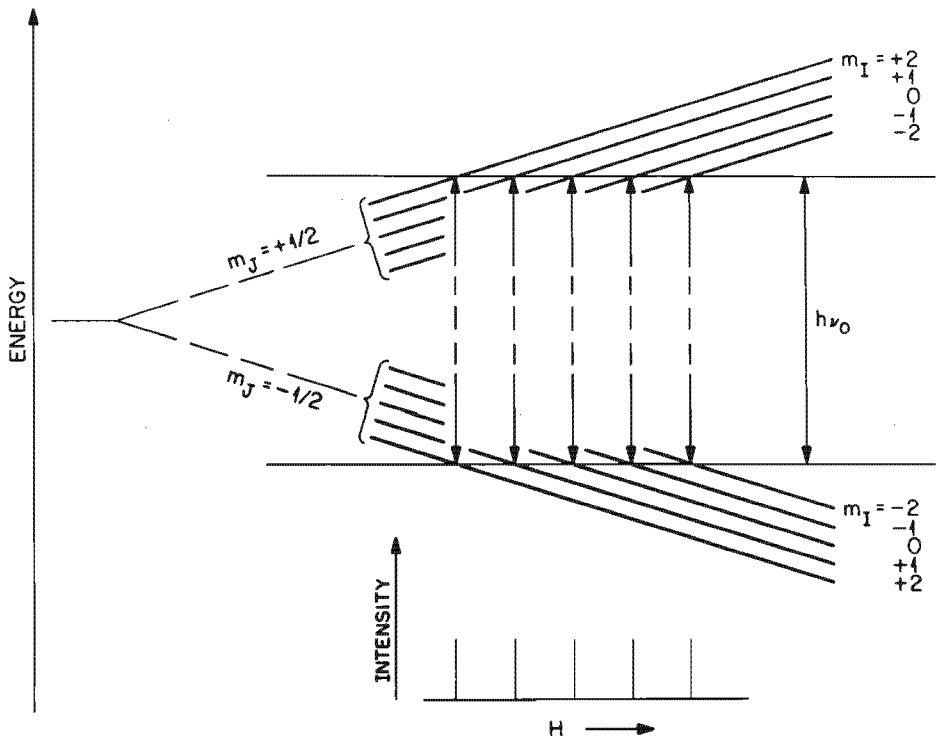

FIGURE 1. Schematic Zeeman energy level diagram for a state with $J=1/2$, $I=2$. The applied magnetic field H increases to the right. The spectrum for the hyperfine components of an $m_J=+1/2 \leftrightarrow -1/2$ transition is shown below.

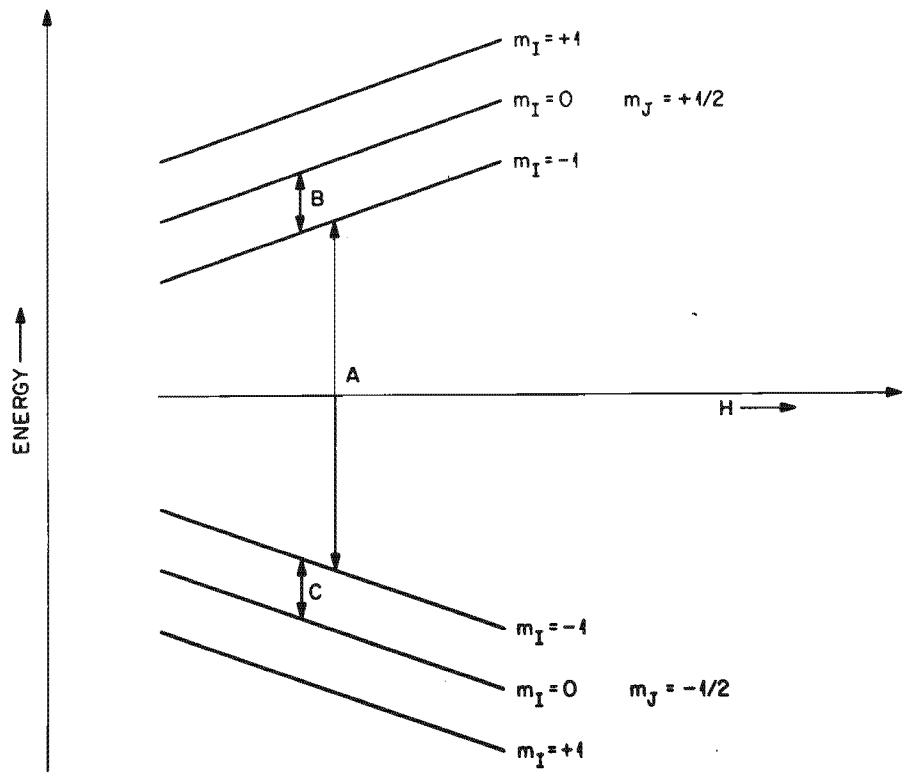

FIGURE 2. Schematic diagram of the energy levels and transitions involved in a typical ENDOR experiment. Transition A ($\Delta m_I=\pm 1$) is saturated by an intense microwave signal. The application of an rf field makes possible the observation of transitions B and C ($\Delta m_I=\pm 1$), from which g_I may be determined.

Explanation of Table B

Nucleus	Chemical symbol with $Z-$ and $A-$numbers
$T_{1/2}$	Half-life of radioactive nucleus
I	Nuclear spin, in units of $h/2\pi$
μ	Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction. See Policies, Diamagnetic corrections, for factors used
Q	Nuclear electric quadrupole moment, in barns, as given by the experimenter Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment.
Refer.	Reference key
μ^1/μ^2	Ratio of the magnetic moments of the indicated pair of nuclei as determined by the relative spread of the resonance pattern or by the ratio of the magnetic interaction constants Values marked with an 'e' are determined from the $g-$values.
Valence and Lattice	The valence of the paramagnetic ion and the chemical formula of the crystal used For diluted crystals, the chemical symbol of the element which is replaced by the element under study is italicized. The number of waters of crystallization is represented by the italicized number following the dot. Example: $Zn\mathrm{K}_2(\mathrm{SO}_4)_2{\cdot}6$ for ^{56}Co indicates that a small fraction of the Zn atoms are replaced by ^{56}Co atoms.

Table B: Nuclear Moments by Paramagnetic Resonance

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{1}_{1}H$					56W46	$\Delta\nu(^2S_{1/2})$=1420.40580 *6* MHz	
$^{14}_{7}N$				±0.014[c]	65Ev09		N impurity in diamond
$^{14}_{7}N$				+0.057 to 0.011‡	65Lo12		N impurity in diamond
						‡Depends upon choice of q, the field gradient at the nucleus	
$^{17}_{8}O$				−0.026* *3*	57K27		Atomic O
$^{17}_{8}O$				−0.0205[c]	62Ko22		
$^{17}_{8}O$				−0.0256*[c]5	68Sc18	a=−219.61 *5*MHz	$^3P_2$state
					(65Ha35)	b=−10.438 *30*MHz	
						a=4.738 *36*MHz	$^3P_1$state
						b=5.199 *90*MHz	atomic ^{17}O gas
$^{17}_{8}O$				−0.025*[c]*3*	69Go12		atomic ^{17}O gas
					(65Ha35)		
$^{17}_{8}O$				−0.0263*[c]	69Ke07		atomic ^{17}O gas
					(65Ha35)		
$^{17}_{8}O$				−0.02578*[c]	69Sc34		
					(65Ha35)		
$^{19}_{9}F$					61Ra14	$\Delta\nu(^2P_{3/2})$=4020.01 2MHz	
$^{25}_{12}Mg$		5/2			57W13		MgO, irradiated
$^{31}_{15}P$		1/2			54F41		P doped Si
$^{31}_{15}P$			±1.133[E] *1*		69Se11		$(PO_4)^{2-}$or $(PO_3)^{2-}$ natural $CaCO_3$ crystal
$^{32}_{15}P$	14d	1	−0.2523[E] *3*		57F32		^{32}P in Si plates
$^{33}_{16}S$		3/2[E]			65Lu06		1+ S doped Si
$^{47}_{22}Ti$		5/2			61Ga16		3+ $^{47}Ti_2(SO_4)_3$
$^{47}_{22}Ti$		5/2			62Mc05		3+ Al acetylacetonate
$^{47}_{22}Ti$		5/2			62Wa03		3+ $TiCl_3$
$^{47}_{22}Ti$					68Lo05	$^{47}/_{49}$=1.400 *1*	3+ CaF_2
$^{49}_{22}Ti$		7/2			61Ga16		3+ $^{49}Ti_2(SO_4)_3$
$^{49}_{22}Ti$		7/2			62Mc05		3+ Al acetylacetonate
$^{49}_{22}Ti$		7/2			62Wa03		3+ $TiCl_3$
$^{49}_{23}V$	330d	7/2[P]	±4.5[P]		57W17		4+ V−cupferron chelate
$^{50}_{23}V$	>40Jy	6	±3.34 *1*		52B63	$^{50}/_{51}$=0.651 *2*	2+ $K_4Fe(CN)_6 \cdot 3$
$^{50}_{23}V$	>40Jy	6	±3.346 *8*		53K41	$^{50}/_{51}$=0.6501 *14*	2+ $Zn(NH_4)_2(SO_4)_2 \cdot 6$
$^{51}_{23}V$		7/2			51B43		2+ $Zn(NH_4)_2(SO_4)_2 \cdot 6$
$^{51}_{23}V$		7/2			52B63		2+ $K_4Fe(CN)_6 \cdot 3$
$^{53}_{24}Cr$		3/2	±0.58		52B66		3+ $K_3Co(CN)_6$
$^{53}_{24}Cr$			±0.475		57L50		3+ MgO
$^{53}_{24}Cr$				−0.03[E]‡	61Te01		3+ Al_2O_3
						‡Magnitude and even sign may be wrong, from comparison of hyperfine fields and electric field gradients for impurities in corundum [63La16]	
$^{53}_{24}Cr$				<+0.05[Ec] −0.024[c]	64Ar23		3+ Al_2O_3
$^{53}_{24}Cr$			−0.4735[E]‡ *4*		67Wo04		3+ MgO at 4.2°K
						‡Includes estimated paramagnetic correction	

Table B: Nuclear Moments by Paramagnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{52}_{25}Mn$	5.7d	6	±2.97 *15*		61Je04	$^{52}/_{55}$=0.86 *4*	2+ $La_2Mg_3(NO_3)_{12}$· *24*
$^{53}_{25}Mn$	2My	7/2	±5.018 *7*		56D45	$^{53}/_{55}$=1.455 *2*	2+ powdered $SrCl_2$
$^{54}_{25}Mn$	290d	3	±3.28 *6*		61Je04	$^{54}/_{55}$=0.952 *18*	2+ $La_2Mg_3(NO_3)_{12}$· *24*
$^{55}_{25}Mn$		5/2			51B30		2+ $ZnSiF_6$· *6*
$^{55}_{25}Mn$			±3.469[E] *6*		60Lu02		1− Mn in Si
$^{55}_{25}Mn$				±0.20 *4*	60Sc17		3+ K_2CrO_4 crystal
$^{55}_{25}Mn$			±3.4		65Ik01		2+ Mn doped $BaTiO_3$
$^{55}_{25}Mn$			+3.4486 *15*		67Dy02		2+ MgO at 4.2°K
$^{55}_{25}Mn$			+3.444[E] *6*		67Es04		2+ MgO
$^{55}_{25}Mn$			±3.4502[E] *23*		67Mi04	$\gamma/2\pi$=10.500 *7* kHz/gauss	2+ $CaWO_4$, CaO, ZnS
$^{57}_{26}Fe$		1/2			57G16		3+ $FeCl_3$ and Borax
$^{57}_{26}Fe$		1/2			58L64		Fe doped Si
$^{57}_{26}Fe$			+0.0905[E] *7*		60Lu02		0 Fe doped Si
$^{57}_{26}Fe$			+0.09042[E] *7*		65Lo11		3+ Fe_2O_3 diffused in MgO
$^{57}_{26}Fe$			±0.09054[E] *15*		70Ca15		3+ natural Fe impurity in CaO
$^{56}_{27}Co$	77d	4	±3.822 *15*		56B69	$^{56}/_{59}$=0.828 *3*	2+ $ZnK_2(SO_4)_2$· *6*
$^{56}_{27}Co$	77d	4	±3.831 *12*		56J06	$^{59}/_{56}$=1.205 *2*	2+ $ZnK_2(SO_4)_2$· *6*
$^{57}_{27}Co$	270d	7/2	±4.62 *4*		56B69	$^{57}/_{59}$=1.00 *1*	2+ $ZnK_2(SO_4)_2$· *6*
$^{58}_{27}Co$	71d	1,2?	±4.032 *14*		57D38	$^{58}/_{59}$=0.8734 *24* $^{58}/_{60}$=1.0645 *20*	2+ $ZnK_2(SO_4)_2$· *6*
$^{59}_{27}Co$		7/2			51B38		2+ $Zn(NH_4)_2(SO_4)_2$· *6*
$^{60}_{27}Co$	5.3y	5	±3.781 *11*		56D08	$^{60}/_{59}$=0.8191 *16*	2+ $Zn(NH_4)_2(SO_4)_2$· *6*
$^{60}_{27}Co$	5.3y		±3.787 *18*		57D38	$^{58}/_{60}$=1.0645 *20*	2+ $ZnK_2(SO_4)_2$· *6*
$^{61}_{28}Ni$		3/2			58W52		Ni, As doped Ge
$^{61}_{28}Ni$			±0.9[c]		62Be15		2+ Ni doped Ge Ni doped MgO
$^{61}_{28}Ni$			±0.748[E] *7*		63Lo05		2+ Al_2O_3
$^{63}_{29}Cu$				±0.11	51A28		2+ Tutton salts
$^{63}_{29}Cu$				−0.16 *3*	55B21		2+ $La_2Mg_3(NO_3)_{12}$· *24*
$^{63}_{29}Cu$					63Bl27	A^{63}/A^{65}=0.933559[E] *7*	3+ Al_2O_3
$^{63}_{29}Cu$					68Ma22	$^{63}/_{65}$=0.9328 *8*	2+ $Mg(C_2H_3O_2)_2$
$^{63}_{29}Cu$				−0.15 *2*	69Ri07		2+ $ZnWO_4$
$^{65}_{29}Cu$				±0.11	51A28		2+ Tutton salts
$^{65}_{29}Cu$				−0.15 *3*	55B21		2+ $La_2Mg_3(NO_3)_{12}$· *24*
$^{65}_{25}Cu$					67Ga03	$^{65}/_{63}$=1.063 *2*	2+ doped $ZnWO_4$ crystal
$^{65}_{29}Cu$				0.14 *2*	69Ri07		2+ $ZnWO_4$
$^{75}_{33}As$		3/2			54F41		As doped Si
$^{76}_{33}As$	26.5h	2(1?)	−0.903 *5*		58P43	$^{76}/_{75}$=−0.6293 *4*	As doped Si
$^{87}_{38}Sr$		9/2		+0.154	65Cu05		n irradiated SrO crystal
$^{93}_{41}Nb$			±6.17 *16*		69Ki19		4+ $CaWO_4$
$^{95}_{42}Mo$		5/2			56O04		5+ $K_3(InCl_6)$· *2*
$^{97}_{42}Mo$		5/2			56O04		5+ $K_3(InCl_6)$· *2*
$^{99}_{43}Tc$	210ky	9/2			58L62		4+ K_2PtCl_6 crystal
$^{99}_{44}Ru$		5/2			52G19	$^{101}/_{99}$=1.09 *3*	3+ $Co(NH_3)_6Cl_3$
$^{99}_{44}Ru$					68Ya06	$^{101}/_{99}$=1.12	3+ TiO_2(4.2°K)
$^{101}_{44}Ru$		5/2			52G19		3+ $Co(NH_3)_6Cl_3$

Table B: Nuclear Moments by Paramagnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{110m}_{47}Ag$	253d	6	±3.55‡ *4*		66Ea01		2+ $[(iso\text{-}C_3H_7)_2NCS_2]Ag$
						‡Includes Δ(hfs anomaly) correction=(3.7 *10*)%	
$^{119}_{50}Sn$					67Su06	$^{119}/_{117}$=1.046 *2*	3+ Sn doped ZnS
$^{121}_{51}Sb$			±3.3600[E] *17*		58E03	$^{121}/_{123}$=1.31437 *6*	Sb doped Si
$^{122}_{51}Sb$	2.8d	2	−1.904[E] *20*		58P45	$^{122}/_{121}$=−0.5678 *4*	Sb doped Si
$^{123}_{51}Sb$			±2.5484[E] *10*		58E03		Sb doped Si
$^{141}_{58}Ce$	33d	7/2	±0.89 *9*		57K13		3+ $La_2Mg_3(NO_3)_{12}\cdot$ *24*
$^{141}_{58}Ce$	33d		±1.18[c] *12*		62Li06		
$^{141}_{58}Ce$	33d		±0.968[c] *30*		63Bl25		
$^{141}_{59}Pr$		5/2			51D28		3+ $PrCl_3\cdot$ *7*
$^{141}_{59}Pr$		5/2	±3.94 *20*		58B35		3+ $Y(C_2H_5SO_4)_3\cdot$ *9*
$^{141}_{59}Pr$		5/2	±4.6		58Hu17		3+ $LaCl_3$
$^{141}_{59}Pr$			±4.0[c]		62Fr14		
$^{141}_{59}Pr$			±5.1[c] *3*		62Li06		
					(58B35)		
$^{141}_{59}Pr$			±4.24[c] *10*		63Bl25		
$^{143}_{60}Nd$		7/2	±1.04	±<1	55Bl51	$^{143}/_{145}$=±1.6083 *12*	3+ $La(C_2H_5SO_4)_3\cdot$ *9*
$^{143}_{60}Nd$		7/2			57K13	$^{143}/_{145}$=±1.614 *2*	3+ $La_2Mg_3(NO_3)_{12}\cdot$ *24*
$^{143}_{60}Nd$		7/2	±1.1		58Hu17		3+ $LaCl_3$
$^{143}_{60}Nd$			±0.99[c]		62Fr14		
$^{143}_{60}Nd$			−1.086[E] *60*	+0.0206 *30*	62Ha29		3+ $LaCl$
$^{143}_{60}Nd$			±1.24[c] *20*		62Li06		
					(55Bl51)		
$^{143}_{60}Nd$			±1.10 *10*		66Er08	$^{143}/_{145}$=1.60892 *10*	3+ $LaCl_3$ at 14,4°K; H_o=0
						=1.60886 *29*	3+ $La(C_2H_5SO_4)_3\cdot$9 at 4°K;
						Q^{143}/Q^{145}=−‡1.45 *65*	H_o=0
						‡Some confusion of signs in paper	
$^{145}_{60}Nd$		7/2	±0.64	±<1	55Bl51		3+ $La(C_2H_5SO_4)_3\cdot$9
$^{145}_{60}Nd$		7/2	±0.7		58Hu17		3+ $LaCl_3$
$^{145}_{60}Nd$			+0.675[E] *40*	+0.0105 *20*	62Ha29	$^{143}/_{145}$=+1.60883 *4*	3+ $LaCl$
						Q^{143}/Q^{145}=+1.96 *2*	
$^{145}_{60}Nd$			±0.77[c] *20*		62Li06		
					(55Bl51)		
$^{145}_{60}Nd$			±0.68 *7*		66Er08		3+ $LaCl_3$; H_o=0
							3+ $La(C_2H_5SO_4)_3\cdot$9; H_o=0
$^{147}_{60}Nd$	11d	5/2	±0.56 *6*		57K13	$^{143}/_{147}$=±1.844 *2*	3+ $La_2Mg_3(NO_3)_{12}\cdot$*24*
$^{147}_{60}Nd$	11d		±0.589 *30*		62Ha29	($^{143}/_{147}$=1.844 *2*)	
$^{147}_{60}Nd$	11d		±0.67[c] *7*		62Li06		
$^{147}_{61}Pm$	2.6y	7/2	±3.0 *3*		61St18		3+ $La(C_2H_5SO_4)_3\cdot$9
$^{147}_{61}Pm$	2.6y		±2.55[c] *6*		63Bl25		
$^{147}_{62}Sm$		7/2			52B21	$^{147}/_{149}$=±1.222 *8*	3+ $La(C_2H_5SO_4)_3\cdot$9
$^{147}_{62}Sm$			±0.83 *15*	±<0.7	55Bl51		3+ $La(C_2H_5SO_4)_3\cdot$9
$^{147}_{62}Sm$		7/2	±0.86		58Hu17		3+ $LaCl_3$
$^{147}_{62}Sm$			±0.85[c]		62Fr14		
$^{147}_{62}Sm$			±1.04[c] *18*		62Li06		
					(55Bl51)		
$^{147}_{62}Sm$			±0.812[c] *22*		63Bl25		
$^{149}_{62}Sm$		7/2			52B21		3+ $La(C_2H_5SO_4)_3\cdot$9
$^{149}_{62}Sm$			±0.68 *10*	±<0.7	55Bl51		3+ $La(C_2H_5SO_4)_3\cdot$9
$^{149}_{62}Sm$		7/2	±0.75		58Hu17		3+ $LaCl_3$

Table B: Nuclear Moments by Paramagnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{149}_{62}Sm$			±0.85[c] *15*		62Li06		
					(55Bl51)		
$^{149}_{62}Sm$			±0.656[c] *18*		63Bl25		
$^{151}_{63}Eu$		5/2			55B16	$^{151}/_{153}$=±2.24 *3*	2+ SrS phosphor
$^{151}_{63}Eu$					57A05	$^{151}/_{153}$=±2.264 *6*	2+ KCl powder
$^{151}_{63}Eu$		5/2			57M19	$^{151}/_{153}$=+2.24	2+ SrS•Eu
$^{151}_{63}Eu$			+3.465[E] *2*		62Ba12	$^{151}/_{153}$=2.2632[E] *26*	2+ CaF_2
						$^{151}/_{153}$=2.25313 *15*	
$^{151}_{63}Eu$					69Ab12	$^{151}/_{153}$=2.263 *14*	2+ ThO_2 at <77°K
						Q^{151}/Q^{153}=0.391 *8*	
$^{151}_{63}Eu$			+3.468‡[E] *2*		70Ki13	$^{151}/_{153}$=2.266[E] *5*	2+ $CaWO_4$
						A^{151}/A^{153}=2.2533 *3*	
						Q^{151}/Q^{153}=0.39198 *12*	
						‡Spherical average; g_I anisotropic.	
						Note: Assuming a linear dependence of g and g_I on Q_o^o, the spherical average quadrupole coupling, they get g=2.0027 and μ_{cor}=3.454 at Q_o^o=0.	
$^{152}_{63}Eu$	13y	3	±1.93 *2*		57A05	$^{152}/_{151}$=±0.5574 *60*	2+ KCl powder
$^{152}_{63}Eu$	13y	3	±1.96 *2*		57M19	$^{151}/_{152}$=±1.77 *2*	2+ SrS•Eu
$^{153}_{63}Eu$		5/2	±1.55 *2*		55B16	$^{151}/_{153}$=2.24 *3*	2+ SrS phosphor
$^{153}_{63}Eu$			+1.531[E] *2*		62Ba12		2+ CaF_2
$^{153}_{63}Eu$			+1.531‡[E] *3*		70Ki13	‡Spherical average; g_I anisotropic.	
$^{154}_{63}Eu$	16y	3	±2.000 *6*		57A05	$^{154}/_{153}$=±1.308 *4*	2+ KCl powder
$^{155}_{64}Gd$		3/2	±0.23 *2*		56L29	$^{155}/_{157}$=±0.75 *7*	3+ $Bi_2Mg_3(NO_3)_{12}$•*24*
$^{155}_{64}Gd$		3/2	±0.240 *4*		57M55	$^{155}/_{157}$=±0.736 *12*	3+ SrS•^{155}Gd
$^{155}_{64}Gd$					59L63	$^{155}/_{157}$=±0.7495 *45*	3+ ThO_2•Gd
$^{155}_{64}Gd$					60He17	$^{155}/_{157}$=±0.763 *6*	3+ $CaWO_4$
$^{155}_{64}Gd$			±0.28[c] *4*		63Bl25		
$^{155}_{64}Gd$			−0.254 *3*		65Hu14	($^{155}/_{157}$=0.7495 *45*)	3+ ThO_2
$^{155}_{64}Gd$					67Ma56	$^{155}/_{157}$=0.7628 *8*	3+ ThO_2 crystal
$^{155}_{64}Gd$					68Ma48	$^{155}/_{157}$=0.7624 *10*	3+ $CaCO_3$
$^{155}_{64}Gd$			−0.2585[E] *6*		69Ba15	$^{155}/_{157}$=0.7633[E] *45*	3+ CeO_2 crystal
						A^{155}/A^{157}=0.7621 *5*	
$^{155}_{64}Gd$					70Ra42	Q^{155}/Q^{157}=0.94 *1*	3+ YPO_4 crystal
$^{157}_{64}Gd$		3/2	±0.306‡		56L29	^{151}Eu/^{157}Gd=±11.3	3+ $Bi_2Mg_3(NO_3)_{12}$•*24*
						‡Used $\mu(^{151}Eu)_{uncorrected}$=3.440 *1*	
$^{157}_{64}Gd$		3/2	±0.327‡ *1*		57M55	^{151}Eu/^{157}Gd=±10.60 *3*	3+ SrS•^{157}Gd
						‡Used $\mu(^{151}Eu)_{uncorrected}$=3.440 *1*	
$^{157}_{64}Gd$			±0.38[c] *5*		63Bl25		
$^{157}_{64}Gd$			−0.339[E] *3*		65Hu14		3+ ThO_2 crystal
$^{157}_{64}Gd$			−0.3381[E] *6*		69Ba15		3+ CeO_2 crystal
			−0.3395[E] *6*				3+ ThO_2
$^{157}_{65}Tb$	>30y	[3/2]	±2.0 *1*		68Ea04		3+ $Y(C_2H_5SO_4)_3$•9
$^{158}_{65}Tb$	150y	3	±1.753 *7*	+2.7 *5*	68Ea04		3+ $Y(C_2H_5SO_4)_3$•9
$^{159}_{65}Tb$		3/2	±1.52 *8*		58B35		3+ $Y(C_2H_5SO_4)_3$•9
$^{159}_{65}Tb$		3/2	±1.5		58Hu17		3+ $LaCl_3$
$^{159}_{65}Tb$			±1.90[c]		62Li06		
					(58B35)		
$^{159}_{65}Tb$			±1.90[c] *5*		63Bl25		
$^{159}_{65}Tb$			±1.6 *2*		63Lo07	Used $<r^{-3}>$ of Lindgren	3+ CaF_2
$^{159}_{65}Tb$			+2.008[E] *4*		65Ba49		4+ ThO_2
$^{160}_{65}Tb$	72d		±1.697 *8*	+3.0 *5*	68Ea04		3+ $Y(C_2H_5SO_4)_3$•9

Table B: Nuclear Moments by Paramagnetic Resonance – Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{161}_{66}Dy$		5/2	−?0.37 *4*	+?1.1 *4*	58P11	$^{163}/_{161}$=−1.39 *2* Q^{163}/Q^{161}=+1.18 *15*	3+ $La_2Mg_3(NO_3)_{12}$•*24*
$^{161}_{66}Dy$			±0.46[c] *5*		62Li06		
$^{161}_{66}Dy$			±0.455[c] *10*	+1.35[c] *30*	63Bl25		
$^{161}_{66}Dy$			−?0.46[c] *4*		65Of03		3+ $La_2Mg_3(NO_3)_{12}$•*24*
$^{161}_{66}Dy$			−0.472[c] *12*		68Mu01		
$^{163}_{66}Dy$		5/2	+?0.51 *6*	+?1.3 *4*	58P11		3+ $La_2Mg_2(NO_3)_{12}$• *24*
$^{163}_{66}Dy$			±0.65[c] *8*		62Li06		
$^{163}_{66}Dy$			+0.635[c] *14*	+1.62[c] *40*	63Bl25		
$^{165}_{67}Ho$		7/2	+3.31 *17*	+0.7 *7*	58B35		3+ $Y(C_2H_5SO_4)_3$•*9*
$^{165}_{67}Ho$		7/2	±3.4		58Hu17		3+ $LaCl_3$
$^{165}_{67}Ho$			±3.5[c]		62Fr14		
$^{165}_{67}Ho$			±4.1[c]		62Li06 (58B35)		
$^{165}_{67}Ho$			+4.03[c] *15*		63Bl25		
$^{167}_{68}Er$		7/2			51B09		3+ $La(C_2H_5SO_4)_3$•*9*
$^{167}_{68}Er$			±0.48	±9.4	55Bl51		3+ $La(C_2H_5SO_4)_3$•*9*
$^{167}_{68}Er$		7/2	±0.11		58Hu17		3+ $LaCl_3$
$^{167}_{68}Er$				±4*[c]	58Mu08		
$^{167}_{68}Er$			±0.50[c]		62Fr14		
$^{167}_{68}Er$			±0.58[c]		62Li06 (55Bl51)		
$^{167}_{68}Er$			±0.563[c] *6*		63Bl25		
$^{167}_{68}Er$			±0.56 *5*		63Ra24		3+ CaF_2 crystal
$^{167}_{68}Er$			±0.56		65Ab01		3+ Er_2O_3 doped ThO_2 crystal
$^{167}_{68}Er$				+3.0 *4*	66Be25	$\mu/Q<0$	3+ *MgO*
$^{169}_{69}Tm$		1/2	±0.24 *1*		61Ha37		3+ Tm doped CaF_2
$^{169}_{69}Tm$		1/2	±0.23 *2*		63Lo07	Used $<r^{-3}>$of Lindgren	2+ *CaF_2*
$^{169}_{69}Tm$			±0.236‡[E] *3*		65Be34		2+ *CaF_2*
						‡$g_I$corrected for admixture of Γ_8−excited state to Γ_7−ground state	
$^{171}_{70}Yb$		1/2	±0.43 *5*		56C21	$^{173}/_{171}$=±1.39 *1*	3+ $Y(CH_3COO)_3$•*4*
$^{171}_{70}Yb$		1/2	±0.41 *5*		60Lo01	$^{173}/_{171}$=1.3749 *50*	3+ *CaF_2*; site I
$^{171}_{70}Yb$			±0.52[c] *6*		62Li06 (56C21)		
$^{171}_{70}Yb$			±0.52 *5*		63Lo07, 62Lo08	Used $<r^{-3}>$of Lindgren	3+ *CaF_2*; site II
$^{171}_{70}Yb$			±0.50		65Ab01		3+ Yb doped ThO_2
$^{171}_{70}Yb$					69Ba10	A^{171}/A^{173}=−3.6302[E] *4*	3+ *CaF_2*
$^{173}_{70}Yb$		5/2	±0.60 *5*		56C21		3+ $Y(CH_3COO)_3$•*4*
$^{173}_{70}Yb$		5/2	±0.57 *5*		60Lo01		3+ *CaF_2*; site I
$^{173}_{70}Yb$			±0.63[c]		62Fr14		
$^{173}_{70}Yb$			±0.72[c] *7*		62Li6 (56C21)		
$^{173}_{70}Yb$			±0.70 *5*	±2.6 *2*	63Lo07, 62Lo08	$^{173}/_{171}$=1.362 Used $<r^{-3}>$of Lindgren	3+ *CaF_2*; site II
$^{173}_{70}Yb$			±0.68		65Ab01	$^{173}/_{171}$=1.378 *3*	3+ Yb doped ThO_2
$^{173}_{70}Yb$					66Ti04	$^{173}/_{171}$=1.383 *8*	3+ (Yb+P) doped ZnTe
$^{173}_{70}Yb$					68Re06	$^{173}/_{171}$=1.378 *2*	3+ $SrCl_2$

Table B: Nuclear Moments by Paramagnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	μ^1/μ^2	Valence and Lattice
$^{191}_{77}$Ir			+0.147[E] *8*		69Da11	$^{191}/_{193}$=0.9165 *3*	4+ $(NH_4)_2PtCl_6$ at 4°K
$^{191}_{77}$Ir					70Su11	$^{191}/_{193}$=0.936 *26*	4+ $IrCl_4$ in MgO at 77°K, irradiated
$^{193}_{77}$Ir			+0.163[E] *6*		69Da11	Q^{193}/Q^{191}=+0.92 *9*	4+ $(NH_4)_2PtCl_6$ at 4°K
$^{197}_{79}$Au			+0.1453[E] *4*		60Wo02		0 (Cr,Au) doped Si
$^{231}_{91}$Pa	34ky	3/2			60Ky1		4+ $PaCl_4$ in Cs_2ZrCl_6
$^{231}_{91}$Pa	34ky	3/2	±1.98[E] *2*		61Ax1		4+ Cs_2ZrCl_6 crystal
$^{233}_{92}$U	162ky	5/2	±0.54	±3.5 *7*	57D40	$^{235}/_{233}$=±0.651 *2* Q^{235}/Q^{233}=±1.17 *20* μ/Q=±0.152 *15*	3+ $LaCl_3$
$^{235}_{92}$U	710My	7/2	±0.38 or ±0.31		56H26		3+ $LaCl_3$
$^{235}_{92}$U	710My		+?0.35	−?3.8 *8*	56Bl29		3+ $LaCl_3$ and $^{235}UCl_3$
$^{235}_{92}$U	710My		±0.35	±4.1	57D40	$^{235}/_{233}$=0.651 *2*	3+ $LaCl_3$
$^{237}_{93}$Np	2.1My	5/2	±6.0 *25*		54B73		$(NpO_2)^{2+}$ $UO_2Rb(NO_3)_3$
$^{237}_{93}$Np	2.1My		±2.70‡		60Hu14	‡Used $<r^{-3}>=50\times10^{24}cm^{-3}$	UF_6; NpF_6
$^{237}_{93}$Np	2.1My		±3.2[c] *9* or ±2.6[c]‡ *7*		65Ei05	‡Using $<r^{-3}>=50\times10^{24}cm^{-3}$	$Rb(NpO_2)(NO_3)_3$
$^{237}_{93}$Np	2.1My		±2.1 *4*		69Le11		$(NpO_2)^{2+}$
						$B/P<0$	$Cs_2UO_2Cl_4$ at 4°K
			±2.9 *6*			$A/P<0$	$Cs_2UO_2(NO_3)_3$ at 4°K
$^{239}_{93}$Np	2.3d	>1/2			58A18		$(NpO_2)^{2+}$ $UO_2Rb(NO_3)_3$
$^{239}_{94}$Pu	24ky	1/2	±0.4 *2*		54B72	$^{241}/_{239}$=±3.53 *2*	$(PuO_2)^{2+}$ $UO_2Rb(NO_3)_3$
$^{239}_{94}$Pu	24ky	1/2			58A18		$(PuO_2)^{2+}$ $UO_2Rb(NO_3)_3$
$^{239}_{94}$Pu	24ky				70Ko32	$^{249}/_{239}$=3.590[E] *10*	3+ CaF_2
$^{241}_{94}$Pu	13y	5/2	±1.4 *6*		54B72		$(PuO_2)^{2+}$ $UO_2Rb(NO_3)_3$
$^{241}_{95}$Am	460y	5/2			68Ed01 67Ea04	$^{241}/_{243}$=1.0088 *15*	2+ CaF_2 crystal
$^{241}_{95}$Am	460y				70Ab03	$^{241}/_{243}$=1.008 *1*	2+ $SrCl_2$ crystal
$^{243}_{96}$Cm	28y	5/2	≈±0.40‡		73Ab03	$^{243}/_{245}$=0.79 *1* $^{243}/_{247}$=1.105 *8* ‡Using $\mu(^{241}Am)$ of 66Ar04. Not corrected for differences in $<r^{-3}>$ between Am^{2+} and Cm^{3+}.	3+ $SrCl_2$ crystal at liquid He temperatures
$^{245}_{96}$Cm	8.26ky	7/2	±0.5‡ *1*		70Ab03	‡Using $\mu(^{241}Am)$ of 66Ar04	3+ $SrCl_2$ crystal
$^{247}_{96}$Cm	15.4My	9/2	≈±0.36‡		73Ab03	$^{245}/_{247}$=1.41 *1* ‡Using $\mu(^{241}Am)$ of 66Ar04	3+ $SrCl_2$ crystal
$^{253}_{99}$Es	20.5d	7/2	±3.62 *50*		71Ed04 70Ed02		2+ CaF_2; cubic sites

* Polarization or Sternheimer correction included

[c] Recalculation of earlier data

[E] ENDOR (electron–nuclear double resonance) experiment

[m] Metastable or excited state

[p] Preliminary value from meeting abstract, thesis, private communication, etc.

Table C: Nuclear Moments by Microwave Spectroscopy

Introduction

The technique of microwave spectroscopy is used in the study of the pure rotational spectrum of gas molecules which usually are in the ground electronic state. The rotational states are split by the interaction of the nuclear electric quadrupole moment with the nonuniform molecular electric field at the nucleus.

One can infer the nuclear spin from the number, relative spacing, and relative intensities of the absorption lines observed in the microwave region. The spacing of the lines enables one to calculate the quadrupole coupling constant, from which the electric quadrupole moment can be determined. In view of the difficulties associated with calculating the electric field inhomogeneity and the effect of the polarization of the atomic electron core (Sternheimer effect), the computed values of the quadrupole moment are subject to appreciable uncertainties. No attempt has been made here to evaluate these uncertainties.

If the substance being studied is placed in an external magnetic field, the rotational magnetic moments and the nuclear magnetic moment interact with this field giving rise to a Zeeman splitting in the spectrum from which μ can be determined.

Detailed discussions of the technique can be found in *Microwave Spectroscopy*, W. Gordy, W. V. Smith, and R. F. Trambarulo [53Go38] and *Microwave Spectroscopy*, C. H. Townes and A. L. Schawlow [55To31]. Some of the more recent techniques and applications as well as general theory are described in *Microwave Molecular Spectroscopy* by W. Gordy and R. L. Cook [70Go50].

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table C

Nucleus — Chemical symbol with $Z-$ and $A-$numbers

I — Nuclear spin, in units of $h/2\pi$

μ — Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction. See Policies, Diamagnetic corrections, for factors used

Q — Nuclear electric quadrupole moment, in barns, as given by the experimenter
Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment.

Refer. — Reference key

eqQ ratio — Ratio of the electric quadrupole coupling constants for the two nuclei indicated

eqQ — Electric quadrupole coupling constant in MHz
When the quantity is enclosed in parentheses, ( ), the value has not been measured by the author quoted, but has been used by him to calculate the value of Q.

Compound — Compound used

Table C: Nuclear Moments by Microwave Spectroscopy

Nucleus	I	μ	Q	Refer.	eqQ ratio	eqQ	Compound
$^{10}_{5}B$	3		≈+0.06	50G10	$^{10}/_{11}$=+2.17	+3.36 *10*	$BH_3{}^{12}CO$
$^{10}_{5}B$	3			50W03		+3.44 *1*	$H_3{}^{10}BCO$
$^{11}_{5}B$	3/2		≈+0.03	50G10		+1.55 *8*	$BH_3{}^{12}CO$
$^{14}_{7}N$	1			46C10		+10	NH_3
$^{14}_{7}N$	1		+0.02	48T10		−3.63 *10*	ClCN
$^{14}_{7}N$			+0.01	50S51		−7.07	NF_3
$^{14}_{7}N$			+0.0071[c]	55B54		(+4.58 *5*)	HCN
$^{14}_{7}N$			+0.016[c] *7*	60Li10		eqQ=−1.7 $eq'Q$=22	NO
$^{14}_{7}N$			+0.0094[c]	61Ka31		(−4.10)	ND_3
$^{17}_{8}O$	5/2			52G26		−1.32 *7*	$^{17}O^{12}C^{32}S$
$^{17}_{8}O$	5/2			52M26			$^{16}O^{17}O$
$^{17}_{8}O$			−0.026 *9*	57S93		−8.1 *1*	HDO
$^{18}_{8}O$	0[♦]		<0.004	48T10		<1	OCS
$^{18}_{8}O$	0[■]			51M20			$^{16}O^{18}O$; $^{18}O_2$
$^{19}_{9}F$	1/2[♦]		<0.0003	49G28		<0.5	PF_3
$^{28}_{14}Si$	0[♦]			49T09			SiH_3Cl
$^{29}_{14}Si$	1/2[♦]		<0.0001	53W39		<0.05	SiD_3F
$^{30}_{14}Si$	0[♦]			49T09			SiH_3Cl
$^{31}_{15}P$	1/2[♦]			49G28			PF_3
$^{33}_{16}S$	3/2		-0.05^{+5}_{-3}	48T13		−28.5 *7*	OCS
$^{33}_{16}S$	3/2	+0.634 *10*		52E07		−29.07 *1*	$^{16}O^{12}C^{33}S$
$^{33}_{16}S$			−0.06*	53B92		+40	H_2S
$^{33}_{16}S$			−0.058 *10*	54B40			Several
$^{33}_{16}S$			−0.056[c]	62Ko22 (54B40)			
$^{34}_{16}S$	0[♦]		<0.002	48T10		<1	OCS
$^{35}_{16}S$	3/2		$+0.06^{+6}_{-3}$	51W11	$^{33}/_{35}$ negative	+20.5 *2*	OCS
$^{35}_{16}S$		+1.00 or −1.07 *4*		54B05		+21.90 *4*	OCS
$^{35}_{16}S$			+0.045* *10*	54B40	($^{35}/_{33}$=−0.695)		Several
$^{36}_{16}S$	0[♦]		<0.01	49L21		<5	OCS
$^{35}_{17}Cl$	3/2		−0.077	48T10 49T17			Several
$^{35}_{17}Cl$				49G25	$^{35}/_{37}$=+1.2704 *4*	−145.94 *26*	FCl
$^{35}_{17}Cl$				50S56	$^{35}/_{37}$=+1.2768 *40*	−103.60 *15*	BrCl
$^{35}_{17}Cl$				51G06	$^{35}/_{37}$=1.2670 *5*		GeH_3Cl
					$^{35}/_{37}$=+1.2682 *6*		ClCN
					$^{35}/_{37}$=+1.2691 *3*		CH_3Cl
$^{36}_{17}Cl$	2		−0.0172 *4*	49T10			$^{36}Cl^{12}C^{14}N$
$^{36}_{17}Cl$	2		−0.0168 *1*	51J21		−15.87 *9*	CH_3Cl
$^{36}_{17}Cl$	2		−0.0164 *8*	52G04		−15.6 *6*	$CH_3{}^{36}Cl$
$^{36}_{17}Cl$	2	+1.31 *8*		55A23	g^{36}/g^{35}=±1.20 *7*	−15.83 *20*	$CH_3{}^{36}Cl$
$^{37}_{17}Cl$	3/2		−0.061	48T10		−65.7 *5*	$^{37}Cl^{12}C^{14}N$
$^{37}_{17}Cl$				49G25		−114.92 *26*	FCl
$^{55}_{25}Mn$	5/2		$+0.55^{+50}_{-25}$	54J16		+16.8	MnO_3F
$^{69}_{31}Ga$				70Ho23	$^{69}/_{71}$=1.5871 *10*	−107.07 *8*	^{69}GaF
$^{71}_{31}Ga$				70Ho23		−67.46 *8*	^{71}GaF

Table C: Nuclear Moments by Microwave Spectroscopy — Continued

Nucleus	I	μ	Q	Refer.	eqQ ratio	eqQ	Compound
$^{70}_{32}Ge$	0♦		<0.007	49T09			GeH_3Cl
$^{72}_{32}Ge$	0♦		<0.007	49T09			GeH_3Cl
$^{73}_{32}Ge$	9/2		−0.21 *10*	49T09		−95 *3*	GeH_3Cl
$^{73}_{32}Ge$			−0.21[c]	62Ko22			
				(49T09)			
$^{74}_{32}Ge$	0♦		<0.007	49T09			GeH_3Cl
$^{76}_{32}Ge$	0♦		<0.007	49T09			GeH_3Cl
$^{75}_{33}As$	3/2			48D08		−235	AsF_3
$^{74}_{34}Se$	0♦			49S07		<0.5	OCSe
$^{74}_{34}Se$	0♦		<0.002	50G05			OCSe
$^{75}_{34}Se$	5/2		+1.1 *2*	55A06	$^{75}/_{79}$=+1.25783 *62*	+946.0	$OC^{75}Se$
$^{76}_{34}Se$	0♦			49S07		<0.5	OCSe
$^{76}_{34}Se$	0♦		<0.002	50G05			OCSe
$^{77}_{34}Se$	1/2♦			49S07		<0.5	OCSe
$^{77}_{34}Se$	1/2♦		<0.002	50G05		<1.0	OCSe
$^{78}_{34}Se$	0♦			49S07		<0.5	OCSe
$^{78}_{34}Se$	0♦		<0.002	50G05			OCSe
$^{79}_{34}Se$	7/2	−1.018 *15*	+0.7 *2*	53H50		+752.09 *5*	OCSe
$^{79}_{34}Se$			+0.9* *2*	54B40		(752.09)	OCSe
$^{79}_{34}Se$			+0.8[c]	62Ko22			
				(54B40)			
$^{80}_{34}Se$	0♦			49S07		<0.5	OCSe
$^{80}_{34}Se$	0♦		<0.002	50G05			OCSe
$^{82}_{34}Se$	0♦			49S07		<0.5	OCSe
$^{82}_{34}Se$	0♦		<0.002	50G05			OCSe
$^{79}_{35}Br$			+0.28	48G25	$^{79}/_{81}$=+1.197	+686.0	BrCN
			+0.24		$^{79}/_{81}$=+1.197	+577.0	CH_3Br
$^{79}_{35}Br$	3/2		+0.28	48T10		+686.5 *5*	BrCN
$^{79}_{35}Br$				50S56	$^{79}/_{81}$=+1.1963 *14*	+876.8 *9*	BrCl
$^{79}_{35}Br$			+0.31	51G37			Several
$^{79}_{35}Br$				54R43	$^{79}/_{81}$=+1.19711 *12*		PBr_2
$^{81}_{35}Br$			+0.23	48G25	$^{79}/_{81}$=1.197	+573.0	BrCN
			+0.19			+482.0	CH_3Br
$^{81}_{35}Br$	3/2		+0.23	48T10		+573.5 *5*	BrCN
$^{81}_{35}Br$				50S56		+732.9 *5*	BrCl
$^{81}_{35}Br$			+0.26	51G37			Several
$^{115}_{49}In$				70Ho23	$^{115}/_{113}$=1.0139 *4*		^{115}InF
$^{121}_{51}Sb$	5/2			51L24	$^{121}/_{123}$=+0.791	−455	SbH_2D
$^{121}_{51}Sb$			-0.8^{+1}_{-6}	55J30	$^{121}/_{123}$=0.784 *2*	458.7 *8*	SbH_3
						465.4 *8*	SbD_3
$^{123}_{51}Sb$	7/2			51L24		−575	SbH_2D
$^{123}_{51}Sb$			-1.0^{+1}_{-8}	55J30		586.0 *8*	SbH_3
						592.8 *8*	SbD_3
$^{125}_{53}I$	5/2	±3.0 *10*	−0.89[b]	58F39	$^{125}/_{127}$=1.127	−2179 *1*	$CH_3{}^{125}I$
$^{127}_{53}I$	5/2		−0.59	48G25		−1934	CH_3I
$^{127}_{53}I$		±2.807		49G19			CH_3I
$^{127}_{53}I$			−0.75	49T17			Several
$^{127}_{53}I$			−0.65	51G37			Several
$^{129}_{53}I$		±2.74 *14*		49G19			CH_3I
$^{129}_{53}I$	7/2		−0.58[b]	49L09	$^{129}/_{127}$=+0.7353	−1422	CH_3I
$^{129}_{53}I$			−0.47[c]	51G37			

Table C: Nuclear Moments by Microwave Spectroscopy — Continued

Nucleus	I	μ	Q	Refer.	eqQ ratio	eqQ	Compound
$^{131}_{53}I$	7/2		−0.40[b]	53L24	$^{131}/_{127}$=+0.5031	−973 *9*	$CH_3{}^{131}I$
$^{131}_{53}I$	7/2	+2.56 *12*	−0.40	58F39	$^{131}/_{127}$=+0.5036	−974 *1*	CH_3I
$^{185}_{75}Re$	5/2		+2.8	54J16	$^{185}/_{187}$=+1.067 *45*	+270 *6*	ReO_3Cl
$^{187}_{75}Re$	5/2			54J16		+253 *6*	ReO_3Cl

* Polarization or Sternheimer correction included

♦ No hyperfine structure observed

* Do not see K=8, 6, and 4 lines of $^{18}O_2$ spectrum, which indicates the spin is zero

[b] Calculated from eqQ–ratio and Q^{127}=0.79 as measured by atomic beams

[c] Recalculation of earlier data

Table D: Nuclear Moments by Quadrupole Resonance

Introduction

In a diamagnetic molecule or crystal, a nucleus possessing an electric quadrupole moment will interact with a nonuniform electric field arising from the charge distribution of its environment. This interaction causes a splitting of electronic energy levels resulting from the possible orientations of the nuclear spin with respect to a reference axis. For an electric field with axial symmetry, the levels for $+m_I$ and $-m_I$ are degenerate and the spacing between levels with $m_I = \pm I, \pm(I-2) \ldots$ is given by $[3eqQ/4I(2I-1)]\cdot(2I-1)$, $(2I-3) \ldots$, where m_I is the projection of I on the axis and q is the electric field gradient at the nucleus. Transitions between the levels can be induced and detected by radio-frequency absorption techniques similar to those used in magnetic resonance. The values of the quadrupole coupling constants can be determined from the resonant frequencies.

Ratios of quadrupole moments of two isotopes can be obtained quite accurately from the ratios of the resonant frequencies for the respective isotopes. The determination of the quadrupole moment from the coupling constant depends upon a calculation of the field inhomogeneity at the nucleus which may be uncertain by a few percent. In addition, the nuclear electric quadrupole moment causes a polarization of the atomic core electrons (Sternheimer effect) which can affect the evaluation of the field gradient by tens of percent.

In several cases the magnetic dipole moment has been determined from the Zeeman splitting of the quadrupole resonance which is produced when the sample is placed in a strong external magnetic field.

Details of this method are described by Krüger [51Kr51] and Dehmelt [53De42]. A discussion of the theory and instrumentation of nuclear quadrupole resonance spectroscopy and its application to solid state physics as well as tables of interaction constants for several elements in many compounds can be found in Das and Hahn [58Da20]. Tables of quadrupole interaction constants can be found in [68Se12] and [69Lu11].

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table D

Nucleus	Chemical symbol with $Z-$ and $A-$number
μ	Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction See Policies, Diamagnetic corrections, for factors used
Q	Nuclear electric quadrupole moment, in barns, as given by the experimenter Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment.
Refer.	Reference key
eqQ ratio	Ratio of the electric quadrupole coupling constants for the two isotopes noted
eqQ	Electric quadrupole coupling constant in MHz
Compound	Compound used

Table D: Nuclear Moments by Quadrupole Resonance

Nucleus	μ	Q	Refer.	eqQ ratio	eqQ	Compound
$^{10}_{5}B$		+0.111*	53D13	$^{10}/_{11}$=2.084 *2*	10.31	BC_3
$^{11}_{5}B$		±0.05	53B91		(4.87)	$B(CH_3)_3$
$^{11}_{5}B$		+0.053*	53D13		4.95	BC_3
$^{33}_{16}S$		−0.050	53D16		45.8	S_8(rhombic)
$^{35}_{16}S$		+0.035	53D16	($^{35}/_{33}$=−0.695 Mic)		
$^{35}_{17}Cl$			51D13	$^{35}/_{37}$=1.2688 *2*	37.5	CHCl=CHCl
$^{35}_{17}Cl$			51L09	$^{35}/_{37}$=1.26878 *15*		5 compounds
$^{35}_{17}Cl$	±0.8224 *10*		53T29			$NaClO_3$
$^{35}_{17}Cl$			55W24	$^{35}/_{37}$=1.268736 to 1.268973		4 compounds at several temp.
$^{35}_{17}Cl$			66Ca15	$^{35}/_{37}$=1.2685 *3*		$GdCl_3$ (ferromagnetic)
$^{35}_{17}Cl$			70Ka25	$^{35}/_{37}$=1.26877 *3*		$LiClO_3$ dried
$^{37}_{17}Cl$			51D13		29.5	CHCl=CHCl
$^{40}_{19}K$		±0.066*[d] *10*	69Jo06	$^{40}/_{39}$=1.244[d] *2*		$^{40}KClO_3$ crystal
$^{63}_{29}Cu$			52K29	$^{63}/_{65}$=1.0806 *3*	65.3	$KCu(CN)_2$
$^{63}_{29}Cu$	±2.231 *7*		57C48	$^{63}/_{65}$=1.0811 *12*	51.96 *4*	Cu_2O
$^{63}_{29}Cu$			66De17	$^{63}/_{65}$=1.0806 *6*		Cu_2O
$^{65}_{29}Cu$	±2.382 *7*		57C48		48.06 *4*	Cu_2O
$^{69}_{31}Ga$			53D22	$^{69}/_{71}$=1.5867 *4*	58.120 *4*	$GaCl_3$
$^{69}_{31}Ga$			56K66	$^{69}/_{71}$=1.589 *2*		Ga metal
$^{71}_{31}Ga$			53D22		36.630 *4*	$GaCl_3$
$^{75}_{33}As$	±1.44 *3*		52K28		232.52 *4*	As_4O_6
$^{79}_{35}Br$		±0.30	51D16	$^{79}/_{81}$=1.1968 *2*	764.86 *8*	Br_2 (crystal)
$^{79}_{35}Br$			53K22	$^{79}/_{81}$=1.1970 *1*	497.0	C_2H_5Br
$^{79}_{35}Br$			54Sc10	$^{79}/_{81}$=1.19707 *3*		average for 6 compounds
$^{81}_{35}Br$		±0.25	51D16		638.92 *6*	Br_2 (crystal)
$^{121}_{51}Sb$			51D15	$^{123}/_{121}$=1.2751* *2*	383.66* *4*	$SbCl_3$
$^{121}_{51}Sb$			55W24	$^{123}/_{121}$=1.274745 *10*	321.93223	$SbBr_3$
				$Q_4{}^{123}/Q_4{}^{121}$~0.8 *3*	eq_4Q_4=0.030 *5*	
					eqQ/eq_4Q_4<0	
$^{121}_{51}Sb$			57O11	$^{123}/_{121}$=1.274755 *2*	551.3822 *5*	Sb_2O_3
				$Q_4{}^{123}/Q_4{}^{121}$~1.5 *10*	eq_4Q_4=0.012 *5*	
$^{121}_{51}Sb$			63He02	$^{123}/_{121}$=1.27492 *2*	76.867 *1*	powdered Sb
					eq_4Q_4=+0.015 *5*	
$^{123}_{51}Sb$			51D15		489.21* *5*	$SbCl_3$
$^{123}_{51}Sb$			55W24		410.3814	$SbBr_3$
					eq_4Q_4=0.024 *5*	
					eqQ/eq_4Q_4<0	
$^{123}_{51}Sb$			57O11		702.8773 *5*	Sb_2O_3
					eq_4Q_4=0.018 *10*	
$^{123}_{51}Sb$			63He02		97.999 *1*	powdered Sb
					eq_4Q_4=+0.013 *30*	
$^{127}_{53}I$		±0.69*	52K43		2156*	solid I_2
$^{127}_{53}I$			53L16	$^{127}/_{129}$=1.42610 *3*	1389.678(site A)	SnI_4
					1399.949(site B)	
$^{129}_{53}I$		±0.55[b]	53L16	$^{127}/_{129}$=1.42610 *3*	974.481 (site A)	SnI_4
					981.654 (site B)	

Table D: Nuclear Moments by Quadrupole Resonance – Continued

Nucleus	μ	Q	Refer.	eqQ ratio	eqQ	Compound
$^{133}_{55}Cs$		$Q_4<100^{E}b^2$	67Tz01			CsI
$^{135}_{56}Ba$			62Wil0	$^{137}/_{135}=1.543$ *3*		$BaBr_2 \cdot 2H_2O$
$^{135}_{56}Ba$	±0.840		63Nal1	$^{137}/_{135}=1.542$ *2* $\mu^{137}/\mu^{135}=1.123$	8.55 *1* $\gamma/\gamma_H=0.0997$	$Ba(ClO_3)_2 \cdot H_2O$
$^{137}_{56}Ba$	±0.944		63Nal1		13.18 *1* $\gamma/\gamma_H=0.112$	$Ba(ClO_3)_2 \cdot H_2O$
$^{185}_{75}Re$			57S32	$^{185}/_{187}=+1.056$ *5*		$Re_2(CO)_{10}$
$^{185}_{75}Re$			68Se09	$^{185}/_{187}=1.0565$ *3*		7 compounds
$^{185}_{75}Re$			70Bu09	$^{185}/_{187}=1.059^{E}$ *14*		Rh metal crystal
$^{201}_{80}Hg$		±0.6	54D01		720	$HgCl_2$
$^{209}_{83}Bi$			53R33		669.06 *13*	$Bi(C_6H_5)_3$

* Polarization or Sternheimer correction included

[a] Corrected for non-rotationally symmetric field

[b] Calculated from eqQ-ratio and $Q^{127}=0.79$ as measured by atomic beams

[c] Recalculation of earlier data

[d] Double resonance experiment

[E] Nuclear acoustic resonance experiment

Table E: Nuclear Moments by Nuclear Magnetic Resonance

Introduction

A nucleus with spin I and an associated magnetic moment μ, when placed in a magnetic field H_o, will precess so that its spin axis rotates about H_o with a (Larmor) frequency

$$\nu_L = \mu H_o / hI.$$

If the nucleus is in a medium (gas, liquid, or solid) which does not contain a large concentration of unpaired electrons, then the field due to the neighboring atoms is small compared to the value of H_o, which is generally of the order of several kilogauss. The field H_o will cause a splitting of the ground state into $2I + 1$ magnetic states, separated in energy by $\mu H_o/I$, with relative population given by the Boltzmann distribution function characteristic of the temperature of the sample. The application of a rotating field H_1, perpendicular to H_o, induces transitions between the levels when its frequency resonates with the Larmor frequency. Because of the differences in level occupation, there is a net absorption of energy from the field H_1 at frequency ν_L. This absorption can be observed electronically.

In order that this method be applicable, not only must the sample be diamagnetic, but also: 1) the spin–lattice relaxation time, i.e., the time taken for the spin system to come into approximate thermal equilibrium with the lattice, must be a reasonable figure (0.1 to 0.001 s); 2) the nuclear interaction should be free from large electric quadrupole effects; 3) the spin density should be high enough so that a reasonable signal can be observed. In practice this might mean 10^{18} to 10^{20} spins in a volume of 0.1 to 1 cc in a field of about 10^4 gauss.

The precision with which nuclear magnetic resonance frequencies have been measured ranges up to a few parts in 10^7. The corresponding nuclear magnetic moments, however, are known to a much lower precision. The uncertainty is introduced in part because of two small contributions to the effective magnetic field at the nucleus which cannot be precisely evaluated.

The effective field can be expressed as

$$H_{eff} = H_o + H' + H'' = H_o(1 + H'/H_o + H''/H_o),$$

where H_o is the externally applied field, H' is the diamagnetic effect due to the currents induced in the atomic electrons by the external field, and H'' is the contribution due to the molecular environment.

Prior to any precise measurements of nuclear resonance, H'/H_o was evaluated (approximately) by Lamb [41La03] by means of a simple calculation based upon the Fermi–Thomas model. This calculation was extended by Dickinson [50Di10] using Hartree–Fock functions. No account was taken of relativity or other possible high–order corrections. Dickinson had estimated that the accuracy of the correction was about 5%. Since this correction varies from about 0.2% for hydrogen to about 1.2% for uranium, the quoted uncertainty in the tabulated value of μ is, in many cases, due to the uncertainty in the diamagnetic correction. Newer calculations based on Hartree–Fock relativistic electron wavefunctions show these earlier values of the diamagnetic correction are too small. They differ by about 1% at low Z, while for Z about 90, they are off by a factor of two. Diamagnetic correction factors for some closed–shell and closed sub–shell ions can be found in a paper by Feiock and Johnson [68Fe05]. Average correction factors for neutral atoms have been calculated by Lin, Johnson and Feiock [72Jo18]. These values take into account the contributions of the closed–shell core of the atom and an average shielding for the valence electrons in the ground state configuration. This average is made over the ground state multiplet assigning statistical weights to the sub–shells. Such average diamagnetic correction factors do not include possible large contributions for individual valence electrons. Values of the diamagnetic correction factors, $(1-\sigma)^{-1} = (1+H'/H_o)^{-1}$, used in the tables are tabulated under Diamagnetic Corrections (see Policies) along with the newer calculated values of Lin, Johnson and Feiock.

The term H''/H_o, the so–called "chemical shift," is associated with the induced field in the molecular environment. This effect has been evaluated theoretically in only a few simple cases. If the magnetic moment can be measured in a free atom in a well defined state, such as by atomic beams or optical double resonance, the value of H''/H_o can be determined empirically. While differences in H''/H_o between different compounds have been observed to be as high as 10^{-2}, the more common values appear to be near 10^{-4} (see Walchli [53W63]). In addition, in aqueous solutions H'' may also be a function of concentration. Much work has been done recently by Lutz, Schwenk and collaborators at Tübingen on the effect of concentrations and of added paramagnetic salts on the resonance frequency in aqueous solutions. For example, see [67Lu06], [67Lu10], and [68Lu07]. In the table, no attempt has been made to consider quantitatively the chemical effects. Therefore, the significance of any limits of precision for the magnetic moments stated to less than 10^{-4}, except for the very light elements, should be questioned.

In view of the difficulty of measuring the absolute value of H, the tabulated value of μ_a of the nucleus has been calculated by use of the relation

$$\mu_a = \mu'_p(\nu_a/\nu_b)(\nu_b/\nu_p)(I_a/I_p)(1 + H'/H_o)_a^{-1},$$

where the subscript "a" refers to the nucleus under consideration, "p" to the proton, and "b" to a reference standard. The value used for μ'_p for a spherical water sample, 2.79270, is the weighted average of the values of Bloch and Jeffries [50Bl73], Sommer et al. [51So34], Collington et al. [55Co36], and Trigger [56Tr19], whose experiments yield the magnetic moment directly in nuclear magnetons without application of correction factors. Our value agrees well with the value ν'_p = 2.79268 *2* (for a proton in water) in the adjustment of Cohen and DuMond [65Co20]. Newer measurements, see [73CoTa], indicate that the magnetic moment of the proton, measured directly in nuclear magnetons for a spherical sample of water, should be increased to 2.7927740 *11*, well outside the previously quoted uncertainties.

Values of the frequency ratios, ν_b/ν_p, which were adopted in order to calculate the magnetic moments from relative measurements, are tabulated below:

^{2}H	0.15350609† *2*	^{45}Sc	0.24291623 *10*
^{7}Li	0.38863618† *8*	^{50}V	0.0997015♦ *10*
^{11}B	0.3208377♦ *2*	^{55}Mn	0.24789167 *6*
^{14}N	0.07226261 *1*	^{73}Ge	0.03488401 *14*
^{23}Na	0.26451775† *7*	^{85}Rb	0.096552095♦ *54*
^{27}Al	0.26056752 *7*	^{127}I	0.200080♦ *14*
^{35}Cl	0.09797858 *5*	^{199}Hg	0.178788 *15* (NMR
^{39}K	0.0466636♦ *7*		0.1782706 *3* (OP)
^{41}K	0.02561295 *12*		

†From a least squares adjustment for the g–factors for ^{2}H, ^{7}Li, ^{23}Na with g'_p=5.58540 fixed.
♦Weighted average.

These were calculated from the measured ratios which are marked with a † in the table. A least squares adjustment was made for $g'(^{2}H)$, $g'(^{7}Li)$, and $g'(^{23}Na)$ with g'_p=5.58540 fixed. The other values are either weighted averages of the measured ratios or particular measured ratios. A diagram of the most precisely measured frequency ratios between pairs of these isotopes is given in figure 1. The intensity of the line joining the isotopes represents the relative uncertainty of the measured frequency ratios.

In the calculation of the nuclear magnetic moments, no error in the value of μ'_p was assumed. The uncertainties quoted in the tabulated moments represent a composite of uncertainties in the experimental values, conversion factors, standard frequency ratios, and the assumed 5% uncertainty in the diamagnetic corrections.

While the technique of nuclear resonance is primarily useful for the determination of the ratio μ_I/I, in some cases it is possible to determine the value of the nuclear spin. If the electric quadrupole interaction in a single crystal is of the right order of magnitude, the magnetic resonance line may be split into $2I$ components. If these are clearly resolved, then the spin and electric quadrupole interaction, eqQ, can be determined unambiguously. Several spins have been measured or confirmed in this way. The width and intensity of a resonance line in a polycrystalline or noncrystalline medium is related to the nuclear spin. In principle, therefore, the spin can be determined from measurements of line shape. However, distortions due to power saturation and field inhomogeneities subject these measurements to some

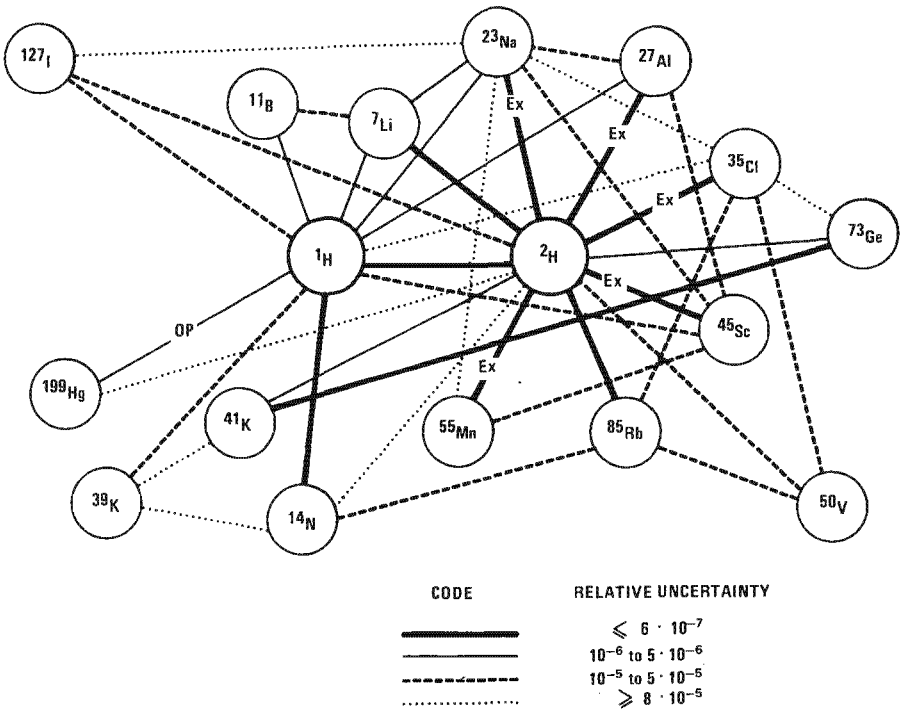

FIGURE 1. Diagram of relative uncertainities of the more precise frequency ratios for the ground states of the corresponding isotopes. The ratios for those connections marked with "Ex" have been determined by extrapolation to zero concentration. The connection marked with "OP" represents an optical pumping measurement.

question. The electric quadrupole moments listed in this table have been determined either by splitting of the resonance line in a single crystal or by line broadening in a noncrystalline medium.

In preparing the table, the compilers omitted data with accuracy about an order of magnitude less than that of the other values available.

Detailed discussions of these techniques can be found in Bloembergen et al. [48Bl32], Pound and Knight [50Po15], Andrew [55An65], Pake [56Pa60], Abragam [61Ab08], and Slichter [63Sl03] as well as in the references given in the general introduction.

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table E

Nucleus	Chemical symbol with $Z-$ and $A-$number
I	Nuclear spin, in units of $h/2\pi$ Values not measured but assumed in order to calculate μ are enclosed in brackets, [ ].
μ	Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction. See Policies, Diamagnetic corrections, for factors used Moment values which have been obtained by combining optical pumping or nuclear alignment with NMR have been tabulated here as well as in Tables H or J, respectively. Uncorrected magnetic dipole moment values, based on adopted frequency ratios quoted above, have also been tabulated along with a reference to the procedure used to obtain the ratio.
Diam. Cor.	Diamagnetic correction in nuclear magnetons $\times 10^4$ which has been added to the observed magnetic moment to give value quoted in table The uncertainty in the diamagnetic correction is assumed to be 5%.
Q	Nuclear electric quadrupole moment, in barns, as given by experimenter
Refer.	Reference key
$\nu/\nu'_{\text{standard}}$	Ratio of the measured resonance frequency for the nucleus under consideration to that of a standard nucleus Values marked with a † were used to obtain adopted frequency ratios above.
Standard	Nucleus used as standard
Chemical Forms	Chemical formulae of substances containing the nuclide under consideration and the standard The formulae have been separated by a plus sign when the substances were physically mixed and by a semicolon when they were in separate samples.

Table E: Nuclear Moments by Nuclear Magnetic Resonance

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
μ^+			±8.89013[r] *2*			70Ha74	3.183347 *9*	^{1}H	$NaOH+H_2O$; H_2O; $CH_2(CN)_2$
μ^+			±8.89009[r] *12*			70Hu19	3.183330 *44*	^{1}H	spherical sample H_2O
$^2_1$H		1	+0.857415 *4*	0.24		50L06	0.15350585 *75*	^{1}H	D_2O; H_2O
$^2_1$H			±0.857416 *1*	0.24		51S72	†0.153506083 *60*	^{1}H	D_2O+H_2O
			±0.857417 *1*	0.24			†0.153506125 *50*	^{1}H	D_2+H_2
$^2_1$H			±0.857420 *1*	0.24		52L18	†0.15350668 *12*	^{1}H	D_2O; H_2O
$^2_1$H			±01857416 *1*	0.24		53W23	†0.153506096 *8*	^{1}H	HD
$^2_1$H			±0.857415 *1*	0.24		61Bo11	†0.15350581 *7*	^{1}H	D_2O; H_2O
$^2_1$H			±0.85739292[l] *14*	—		Adj.	0.15350609 *2*	^{1}H	Least squares adj. of ^{2}H, ^{7}Li, and ^{23}Na ratios
$^3_1$H	12y		±2.97894 *30*	0.83		47A09	1.06666 *10*	^{1}H	T_2O+H_2O
$^3_1$H	12y	1/2	+2.978877 *30*	0.83		47B32	1.066636 *10*	^{1}H	T_2O; H_2O
$^3_1$H	12y		±2.978887 *4*	0.83		59D80	1.06663975 *2*	^{1}H	T_2O; H_2O; HTO
$^3_1$H	12y		±2.978860 *4*	0.83		65Hu13	1.0666315 *30*	^{1}H	0.5% T_2O at
							1.0666298 *5*	^{1}H	23.5, 10800G
$^3_2$He		1/2	±2.127569 *7*	1.28		49A11	0.7617866 *12*	^{1}H	$^3He+H_2+O_2$
$^3_2$He			negative			57K31			^{3}He; H_2O
$^3_2$He			±2.127574‡ *1*	1.28		69Wi19	0.76178685 *8*	^{1}H	$He+H_2+O_2$ at 10 to
							0.76181237‡ *46*	^{1}H	30 atmospheres
							‡Used $\sigma(^3He)$=59.935 and $\sigma(H_2)$=26.43 *60*ppm		
$^6_3$Li			±0.822030 *4*	0.83		51A27	0.37865725 *72*	^{7}Li	LiCl
$^6_3$Li		1			±4.6×10^{-4q}	51S07	Q^6/Q^7=0.023[q] *2*	^{7}Li	$LiAl(SiO_3)_2$ single crystal
$^6_3$Li			±0.822030 *5*	0.83		51W24	0.3786573 *15*	^{7}Li	LiCl
$^6_3$Li						53C40	Q^6/Q^7=0.019[q] *1*	^{7}Li	$LiAl(SiO_3)_2$
$^6_3$Li			+0.822012 *33*	0.83		54W37	0.958638 *38*	^{2}H	$LiCl+D_2O$
$^6_3$Li			±0.822031 *4*	0.83		67Lu06	0.9586599[E] *3*	^{2}H	$LiCl+D_2O$
$^7_3$Li			±3.25613 *17*	3.3		49S56	0.388609 *20*	^{1}H	$LiNO_3$; H_2O
$^7_3$Li			±3.25636 *8*	3.3		52K06	0.388637 *10*	^{1}H	$LiCl+H_2O$
$^7_3$Li			±3.25634 *2*	3.3		52L18	†0.3886341 *10*	^{1}H	$LiNO_3$; H_2O
									$LiNO_3+H_2O$
$^7_3$Li			+3.25636 *2*	3.3		54W37	†1.469225 *3*	^{23}Na	LiCl; not given
$^7_3$Li					±0.069*[q] *21*	61An17			$LiNO_3$ crystal
$^7_3$Li			±3.25636 *4*	3.3		62Ya06	†0.3886357 *16*	^{1}H	$LiCl+H_2O$
$^7_3$Li			±3.256366 *18*	3.29		65Hu13	†0.38863668 *90*	^{1}H	saturated LiF in
							†0.3886375 *13*	^{1}H	H_2O at 23.5, 10800G
$^7_3$Li			±3.25636 *2*	3.3		67Lu06	†2.5317314[E] *3*	^{2}H	$LiCl+D_2O$
$^7_3$Li			±3.2560328[l] *6*	—		Adj.	0.38863618 *8*	^{1}H	Least squares adj. of ^{2}H, ^{7}Li and ^{23}Na ratios
$^8_3$Li	0.8s	[2]	±1.6532[a] *8*	2		59C68	ν_L=3.413 *1*MHz H_o=5418 *1*gauss		LiF crystal
$^8_3$Li	0.8s		positive[ab]			62Co08			LiF
$^8_3$Li	0.8s	[2]	±1.6532[a] *8*	2		67Gu14	ν=2.0570 *7*MHz H_o=3264.9 *4* gauss		^{7}LiF
$^8_3$Li	0.85s	[2]	±1.65362[app] *22*, ±1.65288[app] *20*, ±1.65270[app] *30*			71Ha67			^{7}Li(d,p) recoils in Au, Pt, Pd foils

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{9}_{4}$Be			±1.17745 *2*	1.8		49D25	0.1405187 *20*	^{1}H	BeF_2+H_2O
$^{9}_{4}$Be			negative			51A11			$Be(NO_3)_2+H_2O$
$^{9}_{4}$Be		3/2[q]			≈±0.02[q]	51H50	$Q/Q(^{27}Al)\approx0.1$	^{27}Al	$Be_3Al_2Si_6O_{18}$
$^{9}_{4}$Be		3/2[q]				51S17			$BeAl_2O_4$ crystal
$^{9}_{4}$Be			±1.17756 *9*	1.8		51S33	0.915475 *70*	^{2}H	$BeCl_2$; D_2O
$^{9}_{4}$Be		3/2[q]			≈±0.02[q]	53K50			Be powdered
$^{9}_{4}$Be		3/2[q]	±1.1776 *2*	2		56B48	eqQ=±0.504 *4*MHz		$Be_3Al_2Si_6O_{18}$ crystals
$^{9}_{4}$Be					±0.032[cq]	60Po09	(eqQ=48kHz)		(powdered Be)
$^{8}_{5}$B	0.77s	[2]	±1.03551[aj] *25*	2.1		73Mi26	ν=1.90438MHz		^{6}Li(^{3}He,n)^{8}B−recoils in Pt foil
							ν_p=20.5493‡ *55* and 20.5434‡ *100* (for H_o) ‡Corrected using $\sigma_p(H_2O)$=26.5ppm		
$^{10}_{5}$B			±1.80105 *18*	3.6		53T01	0.700065 *70*	^{2}H	$Na_2B_2O_4$; D_2O
			±1.80073 *8*				1.11282 *5*	^{85}Rb	$Na_2B_2O_4$; RbCl
$^{10}_{5}$B			±1.80059 *2*	3.6		58B187	0.3348636 *22*	^{11}B	$NaBO_2$
$^{11}_{5}$B			±2.68845 *4*	5.3		49A12	0.320827 *4*	^{1}H	$KBO_2+K_2B_2O_4+H_2O$
$^{11}_{5}$B			±2.68875 *13*	5.3		51S33	0.825615 *40*	^{7}Li	$Na_2B_2O_4$; $LiC_2H_3O_2$
$^{11}_{5}$B			±2.68854 *3*	5.3		52L18	†0.3208381 *8*	^{1}H	$Na_2B_2O_4$; H_2O
									$K_2B_2O_4$; H_2O
$^{11}_{5}$B			±2.68854 *3*	5.3		65Hu13	†0.3208366 *18*	^{1}H	$BF_3{\cdot}2H_2O$ at
							†0.32083766 *22*	^{1}H	23.5, 10800G
$^{11}_{5}$B			±2.6880102[l] *17*	—		Wtd.Ave.	0.3208377 *2*	^{1}H	
$^{12}_{5}$B	20.4ms	(1)	+1.003[aj] *1*			67Su03, 68Su05	1.79641‡ *32*, 1.79637‡ *39*; 1.79510‡ *25*, 1.79526‡ *29*; 1.79639‡ *22* ‡Corrected using $\sigma_p(H_2O)$=26.5ppm	^{1}H	^{11}B(d,p) recoils in Cu; Pt; and Au foils
$^{12}_{5}$B	20.4ms	1			±0.017‡[e]*2*	70Su04	eqQ=154 16;		powdered TiB_2;
						71Mi06	49 5kHz Q^{12}/Q^{11}=±0.42 *4* ‡Used Q^{11}=+0.04065 *26*(70Ne21)		ZrB_2
$^{12}_{5}$B	20.4ms	(1)	+1.00285$^{akn+15}_{-14}$			70Wi17			^{11}B(d,p) recoils in Au; Cu; Pd; Pt. Knight shift estimated from relaxation times.
					+0.030[a] *8*				Recoils in Be foils; used $\gamma_\infty(B^{3+})$=−0.145
$^{12}_{5}$B	20.4ms	(1)			≈±0.0346[ap]	71Wi28	eqQ=54.9 6kHz		^{12}B recoils in Be single crystal
$^{13}_{5}$B	19ms	[3/2]	±3.17712[akn] *51*			71Wi09	0.379104 *25*	^{1}H	^{11}B(t,p) recoils in Pd, Au, Pt
$^{13}_{5}$B	19ms	[3/2]			≈±0.08	73Ha71	Q^{13}/Q^{12}=2.79 *6* eqQ^{13}=130 *2*, eqQ^{12}=46.5 *5*kHz		^{11}B(d,p) and ^{11}B(t,p) recoils in Mg crystal
$^{13}_{6}$C		1/2	±0.702388[d] *9*	1.83		54R34	0.2514431[d] *5*	^{1}H	$^{13}CH_3I$
$^{13}_{6}$C			±0.70234 *14*	1.8		49P08	0.25143 *5*	^{1}H	$^{13}CH_3I$; oil

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Standard	Chemical Forms
$^{12}_{7}N$	12ms	(1)	+0.4572[si] *1*	1		68Su05	0.081817‡ *23*;	^{1}H	$^{10}B(^{3}He,n)$ recoils in
							0.081850‡ *23*,	^{1}H	Al; Cu; Pt
							0.081869‡ *23*;	^{1}H	
							0.081836‡ *13*	^{1}H	
							‡Includes correction of 26.5ppm for proton resonance in H_2O		
$^{12}_{7}N$	12ms	1‡[a]				71Mi06			$^{10}B(^{3}He,n)$ recoils in bcc metals
							‡From eqQ spectra		
$^{14}_{7}N$			+0.40370 *4*	1.31		51P02	0.47070 *5*	^{2}H	HNO_3; D_2O
$^{14}_{7}N$			±0.40371 *2*	1.31		53T01	0.74837 *4*	^{85}Rb	HNO_3; RbCl
$^{14}_{7}N$			+0.403603[d] *7*	1.31		59A134	0.072236947[d] *80*	^{1}H	NH_4Cl
$^{14}_{7}N$			+0.403602[d] *7*	1.31		62Ba63	0.072236749[d] *10*	^{1}H	NH_4^+
$^{14}_{7}N$			+0.403565[g] *10*			64Ba11	(0.072236749 *10*)	^{1}H	NH_4^+
$^{14}_{7}N$			±0.403747 *7*	1.31		68Sc03	†0.072262607[c]‡ *13*	^{1}H	10M aqueous
						(62Ba63)	(0.072236749 *10*)	^{1}H	$(NH_4)(NO_3)$
							‡Used measured ratios for: ^{14}N: $\nu(NO_3)/\nu(NH_4)=1.0003556$ *1* ^{1}H: $\nu(NH_4)/\nu(H_2O)=1.00000236$ *5* to correct to HNO_3 value		
$^{14}_{7}N$			±0.40361558[l] *6*	—		68Sc03	0.07226261 *1*	^{1}H	
$^{15}_{7}N$			−0.28305 *2*	0.92		50P06	0.66004 *4*	^{2}H	$^{15}NH_3$; D_2O
$^{15}_{7}N$			−0.28317 *2*	0.92		51P02	1.4027 *1*	^{14}N	$NaNO_3$
$^{15}_{7}N$			−0.283078[d] *5*	0.92		59A134	0.101330930[d] *80*	^{1}H	NH_4Cl
			−0.283179[d] *5*				1.4027576 *15*	^{14}N	NH_4Cl
$^{15}_{7}N$			±0.283179 *5*	0.92		61Br13	1.4027566 *10*	^{14}N	liquid N
$^{15}_{7}N$			−0.283077[d] *5*	0.92		62Ba63	0.101330447[d] *10*	^{1}H	NH_4^+
			−0.283179[d] *5*				1.40275480[d] *20*	^{14}N	NH_4^+
$^{15}_{7}N$			−0.283051[g] *7*			64Ba11	(0.101330447 *10*)	^{1}H	NH_4^+
$^{17}_{8}O$		5/2	−1.89372 *10*	7.5		51A08	†0.88313 *4*	^{2}H	$H_2{}^{17}O+D_2O$
$^{17}_{9}F$	66s	[5/2]	±4.7224[a] *12*	24		66Su01	0.33797,	^{1}H	$^{16}O(d,n)F$ recoils
							0.33804		in CaF_2
$^{19}_{9}F$			±2.62896 *7*	12.2		49S56	0.940934 *15*	^{1}H	$C_2F_3Cl_3$; H_2O
$^{19}_{9}F$			±2.62861 *6*	12.2		50G65	0.940807 *10*	^{1}H	$HF+H_2O$
$^{19}_{9}F$			±2.6285 *2*	12.2		51B82	0.940760 *50*	^{1}H	BeF_2+H_2O
$^{19}_{9}F$			±2.62863 *6*	12.2		51K25	0.940814 *9*	^{1}H	$HF+H_2O$
$^{19}_{9}F$			±2.62874 *6*	12.2		52L18	0.9408545 *30*	^{1}H	$CHFCl_2$; H_2O
			±2.62896 *6*	12.2			0.9409330 *30*	^{1}H	$CFCl_3$; H_2O
$^{19}_{9}F$			+2.628383[g] *5*			64Ba11	(0.9407714 *14*)	^{1}H	HF
$^{19}_{9}F$			±2.62880 *6*	12.2		65Hu13	0.9408762 *22*	^{1}H	$C_6H_5CF_3$ at
							0.94087636 *10*	^{1}H	23.5, 10800G
$^{20}_{9}F$	11s	[2]	+2.094[a] *2*	10		63Ts01			CaF_2 crystal
$^{20}_{9}F$	11s	[2]	±2.0935[a] *9*	10		67Gu14	ν=2.1820 *7*MHz		CaF_2
							H_o=2735.8 *4*gauss		
$^{20}_{9}F$	11s	[2]			±0.064[a] *20*	73Ac03	eqQ=5.77 *2*MHz		MgF_2 crystal(polar.n,);
							Q/Q^{19}(197keV)= ±0.108 *4*		H_o=4.35kG
$^{23}_{11}Na$			±2.21736 *12*	13.9		51S33	1.08883 *5*	^{45}Sc	$Na_2B_2O_4$; $ScCl_3$
			±2.21713 *14*	13.9			1.08872 *6*	^{45}Sc	NaBr; $ScCl_3$
$^{23}_{11}Na$			±2.21751 *10*	13.9		52K06	0.264514 *9*	^{1}H	$NaI+H_2O$
$^{23}_{11}Na$			±2.21754 *7*	13.9		52L18	†0.2645182 *7*	^{1}H	$Na_2B_2O_4$; H_2O
									NaBr; H_2O
$^{23}_{11}Na$			+2.21753 *8*	13.9		54W37	1.723167 *34*	^{2}H	$NaCl+D_2O$

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{23}_{11}Na$			±2.21755 *7*	13.9		67Lu06	†1.7231746[E] *4*	^{2}H	$NaCl+D_2O$
$^{23}_{11}Na$			±2.2161562[1] *6*	—		Adj.	0.26451775 *7*	^{1}H	Least squares adj. of ^{2}H, ^{7}Li and ^{23}Na ratios
$^{25}_{12}Mg$			−0.85540 *9*	6.1		51A11	0.84714 *8*	^{14}N	$MgCl_2$; HNO_3
$^{27}_{13}Al$			±3.6412 *4*	29		49B07	0.26056 *3*	^{1}H	not given
$^{27}_{13}Al$			±3.64161 *14*	28.9		50G65	0.985143 *10*	^{23}Na	$NaAlO_2$
$^{27}_{13}Al$		5/2[q]				50P66			Al_2O_3 crystal
$^{27}_{13}Al$			±3.6411 *2*	29		51S33	1.07261 *5*	^{45}Sc	$AlCl_3$; $ScCl_3$
$^{27}_{13}Al$			±3.64148 *18*	28.9		52K06	0.260579 *8*	^{1}H	$AlCl_3+H_2O$
$^{27}_{13}Al$			±3.64135 *14*	28.9		52L18	0.2605694 *10*	^{1}H	$AlCl_3+H_2O$
									$AlCl_3$; H_2O
$^{27}_{13}Al$			+3.64128 *15*	28.9		54W37	0.985055 *12*	^{23}Na	$AlCl_3$+NaBr
$^{27}_{13}Al$		5/2[q]	±3.6414 *3*	29		56B48			$2(Be_3Al_2Si_6O_{18})$
$^{27}_{13}Al$					+0.377*[cq]	66Ar11			(Al_2O_3 crystal)
$^{27}_{13}Al$			±3.64132 *14*	28.9		68Ep01	†1.69744096[E] *30*	^{2}H	$AlCl_3+D_2O$
$^{27}_{13}Al$					+0.155*[c]‡	70Sa08			Al_2O_3
							‡Used eqQ=2.40MHz(Pound), $1-R$=1.005, $1-\gamma$=3.59		
$^{27}_{13}Al$					+0.148*[c]‡	70Sh16			Al_2O_3
							‡Used eqQ=2.40MHz(Pound), $1-R$=1.005, $1-\gamma$=3.59		
$^{27}_{13}Al$			±3.6384346[1] *9*	—		(68Ep01)	0.26056752 *7*	^{1}H	
$^{28}_{14}Si$		0[♦]				54W08	$g^{28}/g^{29}<0.04$[d], if I=1	^{29}Si	$^{28}SiF_4$
$^{29}_{14}Si$			−0.55526 *4*	4.9		53W51	1.29410 *7*	^{2}H	cobalt glass; D_2O
$^{29}_{14}Si$		1/2[d]				54O01			SiH_4 liquid
$^{29}_{14}Si$		1/2[d]				54W08			$^{29}SiF_4$
$^{29}_{15}P$	4.2s	[1/2]	±1.2349[a] *3*	13		71Su13	μ_{unc}=1.23374 *9*; 1.23356 *3*		Si on Cu(d,n) recoils in red P; Si
$^{31}_{15}P$			±1.1321 *2*	11		48P09	1.5310 *3*	^{23}Na	P_2O_5; NaI
$^{31}_{15}P$			±1.13161 *12*	11.0		49B07	0.40481 *4*	^{1}H	not given
$^{31}_{15}P$			±1.13183 *8*	11.0		51S33	1.04182 *5*	^{7}Li	H_3PO_4; $LiC_2H_3O_2$
$^{31}_{15}P$			±1.13159 *6*	11.0		52K06	0.404804 *10*	^{1}H	$P_2O_5+H_2O$
$^{31}_{15}P$			+1.13161 *6*	11.0		54W37	1.530366 *40*	^{23}Na	H_3PO_4; NaBr
			+1.13160 *6*	11.0			1.041611 *30*	^{7}Li	H_3PO_4; LiCl
$^{31}_{15}P$			±1.13177 *12*	11.0		55F45	0.404868 *40*	^{1}H	H_3PO_4
$^{31}_{15}P$			±1.13176 *6*	11.0		63Ba23	0.404862808 *5*	^{1}H	$(CH_3O)_3P$; H_2O
$^{33}_{16}S$			+0.64348 *9*	6.8		53W51	1.06174 *13*	^{14}N	CS_2; HNO_3
$^{35}_{17}Cl$			+0.82180 *9*	9.4		51P02	0.63827 *6*	^{2}H	HCl; D_2O
$^{35}_{17}Cl$			±0.82186 *5*	9.4		52W08	$^{50}V/^{2}H$= 0.649527 *70*	^{2}H thru ^{50}V	$^{50}VOCl_3$;
							$^{50}V/^{35}Cl$= 1.01758 *10*		D_2O+RbCl
$^{35}_{17}Cl$			±0.82185 *6*	9.4		53T01	1.01481 *5*	^{85}Rb	LiCl; RbCl
$^{35}_{17}Cl$			+0.82186 *5*	9.4		54W37	0.638302 *8*	^{2}H	$RbCl+D_2O$
			+0.82183 *5*	9.4			$^{85}Rb/^{35}Cl$= 0.985431 *18*	^{2}H thru ^{85}Rb	$RbCl+D_2O$
							$^{85}Rb/^{2}H$= 0.628985 *5*		

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Standard	Chemical Forms
$^{35}_{17}Cl$			±0.821818 *47*	9.44		70Bl08	†0.6382716[E] *3*	^{2}H	$NaCl+D_2O$
$^{35}_{17}Cl$			±0.8208743[1] *4*	—		(70Bl08)	0.09797858 *5*	^{1}H	
$^{36}_{17}Cl$	0.3My		+1.28539 *9*	14.8		55S110	0.74873 *3*	^{2}H	HCl; D_2O
$^{37}_{17}Cl$			+0.68407 *7*	7.8		51P02	0.83236 *7*	^{35}Cl	HCl
$^{37}_{17}Cl$			±0.68413 *7*	7.8		51W24	0.83243 *7*	^{35}Cl	LiCl
$^{37}_{17}Cl$			±0.68414 *6*	7.8		53T01	0.84477 *5*	^{85}Rb	LiCl; RbCl
			±0.68412 *5*	7.8			0.832445 *4*	^{35}Cl	LiCl
$^{37}_{17}Cl$			±0.684075 *40*	7.85		70Bl08	0.5312927[E] *3*	^{2}H	$NaCl+D_2O$
$^{37}_{17}Cl$						70Lu03	0.83239448 *8*‡	^{35}Cl	6.00M NaCl in H_2O
							‡3×−rms error + transform uncertainty		
$^{39}_{19}K$			±0.39150 *4*	5.2		50C65	†0.64580 *6*	^{14}N	KNO_3; HNO_3
$^{39}_{19}K$			+0.39140 *3*	5.2		54B09	not given	^{1}H	KCO_2H; H_2O
$^{39}_{19}K$			±0.39155 *4*	5.2		55B11	†0.64588 *6*	^{14}N	KF; HNO_3
$^{39}_{19}K$						57K07	$Q^{41}/Q^{39}=1.22$[q]		$KClO_3$ crystals
$^{39}_{19}K$			±0.39147 *3*	5.2		68Br16	†0.0466634 *5*	^{1}H	H_2O+15M KCOOH
									H_2O+0.1M $MnCl_2$
$^{39}_{19}K$			±0.390952[1] *6*	—		Wtd.Ave.	0.0466636 *7*	^{1}H	
$^{41}_{19}K$			+0.21486 *3*	2.85		54B09	†0.54886 *8*	^{39}K	KCO_2H; H_2O
$^{41}_{19}K$			±0.214873 *14*	2.85		67Lu02	†0.1668530 *8*‡	^{2}H	aqueous KF; D_2O
						71Ka30			two spectrometers
							‡Uncertainty is 3×−rms error ± 2ppm field inhomogeniety ± 2ppm field uncertainty at 2 probe sites		
$^{41}_{19}K$			±0.2145879[1] *10*	—		(67Lu02) (71Ka30)	0.02561295 *12*	^{1}H	
$^{41}_{20}Ca$	110ky	7/2	−1.5946 *1*	22.6		62Br30	0.530631 *3*	^{2}H	$Ca(NO_3)_2$; not given
$^{43}_{20}Ca$		7/2	−1.31721 *15*	18.7		53J06	0.43832 *4*	^{2}H	$CaBr_2+D_2O$
$^{41}_{21}Sc$	0.59s	[7/2]	±5.43[ap] *2*			72Su05	0.2772	^{1}H	^{40}Ca(d,n) recoils in Pt foil at 4.2°K
$^{45}_{21}Sc$			±4.7564 *4*	72		50H15	0.242939 *3*	^{1}H	$ScCl_3$; not given
$^{45}_{21}Sc$			±4.7557 *10*	72		50S58	0.96954 *6*	^{79}Br	$ScCl_3$; NaBr
$^{45}_{21}Sc$			±4.7564 *4*	72		51H54	0.242939 *3*	^{1}H	$Sc(NO_3)_3$; not given
$^{45}_{21}Sc$			+4.7557 *6*	72		51P02	0.9183 *1*	^{23}Na	$Sc(NO_3)_3$; NaCl
$^{45}_{21}Sc$			±4.75591 *36*	71.7		69Lu01	†1.5824534[E] *6*	^{2}H	$ScCl_3+D_2O+H_2O+HCl$
$^{45}_{21}Sc$			±4.748745[1] *2*	—		(69Lu01)	0.24291623 *10*	^{1}H	
$^{47}_{22}Ti$		5/2	−0.78838 *14*	12.7		53J16	0.36721 *6*	^{2}H	$^{47}TiCl_4$ liquid; D_2O
$^{47}_{22}Ti$			±0.78846 *6*	12.7		65Dr03	1.20811 *1*	^{39}K	$TiCl_4$; HCO_2K
$^{49}_{22}Ti$		7/2	−1.10402 *20*	17.7		53J16	0.36731 *6*	^{2}H	$^{49}TiCl_4$ liquid; D_2O
$^{49}_{22}Ti$			±1.10414 *9*	17.7		65Dr03	1.20844 *1*	^{39}K	$TiCl_4$; HCO_2K
$^{50}_{23}V$	40Jy		+3.3471 *3*	57		54W37	0.649518 *8*	^{2}H	$VOCl_3$; D_2O
			+3.3469 *3*	57			†1.017583 *11*	^{35}Cl	$VOCl_3$; RbCl
			+3.3470 *3*	57			†1.032631 *29*	^{85}Rb	$VOCl_3$; RbCl
$^{50}_{23}V$	40Jy		±3.34124[1] *3*	—		Wtd.Ave.	0.0997015 *10*	^{1}H	
$^{51}_{23}V$			±5.1484 *5*	88		49K24	0.99394 *3*	^{23}Na	V_2O_5+NaCl
									$Pb(VO_3)_2$; NaCl
$^{51}_{23}V$			positive			51P02			$Na^{51}VO_3$
$^{51}_{23}V$			±5.1448 *5*	88		51S33	1.08156 *5*	^{45}Sc	V_2O_5; $ScCl_3$
$^{51}_{23}V$			+5.1480 *5*	88		52W21	0.993855 *35*	^{23}Na	$NaVO_3$
			+5.1506 *5*	88			0.994358 *26*	^{23}Na	$VOCl_3$; $NaVO_3$
$^{51}_{23}V$			±5.15062 *43*	87.8		64Ho20	2.638122 *1*	^{50}V	liquid $VOCl_3$
							$Q^{50}/Q^{51}=1.27$[b]		

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{51}_{23}V$					±0.0073*[q]	64Na05	$(1-\gamma)eqQ$=752kHz		V_2O_5
$^{51}_{23}V$					±0.26*[cq]	66Ar11	($(1-\gamma)eqQ\approx$6.4MHz)		(V_2O_3)
$^{51}_{23}V$					≈0.04	67Sa10	eqQ=740kHz		V_2O_5
							$eqQ\approx$3.3MHz		NH_4VO_3; $NaVO_3$; Na_3VO_4•*14*; $Na_4V_2O_7$•*16*
$^{53}_{24}Cr$			−0.47445 *5*	8.6		53A06	0.78226 *5*	^{14}N	Na_2CrO_4; HNO_3
$^{53}_{24}Cr$			−0.47440 *6*	8.6		53J14	0.36820 *3*	^{2}H	Na_2CrO_4; D_2O
$^{53}_{24}Cr$		3/2				54H39			Na_2CrO_4; D_2O
$^{53}_{24}Cr$					±0.022*[q]	64Ru07			$^{53}Cr_2O_3$ powder
$^{53}_{24}Cr$					±0.026*[cq]	66Ar11			(Cr_2O_3 powder)
$^{52}_{25}Mn$	5.7d		+3.059*‡ *2* or +3.0764*‡ *6*	59	+0.53*‡ *7*	70Ni11	0.36961 *7*	^{55}Mn	$(Ce,La)_2Mg_3(NO_3)_{12}$•*24* at 0.1°K
							Q/Q^{55}=+1.5 *2*		
							‡Using μ^{55}_{unc}=3.442 or 3.4614, Q^{55}=+0.35 *5*		
$^{54}_{25}Mn$	312d		±3.284*‡ *5* or ±3.302*‡ *5*	63		67Te01			^{54}Mn in Fe
							‡Using μ^{55}_{unc}=3.442 or 3.4614		
$^{54}_{25}Mn$	312d		+3.278*‡ *2* or +3.2959*‡ *2*	63	+0.35*‡ *4*	70Ni11	0.79199 *6*	^{55}Mn	$(Ce,La)_2Mg_3(NO_3)_{12}$•*24* at 0.1°K
							Q/Q^{55}=+0.99 *10*		
							‡Using μ^{55}_{unc}=3.442 or 3.4614, Q^{55}=+0.35 *5*		
$^{55}_{25}Mn$			+3.4682 *5*	66		51P02	0.9372 *1*	^{23}Na	$LiMnO_4$; NaCl
$^{55}_{25}Mn$			±3.4674 *4*	66		51S33	1.02028 *5*	^{45}Sc	$Ca(MnO_4)_2$; ScCl
$^{55}_{25}Mn$			±3.4680 *3*	66		69Lu06	†1.6148654[E] *4*	^{2}H	$KMnO_4+D_2O$ at 25°C
$^{55}_{25}Mn$			±3.4614353[l] *8*	—		(69Lu06)	0.24789167 *6*	^{1}H	
$^{57}_{26}Fe$			±0.09030 *13*	1.8		67Go11	$\gamma/2\pi$= 137.4 2Hz/G		YIG, magnetically saturated
$^{57}_{26}Fe$			±0.090604 *9*	1.83		70Sc11	0.9281533 *9*‡	^{73}Ge	$Fe(CO_5)$; $GeCl_4$
							‡3×−rms error + 0.4ppm field inhomogeneity		
$^{57}_{27}Co$	270d		+4.722*‡ *17*		+0.49‡ *9*	72Ni01	1.023 *3*	^{59}Co	$(Ce,La)_2Mg_3(NO_3)_{12}$•*25* crystal
							Q/Q^{59}=1.29 *18*		
							‡Used μ^{59}=4.616 *9*, Q^{59}=+0.38		
$^{58}_{27}Co$	71.3d	[2]	+4.035*‡ *8*		+0.21‡ *3*	72Ni01	1.59298 *2*	^{59}Co	$(Ce,La)_2Mg_3(NO_3)_{12}$•*24* crystal
							Q/Q^{59}=0.54 *3*		
							‡Used μ^{59}=4.616 *9*, Q^{59}=+0.38		
$^{59}_{27}Co$			+4.6488 *7*	99		51P02	0.89709 *9*	^{23}Na	$K_3Co(CN)_6$; NaCl
$^{59}_{27}Co$			±4.583[c] *5*			57F20			several
$^{59}_{27}Co$			±4.626[k] *9*	99		67Wa16	$\gamma/2\pi$= 1.0054[k] *20*kHz/G		crushed intermetallic CoSi; $CoSi_2$
$^{59}_{27}Co$			±4.616[k]‡	99		70Sw05	$\gamma/2\pi$=1.003‡kHz/G		$TiFe_{1-x}Co_x$ Measured fields using $\mu(^{39}K)$=0.39090 for aqueous KI
							‡Includes data of 67Wa16		
$^{60}_{27}Co$	5.26y		+3.790*‡ *8*		+0.42‡ *5*	72Ni01	0.5747 *2*	^{59}Co	$(Ce,La)_2Mg_3(NO_3)_{12}$•*24* crystal
							Q/Q^{59}=1.11 *6*		
							‡Used μ^{59}=4.616 *9*, Q^{59}=+0.38		
$^{61}_{28}Ni$			≈±0.54			62Bu08			Ni metal
$^{61}_{28}Ni$			±0.70 *4*			63St08	$\gamma/2\pi$= 0.354 *20*kHz/G		^{61}Ni powder

Table E: Nuclear Moments by Nuclear Magnetic Resonance – Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{61}_{28}$Ni			−0.74984‡ *10*	16.9		64Dr02	0.658944 *5*	^{17}O	^{17}O in liquid $Ni(CO)_4$
							‡Includes a chemical shift correction for O in $Ni(CO)_4$ of −362ppm [62Br46]		
$^{61}_{28}$Ni			±0.75173[j] *9*	16.9		65Dr03	0.91371 *4*	^{35}Cl	Ni–Al alloy; $CaCl_2$
$^{63}_{29}$Cu			±2.2263 *5*	53		48P11	1.0022 *2*	^{23}Na	CuCl powder; NaBr powder
$^{63}_{29}$Cu			±2.2260 *5*	53		49B07	0.265056 *52*	^{1}H	not given
$^{63}_{29}$Cu			±2.2267 *5*	53		49Z02	0.26515 *5*	^{1}H	Cu_2Cl_2+$CuCl_2$; H_2O
$^{63}_{29}$Cu					±0.2[q] *1*	51B98	Q^{63}/Q^{65}=1.081 *3*		$K_3[Cu(CN)_4]$ crystal
$^{63}_{29}$Cu			±2.2262 *3*	53		51S33	1.09125 *6*	^{45}Sc	Cu_2Cl_2 powder; $ScCl_3$
$^{63}_{29}$Cu			+2.2259 *3*	53		54W37	1.002008 *16*	^{23}Na	Cu_2Cl_2+$CuCl_2$; NaBr
$^{63}_{29}$Cu			±2.2259	53		72Me25	$\gamma/2\pi$=1.1285kHz/G		CuBr in KCN
$^{65}_{29}$Cu			±2.3846 *7*	57		48P11	1.0711 *2*	^{63}Cu	CuCl powder
$^{65}_{29}$Cu			±2.3843 *6*	57		49B07	0.28391 *6*	^{1}H	not given
$^{65}_{29}$Cu			±2.3854 *8*	57		49Z02	0.28404 *8*	^{1}H	Cu_2Cl_2+$CuCl_2$; H_2O
$^{65}_{29}$Cu			±2.3858 *3*	57		51S33	1.16951 *6*	^{45}Sc	Cu_2Cl_2 powder; $ScCl_3$
$^{65}_{29}$Cu			+2.3846 *3*	57		54W37	1.073475 *10*	^{23}Na	$CuCl_2$+Cu_2Cl_2; NaBr
$^{65}_{29}$Cu			±2.3847‡	57		72Me25	‡Using μ^{65}/μ^{63}=1.07132 2[54W37]		
$^{65}_{29}$Cu						74Lo12	1.0712107‡ *7*	^{63}Cu	powdered CuCl, CuI and $CuRh_2Se_4$
							‡Average for three materials at H_o=12.5 or 14.0 kG and T=77 to 494°K		
$^{67}_{30}$Zn		5/2	+0.8755‡ *11*	21.8		53W51	0.86580 *1*	^{14}N	$Zn(NH_3)_4^{++}$
							‡Includes calculated chemical shift correction of 290ppm [64Ba11] to correct for N in NH_3 to N in NO_3		
$^{67}_{30}$Zn			±0.87524[i] *11*	21.8		67Sp04	0.0625241[i] *6*	^{1}H	^{67}Zn vapor; mineral oil
$^{69}_{31}$Ga			+2.0161 *3*	53		54W37	0.907349 *20*	^{23}Na	$GaCl_3$; NaCl
$^{69}_{31}$Ga			±2.0161 *3*	53		55R35	0.7870148 *13*	^{71}Ga	$GaCl_3$
$^{71}_{31}$Ga			±2.5617 *9*	67		48P09	1.1529 *4*	^{23}Na	$GaCl_3$; NaI
$^{71}_{31}$Ga			+2.5616 *3*	67		54W37	1.152872 *8*	^{23}Na	$GaCl_3$; NaCl
$^{71}_{31}$Ga						71Lu15	1.2706243 *3*‡	^{69}Ga	saturated solution of $Ga(NO_3)_3$ in H_2O
							‡3×−rms error + transform uncertainty		
$^{73}_{32}$Ge			−0.8792 *3*	24		53J16	0.35572 *4*	^{35}Cl	$GeCl_4$; $TiCl_4$
							$\nu(^{35}Cl$ in $TiCl_4)/\nu(^{35}Cl$ in RbCl) =1.00088 *25*		
$^{73}_{32}$Ge			±0.87915 *15*	24.0		54A27	0.22724 *2*	^{2}H	$GeCl_4$; D_2O+$MnCl_2$
$^{73}_{32}$Ge			±0.87919 *12*	24.0		71Ka30	†0.2272486 *10*‡	^{2}H	$GeCl_4$; D_2O
						70Sc11	†1.3619664 *5*‡	^{41}K	$GeCl_4$; 9M aqueous KF
							Earlier data of [67Lu07] incorrect due to field inhomogeneities		
							‡3×−rms error + 0.4ppm field uncertainty		
$^{73}_{32}$Ge			±0.8767852[l] *4*	—		(71Ka30)	0.03488401 *14*	^{1}H	
$^{73m}_{33}$As	5.8μs	[9/2]	+5.157[skn] *32*			69Qu03	$\|g\|(1+K)$=1.1495 *57*		liquid metal ^{71}Ga(α,2n); assumed K=+0.0032 *10*
$^{75}_{33}$As		3/2	+1.4392 *3*	41		52J05	0.17129 *3*	^{1}H	Na_3AsS_4; H_2O
$^{75}_{33}$As			±1.4390 *2*	41		53T01	1.11569 *5*	^{2}H	Na_2HAsO_4; D_2O
$^{75}_{33}$As			+1.4390 *4*	41		53W51	0.64745 *15*	^{23}Na	Na_2HAsO_4; NaCl

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^{11})	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{77}_{34}Se$			+0.53488 *8*	15.8		53W51	0.72193 *2*	^{23}Na	H_2SeO_3; NaCl
$^{77}_{34}Se$			+0.53406 *8*	15.8		54W37	1.242100 *19*	^{2}H	H_2Se; D_2O
$^{78m}_{35}Br$	100μs	[4]	±4.113[aj] *12*	127		71Br31			molten Se–Tl alloy (pulsed p,n); H_o=6.5G
$^{79}_{35}Br$			±2.1056 *9*	65		47P16	0.9278 *3* Q^{79}/Q^{81}=1.75[b]	^{81}Br	LiBr or NaBr
$^{79}_{35}Br$					≈0.4[b]	48P09	Q^{79}/Q^{127}≈0.57[b]	^{127}I	LiBr; NaI
$^{79}_{35}Br$			±2.1059 *5*	65		49Z02	0.25059 *5*	^{1}H	NaBr; H_2O
$^{79}_{35}Br$			±2.1057 *3*	65		51S33	1.03145 *5*	^{45}Sc	NaBr; $ScCl_3$
$^{79}_{35}Br$			+2.1055 *3*	65		54W37	0.947140 *9*	^{23}Na	NaBr
$^{79}_{35}Br$			±2.1055 *3*	65		70Bl08	1.632111[E] *3*‡	^{2}H	KBr+D_2O
							‡3×–rms error + systematic errors		
$^{81}_{35}Br$			±2.2695 *8*	70		47P16	1.0209 *3*	^{23}Na	LiBr; not given NaBr
$^{81}_{35}Br$			±2.2693 *8*	70		49B07	0.27003 *8*	^{1}H	not given
$^{81}_{35}Br$			±2.2702 *6*	70		49Z02	0.27014 *5*	^{1}H	NaBr; H_2O
$^{81}_{35}Br$			±2.2694 *4*	70		51S33	1.11165 *6*	^{45}Sc	NaBr; $ScCl_3$
$^{81}_{35}Br$			+2.2696 *4*	70		54W37	1.020965 *14*	^{23}Na	NaBr
$^{81}_{35}Br$			±2.2696 *4*	70		70Bl08	1.759309[E] *3*‡	^{2}H	KBr+D_2O
							‡3×–rms error + systematic errors		
$^{81}_{35}Br$						70Lu02	1.0779355 *3*‡	^{79}Br	7.31M NH_4Br in H_2O; H_o≈18.07kG
							‡3×–rms error		
$^{81m}_{35}Br$	35μs	[9/2]	±5.86[a] *7*	180		71Br31			molten Se–Tl alloy (pulsed p,n); H_o=10.4G
$^{83}_{36}Kr$			+‡0.97017 *16*	31.1		54B03	not given		Kr gas
							‡Atomic spectra and beams measurements determine μ to be negative		
$^{83}_{36}Kr$			±0.97034 *16*	31.1		68Br16	0.8246789[E] *24* $^{39}K/^{1}H$=0.0466634 *5*	^{39}K	Kr gas; KCOOH
			±0.97033 *16*	31.1			0.0384825[E] *6*	^{1}H	Kr gas; H_2O
$^{85}_{37}Rb$			±1.3527 *2*	45		51Y03	†0.09655207 *30*	^{1}H	RbCl; H_2O
$^{85}_{37}Rb$			±1.3528 *2*	45		52W08	$^{50}V/^{2}H$= 0.649527 *70* $^{50}V/^{85}Rb$= 1.03262 *10*	^{2}H	$VOCl_3$; RbCl+D_2O
$^{85}_{37}Rb$			+1.3527 *2*	45		54W37	0.628985 *5*	^{2}H	RbCl+D_2O
$^{85}_{37}Rb$			±1.3527 *2*	45		61Bl08	†0.6289789 *4*	^{2}H	RbCl; D_2O
$^{85}_{37}Rb$			±1.3482052[l] *8*	—		Wtd.Ave.	0.096552095 *54*	^{1}H	
$^{87}_{37}Rb$	47Gy		±2.7503 *7*	92		49B07	0.32718 *6*	^{1}H	not given
$^{87}_{37}Rb$	47Gy		±2.7503 *14*	92		49Z02	0.32718 *16*	^{1}H	Rb_2CO_3; H_2O
$^{87}_{37}Rb$	47Gy		±2.7506 *5*	92		51A31	3.388966 *47*	^{85}Rb	RbCl
$^{87}_{37}Rb$	47Gy		±2.7495 *5*	92		51S33	1.25529 *6*	^{27}Al	Rb_2CO_3; $AlCl_3$
$^{87}_{37}Rb$	47Gy		±2.7506 *5*	92		51Y03	0.32721338 *55*	^{1}H	RbCl; H_2O
$^{87}_{37}Rb$	47Gy		+2.7506 *5*	92		54W37	1.237041 *8*	^{23}Na	RbCl; NaCl
$^{87}_{37}Rb$	47Gy		±2.7507 *5*	92		61Bl08	2.1315984 *2*	^{2}H	RbCl; D_2O
$^{87}_{37}Rb$	47Gy		±2.7505 *5*	92		67Lu06	2.1315419[E] *15*	^{2}H	RbCl+D_2O
$^{87}_{38}Sr$			−1.0930 *2*	38		53J14	0.28232 *3*	^{2}H	$^{87}SrBr_2$; D_2O
$^{89}_{39}Y$			−0.13732 *3*	4.9		54B09	0.048994 *1*	^{1}H	$Y(NO_3)_3$; H_2O
$^{89}_{39}Y$			±0.137344 *26*	4.91		65Ba42	0.678141 *18*	^{14}N	YCl_3; HNO_3

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{91}_{40}$Zr		5/2	−1.3028 *2*	48		57Br26	0.60557 *1*	^{2}H	$(NH_4)_2ZrF_6+D_2O$
$^{93}_{41}$Nb			±6.1672 *12*	236		51S33	1.00613 *5*	^{45}Sc	Nb_2O_5; $ScCl_3$
$^{95}_{42}$Mo			−0.9136 *2*	36		51P02	0.97943 *10*	^{97}Mo	K_2MoO_4
$^{95}_{42}$Mo					±0.12[f] *3*	66Na04			Mo metal
$^{97}_{42}$Mo			−0.9328 *2*	37		51P02	0.9208 *1* $\lvert Q^{97}/Q^{95}\rvert>1$[f]	^{14}N	K_2MoO_4; HNO_3
$^{97}_{42}$Mo						65Ka03	$Q^{97}/Q^{95}=9.2$[b] *8*		K_2MoO_4 solution
$^{97}_{42}$Mo					±1.1 *2*	66Na04	($Q^{97}/Q^{95}=9.2$[b] *8*)		
$^{96}_{43}$Tc	4.3d	(6‡)	±4.60‡[an] *14*			71Fo24			Tc–Fe; H_{int}=−298 *10*kG
							‡Obtained g from slope of ν vs H; spin measured by ABMR (1974)		
$^{99}_{43}$Tc	210ky		+5.6807 *12*	234		52W02	1.46628 *10*	^{2}H	$NH_4TcO_4+D_2O$
$^{103}_{45}$Rh			−0.088321[k] *19*	3.87		55S110	0.205574 *7*	^{2}H	Rh metal; D_2O
$^{103}_{45}$Rh			−0.08825[k] *2*	3.9		65Se11	not given		$RhSn_2$
$^{105}_{46}$Pd			±0.6015[j] *6*	26		62Go25	0.04388 *4*	^{1}H	Pd metal (finely divided); H_2O
$^{105}_{46}$Pd			−0.642[k] *3*	30		64Se13	not given		Pd metal
$^{107}_{47}$Ag			−0.11354 *3*	5.3		54B09	0.040468 *1*	^{1}H	$AgNO_3$; H_2O
$^{107}_{47}$Ag			−0.11358 *3*	5.3		54S105	0.86985 *1*	^{109}Ag	$AgNO_3$
$^{109}_{47}$Ag			−0.13053 *3*	6.1		54B09	0.046523 *1*	^{1}H	$AgNO_3$; H_2O
$^{109}_{47}$Ag			−0.13057 *3*	6.1		54S105	0.30316 *3*	^{2}H	$AgNO_3$; D_2O
$^{109}_{47}$Ag			±0.13124[j] *3*	6.1		67Na13	0.304715 *6* $\gamma/2\pi$ =0.199150 *4* kHz/G	^{2}H	Au_xAg_{1-x}; D_2O
$^{110}_{47}$Ag	24.4s		±2.7210[e] *8*	126		69Ac02	$\gamma/2\pi$=2.0645 *6*kHz/G		AgF,AgCl,AgBr, Ag_2O,Ag_2O_2(polar. n,); T~8°K
$^{107}_{48}$Cd	6.7h		±0.61444[i] *15*	29.4		66Mc17	0.0437924[i] *20*	^{1}H	Cd vapor; mineral oil
$^{109}_{48}$Cd	470d		±0.82701[i] *20*	39.5		66Mc17	0.0589435[i] *20*	^{1}H	Cd vapor; mineral oil
$^{111}_{48}$Cd		1/2	−0.59499 *16*	28.4		50P51	0.8016 *1*	^{23}Na	$CdCl_2$; NaCl
$^{111}_{48}$Cd			±0.59429[i]‡ *14*	28.4		66Le21	1.1879850[i] *5*	^{199}Hg	^{111}Cd+^{199}Hg vapor
							‡Based on $\nu(^{199}Hg)/\nu(^{1}H)$ from optical pumping measurements		
$^{111}_{48}$Cd			±0.59428[i] *14*	28.4		66Mc16	0.211782[i] *2*	^{1}H	Cd vapor; mineral oil
$^{113}_{48}$Cd	>3Jy	1/2	−0.62245 *17*	29.7		50P51	0.8386 *1*	^{23}Na	$CdCl_2$; NaCl
$^{113}_{48}$Cd	>3Jy					59K39	1.046083[d] *3*	^{111}Cd	$Cd(CH_3)_2$
$^{113}_{48}$Cd	>3Jy		±0.62167[i]‡ *15*	29.7		67Le22	1.0460840[i] *2*	^{111}Cd	^{111}Cd+^{113}Cd vapor
							‡Based on $\nu(^{199}Hg)/\nu(^{1}H)$ from optical pumping measurements		
$^{113}_{48}$Cd	>3Jy		±0.62167[i] *15*	29.7		66Mc16	0.221543[i] *2*	^{1}H	Cd vapor; mineral oil
$^{113}_{49}$In			±5.5232 *15*	271		51P02	0.82667 *8*	^{23}Na	$In(NO_3)_3$; NaCl
$^{113}_{49}$In			±5.5223 *15*	271		53T01	0.99787 *4*	^{115}In	$In(NO_3)_3$
$^{113}_{49}$In			±5.5229 *16*	271		57R42	0.9978609 *12*	^{115}In	$In(ClO_4)_3$
$^{113}_{49}$In			±5.5229 *14*	271		71Lu15	0.9978610 *3*‡	^{115}In	1.6m% $In(ClO_4)_3$ + 0.5m% $H(ClO_4)$ + 97.9m% H_2O; H_o=18.07kG
							‡3×−rms error + Fourier Transform error		

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{115}_{49}$In	600Ty		±5.5348 *15*	272		51P02	0.82841 *8*	^{23}Na	$In(NO_3)_3$; NaCl
$^{115}_{49}$In	600Ty		±5.5336 *15*	272		53T01	0.901877 *50*	^{45}Sc	$In(NO_3)_3$; $ScCl_3$
$^{115}_{49}$In	600Ty		±5.5348 *14*	272		60Fl03	0.219128 *8*	^{1}H	$In_2(SO_4)_3$; glycerin
$^{115}_{49}$In	600Ty		observed ultrasonically-induced $\Delta m=\pm3$ transitions due to hexadecapole moment			66Ma55			InAs crystal
$^{116}_{49}$In	14s		±2.7859[a] *12*	137	±0.09‡[a] *2*	71Wi12	$\gamma/2\pi$=2.1132 *8*kHz/G ‡From temperature dependence of τ_{relax}; used Q^{115}=+0.83b		InP(polar. th n,); T=77°K
$^{115}_{50}$Sn		1/2	−0.9178 *2*	46		50P51	1.2362 *1*	^{23}Na	$SnCl_2$; NaCl
$^{115m}_{50}$Sn	159μs		±1.368[aj] *4*	69		71Br03	$\gamma/2\pi$=0.1887, 0.1880,0.1893 kHz/G		liquid In metal (pulsed p,n)
$^{115m}_{50}$Sn	159μs				±0.8[af] *3*	72Ri13			liquid In metal (pulsed p,n)
$^{117}_{50}$Sn		1/2	−0.9999 *3*	50		50P51	1.3468 *1*	^{23}Na	$SnCl_2$; NaCl
$^{119}_{50}$Sn		1/2	−1.0461 *3*	53		50P51	1.4090 *1*	^{23}Na	$SnCl_2$; NaCl
$^{121}_{51}$Sb			±3.3589 *9*	174		50C57	0.90469 *4*	^{23}Na	$HSbCl_6$; solid NaCl
$^{121}_{51}$Sb			+3.3593 *9*	174		51P02	0.90480 *9*	^{23}Na	$NaSbF_6$; NaCl
$^{121}_{51}$Sb						58E03	1.84661 *1*	^{123}Sb	$KSbF_6$
$^{123}_{51}$Sb			±2.5465 *7*	132		50C57	0.8442 *1*	^{2}H	$HSbCl_6$; D_2O
$^{123}_{51}$Sb			+2.5466 *7*	132		51P02	0.84423 *8*	^{2}H	$NaSbF_6$; D_2O
$^{125}_{51}$Sb	2.7y	7/2‡	±2.63 *6*	136		68Ba70	$\gamma/2\pi$=0.570 *14*kHz/G ‡Spin determined by μ(68St16) and g(68Ba70)		^{125}Sb-Fe at 0.015°K
$^{123}_{52}$Te	>50Ty		−0.7359 *2*	39		53W51	0.99085 *3*	^{23}Na	TeO_2; NaCl
$^{125}_{52}$Te			−0.8872 *2*	47		53W51	1.19457 *4*	^{23}Na	TeO_2; NaCl
$^{127}_{53}$I			±2.8100 *11*	153		48P09	†0.75664 *20*	^{23}Na	solid NaI
$^{127}_{53}$I			±2.8084 *13*	153		49Z02	0.20003 *8*	^{1}H	KI; H_2O
$^{127}_{53}$I			±2.8086 *8*	153		51S33	†1.30317 *6*	^{2}H	KI+H_2O; D_2O+ H_2O+$NiCl_2$
$^{127}_{53}$I			±2.8091 *9*	153		51W12	†1.30337 *20*	^{2}H	NaI+$(NH_2)_2$+D_2O
$^{127}_{53}$I			±2.8093 *8*	153		51Y03	†0.200095 *6*	^{1}H	KI; H_2O
$^{127}_{53}$I			±2.79382[l] *18*	—		Wtd.Ave.	0.200080 *14*	^{1}H	
$^{129}_{53}$I	16My		+2.6173 *8*	143		51W12	0.86744 *10*	^{2}H	NaI+$(NH_2)_2$+D_2O
$^{129}_{54}$Xe			−0.77681 *23*	43.4		51P02	1.0457 *1*	^{23}Na	Xe gas; NaCl
$^{129}_{54}$Xe			−0.77689 *22*	43.4		54B03	0.276633 *5*	^{1}H	Xe gas; H_2O
$^{129}_{54}$Xe			−0.77682 *22*	43.4		68Br12	1.80192[E] *2*	^{2}H	Xe gas; D_2O
$^{131}_{54}$Xe			+0.69066 *19*	38.6		54B03	0.081976 *1*	^{1}H	Xe gas; H_2O
$^{131}_{54}$Xe			+0.69083 *19*	38.6		68Br12	0.534155[E] *3*	^{2}H	Xe gas; D_2O
$^{133}_{55}$Cs			±2.5784 *11*	148		49B07	0.33743 *10*	^{7}Li	not given
$^{133}_{55}$Cs			±2.5790 *8*	148		51S33	0.85449 *4*	^{2}H	CsCl; D_2O
$^{133}_{55}$Cs			+2.5790 *7*	148		54W37	0.854496 *18*	^{2}H	$CsNO_3$+D_2O
$^{133}_{55}$Cs					±<0.004[f]	58B158			CsI; CsBr
$^{133}_{55}$Cs			±2.5789 *7*	148		67Lu06	0.8544377[E] *5*	^{2}H	$CsNO_3$+D_2O

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Standard	Chemical Forms
$^{133}_{55}Cs$					±3.5 *10*mb	68Ha43			Cs_2CuCl_4; Cs_2CoCl_4 single crystals at room T; used $1-\gamma_\infty=120$ *30*
$^{133}_{55}Cs$					±2.3[Efg] *3* mb	70Or08			aqueous CsI at 297°K
$^{135}_{56}Ba$			±0.83717 *25*	49.1		56W20	1.01387 *2*	^{35}Cl	$^{135}BaCl_2$
$^{137}_{56}Ba$			±0.93653 *27*	54.9		56W20	1.13420 *5*	^{35}Cl	$^{137}BaCl_2$
$^{138}_{57}La$	0.1Ty	5	+3.7073 *12*	223	≈±1[f]	55S31	0.93407 *3* $Q^{138}/Q^{139}\approx\pm3.5$ *5*	^{139}La	not given
$^{139}_{57}La$			±2.7780 *9*	167		49D13	0.141251 *14*	^{1}H	$LaCl_3+H_2O$
$^{139}_{57}La$			±2.7783 *9*	167		51S33	0.92025 *6*	^{2}H	$LaCl_3$; D_2O
$^{153}_{63}Eu$						64Ch26	0.4438	^{151}Eu	EuS powder at 4.2°K
$^{155}_{64}Gd$						64Bo09	0.753 *5*	^{157}Gd	GdN
$^{155}_{64}Gd$						65Bu14	0.763	^{157}Gd	$GdAl_2$
$^{163}_{66}Dy$						66Ko14	1.40‡ *1* $Q^{163}/Q^{161}=1.06$‡ *1* ‡Used spin-echo technique	^{161}Dy	powdered Dy-metal in ferromagnetic state
$^{171}_{70}Yb$			+0.4930 *5*	40		64Go06	1.7874 *15*	^{35}Cl	$YbCl_2$; NaCl
$^{173}_{70}Yb$			±0.6791 *6*	54		64Go06	(0.275497[i] *12*)	^{171}Yb	YbS; NaCl
$^{175}_{71}Lu$			±2.229 *1*	180		62Re02	0.73677 *2*	^{2}H	LuB_{12}
			±2.231 *1*	180			0.73732 *2*	^{2}H	LuSb
$^{181}_{73}Ta$			±2.360‡ *2*	200		60Be23	not given ‡Determined magnetic field using ^{7}Li resonance		$KTaO_3$
$^{183}_{74}W$			+0.1167[k] *10*	10		55S110	0.27395 *3*	^{2}H	W powder; D_2O
$^{183}_{74}W$			±0.11722 *5*	10.1		61K101	not given		WF_6
$^{185}_{75}Re$			+3.1718 *14*	281	large[b]	51A11	0.85114 *9*	^{23}Na	$NaReO_4$; NaCl
$^{187}_{75}Re$	60Gy		+3.2044 *14*	284	large[b]	51A11	0.85987 *9*	^{23}Na	$NaReO_4$; NaCl
$^{187}_{75}Re$	60Gy					68Na12	1.01007 *5*	^{187}Re	ReO_3 metal
$^{187}_{75}Re$	60Gy					70Be75	1.01008 *8*	^{187}Re	$Be_{22}Re$ at 300°K
$^{187}_{76}Os$			±0.06432 *3*	5.8		68Sc06	0.8910814 *3*	^{41}K	molten OsO_4;
							0.8910825‡ *5* ‡Corrected for susceptibilities of $OsO_4(-0.211\times10^{-6})$ and $KF(-0.83\times10^{-6})$	^{41}K	aqueous KF
$^{189}_{76}Os$		3/2	+0.65655‡ *30*	59		54L36	0.791896 *93* ‡Used $\nu(^{35}Cl$ in $TiCl_4)/\nu(^{35}Cl$ in RbCl) =1.00088 *25* of 53J16	^{35}Cl	molten OsO_4; $TiCl_4$
$^{189}_{76}Os$			±0.65652 *30*	59		68Sc03	1.074639 *5*	^{14}N in NO_3^-	molten OsO_4; $NH_4(NO_3)$ solution (cylindrical samples)

Table E: Nuclear Moments by Nuclear Magnetic Resonance — Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{191}_{77}$Ir			+0.1453[k]‡ *6*	13.5		68Na01	ν/H(in kHz/G) =0.074133 *18*		Ir metal; used K=+0.013 *4*
							‡Used $\nu(^{109}Ag)/H$=0.199150kHz/G for Ag-metal		
$^{191m}_{77}$Ir	4.9s	[11/2]	±6.08[a] *36*	560		71Es03	ν=389.690‡ *13*; 1174.85‡ *12*MHz		0.08% ^{191}Os in Ni, H_{int} =−467 *3*kG; 0.04% ^{191}Os in Fe; H_{int} =−1405 *8*kG
							‡Extrapolated to H_o=0		
$^{192}_{77}$Ir	74d		±1.901[a] *11*	174		71Es03	ν=167.661‡ *35*; 504.192‡ *50*MHz		0.03% Ir in Ni, H_{int} =−467 *3*kG; 0.03% Ir in Fe, H_{int} =−1405 *8*kG
							‡Extrapolated to H_o=0		
$^{193}_{77}$Ir			+0.1583[k]‡ *6*	14.7		68Na01	ν/H(in kHz/G) =0.080732 *6*		Ir metal; used K=+0.013 *4*
							‡Used $\nu(^{109}Ag)/H$=0.199150kHz/G for Ag-metal		
$^{195}_{78}$Pt		1/2	+0.6060 *3*	57		51P02	0.81273 *8*	^{23}Na	H_2PtCl_6; NaCl
$^{195}_{78}$Pt			±0.6060‡ *3*	57		63Dr05	0.812667 *4*	^{23}Na	H_2PtCl_6
							‡Not corrected for chemical shift which may be as large as +0.7%		
$^{195}_{78}$Pt			±0.6022‡ *3*	57		68Ze04 (63Dr05)			H_2PtI_6+H_2O; least paramagnetic compound tested
							‡Chemical shift with respect to H_2PtCl_6 is −0.63%		
$^{195m}_{78}$Pt	4.1d	[13/2]	±0.602[a]‡ *15*	56		72Ba22	ν=89.5 *5*MHz		Pt-Fe, ^{60}Co; H_{hf}= −1280 *26*kG
							‡Uncorrected for possible hyperfine anomaly		
$^{197}_{79}$Au			+0.14726[i] *7*	14.0		67Na13	ν/H(in kHz/G) =0.074125 *4*		Au_xAg_{1-x}
$^{200m}_{79}$Au	18.7h	[12]	±6.10[a]‡ *10*	600		73Ba83	‡2.5% hyperfine anomaly included		
$^{183}_{80}$Hg	8.8s	1/2	+0.518[a] *9*	50		72Bo09			Also measured by optical pumping
$^{185}_{80}$Hg	50s	1/2	+0.504[a] *4*	49		72Bo09			Also measured by optical pumping
$^{199}_{80}$Hg		1/2	+0.50416 *24*	48.6		51P02	†1.1647 *1*	^{2}H	$Hg_2(NO_3)_2$; D_2O
$^{199}_{80}$Hg			+0.50272[i] *24*	48.6		61Ca21	†0.1782706[i] *3*	^{1}H	Hg gas; H_2O
$^{199}_{80}$Hg			±0.49930[l] *4*	—		(51P02)	0.178788 *15*	^{1}H	NMR-value
			±0.4978563[ii] *8*	—		(61Ca21)	0.1782706 *3*	^{1}H	OP-value
$^{201}_{80}$Hg			−0.55671[i] *27*	53.7		61Ca21	0.0658066[i] *3*	^{1}H	Hg gas; H_2O
$^{203}_{81}$Tl			±1.6118 *8*	158		49P08	0.571499 *50*	^{1}H	$TlC_2H_3O_2$; H_2O
$^{203}_{81}$Tl		1/2	+1.6116 *8*	158		50P51	0.5714 *1*	^{1}H	$TlC_2H_3O_2$+H_2O
$^{203}_{81}$Tl			±1.6116 *8*	158		51S33	0.99026 *5*	^{205}Tl	$TlC_2H_3O_2$
$^{203}_{81}$Tl			±1.6115 *8*	158		63Ba23	0.57139145 *4*	^{1}H	$TlC_2H_3O_2$; H_2O
$^{205}_{81}$Tl			±1.6277 *8*	160		49P08	0.577135 *50*	^{1}H	$TlC_2H_3O_2$; H_2O
$^{205}_{81}$Tl		1/2	+1.6274 *8*	160		50P51	0.5770 *1*	^{1}H	$TlC_2H_3O_2$+H_2O
$^{205}_{81}$Tl			±1.6274 *8*	160		51S33	0.57702 *3*	^{1}H	$TlC_2H_3O_2$; H_2O
$^{205}_{81}$Tl						53G12	1.009838 *1*	^{203}Tl	Tl_2O_3+HCl+HNO_3
$^{205}_{81}$Tl						54W37	1.009816 *22*	^{203}Tl	$TlC_2H_3O_2$
$^{205}_{81}$Tl			±1.6274 *8*	160		63Ba23	0.57701173 *4*	^{1}H	$TlC_2H_3O_2$; H_2O
							1.00983613 *6*	^{203}Tl	$TlC_2H_3O_2$

Table E: Nuclear Moments by Nuclear Magnetic Resonance – Continued

Nucleus	$T_{1/2}$	I	μ	Diam. Cor. (nm x 10^4)	Q	Refer.	$\nu/\nu'_{standard}$	Stan-dard	Chemical Forms
$^{207}_{82}Pb$		1/2	+0.5895 *3*	59		50P51	0.7901 *1*	^{23}Na	$Pb(C_2H_3O_2)_2$; NaCl
$^{207}_{82}Pb$			±0.5902[d] *3*	59		57Ba34	0.2092198[d] *10*	^{1}H	$Pb(C_2H_5)_4$
$^{207}_{82}Pb$			±0.5883‡ *3*	59		58Pi48			$Pb(SO_4)$ powder, most ionic compound
							‡Chemical shift with respect to $Pb(C_2H_3O_2)_2$=0.21%		
$^{207}_{82}Pb$			±0.5880 *4*	59		59Ro45	1.3580‡ *4*	^{2}H	$Pb(SO_4)$ powder; D_2O $Pb(NO_3)_2$•*1*; D_2O
							‡Studied chemical shifts; these two most ionic		
$^{209}_{83}Bi$	>2Ay		+4.0800 *21*	412		51P02	1.0468 *1*	^{2}H	$Bi(NO_3)_3$; D_2O
$^{209}_{83}Bi$	>2Ay		±4.0802 *20*	412		53T01	1.04684 *5*	^{2}H	$Bi(NO_3)_3$; D_2O
$^{209}_{83}Bi$	>2Ay		±4.0809 *20*	412		59F39	0.160722 *14*	^{1}H	$Bi(NO_3)_3$•$5H_2O$; glycerine

* Polarization or Sternheimer correction included
♦ No splitting observed
† Value used in average or least squares adj.
[a] Resonance observed by depolarization of polarized nuclei (γ–anisotropy or β–asymmetry
[b] Determined from broadening of resonance lines
[c] Recalculation of earlier data
[d] Measured by double resonance technique
[e] Extrapolated to zero concentration or density
[f] Determined from relaxation times
[g] Computed corrections for atomic diamagnetism and molecular paramagnetic shielding included
[h] Used circularly polarized rf fields
[i] Used optical pumping to align nuclei
[j] Without Knight shift correction
[k] Includes estimated correction for Knight shift
[l] Value uncorrected for diamagnetism
[m] Metastable or excited state
[n] Not certain if authors corrected for diamagnetism, therefore not corrected by compilers
[p] Preliminary value from meeting abstract, report, thesis, or private communication
[q] Determined from quadrupole splitting of the magnetic resonance
[r] Resonance observed by asymmetry of μ–decay

Table F: Nuclear Moments by Atomic and Molecular Beams

Introduction

The atomic–beam magnetic–resonance apparatus is a device for observing certain types of transitions between atomic energy states. These transitions, usually associated with ground–state levels, can be studied in fields ranging from weak (small fractions of a gauss) to strong (several kilogauss). The basic principles of the method are discussed extensively in *Atomic and Molecular Beam Spectroscopy*, P. Kusch and V. W. Hughes [59Ku94], *Nuclear Moments*, H. Kopfermann [58Ko90], *Molecular Beams*, N. F. Ramsey [56Ra58], and *Molecular Beams*, K. F. Smith [55Sm12].

The precision attainable by this method is associated with the factors: (1) the atom is not perturbed by adjacent atoms or collisions with apparatus walls, (2) the natural lifetime of the energy state is usually extremely long compared with any time constant of the apparatus, and (3) the transit time through the transition region can be made as long as many tens of milliseconds.

The total energy of an atomic level, neglecting interactions with an applied magnetic field, can be expressed as

$$W = W_J + W_{M1} + W_{E2} + W_{M3} + \ldots\ldots, \qquad (1)$$

where W_J is the energy independent of the interactions with the nuclear moments and W_{M1}, W_{E2}, W_{M3} are the energies due to the interaction of the electrons with the nuclear magnetic dipole, electric quadrupole, and magnetic octupole moments, respectively.

The magnetic dipole term can be expressed as

$$W_{M1}/h = aIJ\cos(IJ) = (a/2)[F(F+1) - I(I+1) - J(J+1)]. \qquad (2)$$

The existence of this term causes a particular atomic level to be split into $2I+1$ or $2J+1$ hyperfine levels depending upon whether $I<J$ or $J<I$. The hyperfine–structure splitting is defined by $\Delta\nu=\Delta W/h$, where ΔW is the energy separation of a pair of hyperfine levels with total spins F and $(F-1)$ measured at zero magnetic field. From eq. (2), the hyperfine–structure splitting between such a pair of levels for a state with no quadrupole interaction is just $\Delta\nu(F,F-1)=Fa$.

The magnetic interaction constant a can be shown to be equivalent to $\mu_I H(0)/hIJ$ where $H(0)$ represents the time–averaged magnetic field at the nucleus due to the electron distribution. The precision with which μ_I can be determined from a is limited by the precision with which the atomic wavefunctions are known to permit the calculation of $H(0)$. The uncertainty in $H(0)$ may be of the order of a few percent.

In practice, the magnetic moment of a nucleus can be determined indirectly provided one isotope of that element has been studied by another method such as nuclear resonance. The relationship $\mu_1/\mu_2 = a_1I_1/a_2I_2$, which is based on the assumptions that the electronic wavefunctions and nuclear fields are the same for both isotopes, can be used to evaluate μ. It has been shown experimentally that these two ratios are not exactly equal. The hyperfine–structure anomaly, which is defined by $^1\Delta^2=(a_1I_1\mu_2/a_2I_2\mu_1)-1$, has been found to be as large as 1% for some pairs of isotopes. A tabulation of experimentally determined magnetic hyperfine structure anomalies may be found in a report by Fuller and Cohen [70FuCo]. More precise methods of determining μ will be discussed later.

The electric quadrupole term in (1) is given by

$$W_{E2}/h = (b/4)[(^3/_2)K(K+1) - 2I(I+1)J(J+1)] \times [I(2I-1)J(2J-1)]^{-1} \qquad (3)$$

which, in the classical limit, becomes

$$W_{E2}/h=(b/4)[(3/2)\cos^2(IJ)-1/2]$$

where $b = e(\partial E/\partial z)(Q/h)$ and

$$K = F(F+1)-I(I+1)-J(J+1).$$

The calculation of Q from the quadrupole interaction constant b is limited by the accuracy in the determination of $\partial E/\partial z$ at the nucleus. The uncertainty in the atomic wavefunctions may introduce uncertainties in $\partial E/\partial z$ of a few percent. In addition, the nuclear quadrupole moment causes a polarization of the atomic core electrons (Sternheimer effect). The effect of this polarization on the calculation of $\partial E/\partial z$ at the nucleus may be included as a correction factor which can amount to tens of percent. In compiling the following table, no attempt has been made to apply the Sternheimer correction where the authors have not done so. For any precise application of quadrupole data, one should refer to the original experimental work and to the references on the necessary corrections [66St23].

A severe limitation of the atomic–beam method for the measurement of electric quadrupole interactions is due to the fact that most beam experiments are performed on atoms in the ground state, which in many cases is an S state. In such a state, there is no interaction with the nuclear quadrupole moment. It is possible, however, to perform atomic–beam experiments on such atoms if they have been excited by absorption of optical resonance radiation or by electron impact.

The magnetic octupole term in (1) is given by

$$W_{M3}/h = (5c/4)[K^3 + 4K^2 + (4/5)K\{-3I(I+1)J(J+1) + I(I+1) + J(J+1) + 3\} - 4I(I+1)J(J+1)] \times [I(I-1)(2I-1)J(J-1)(2J-1)]^{-1} \quad (4)$$

where c is the magnetic octupole interaction constant from which the magnetic octupole moment Ω can be calculated. In the classical limit, equation (4) can be written as

$$W_{M3} = (1/3)\Omega(\partial^2 H(0)/\partial z^2)_{ave}[(5/2)\cos^3(IJ) - (3/2)\cos(IJ)].$$

The magnetic octupole interactions so far reported are of the order of 100 Hz or less than 10^{-6} times the dipole interactions. It is therefore necessary to evaluate the first two moments to a very high precision and include perturbation effects of low-lying excited states in order to compute Ω from c.

In the presence of a magnetic field H, additional terms for the direct interaction of the electronic and nuclear magnetic moments with the field must be included. The direct interaction term is given by

$$W_H = \mu_B g_J J \cdot H + \mu_B g'_I I \cdot H, \quad (5)$$

where $g_J = -\mu_J/J\mu_B$ [1], $g'_I = -\mu_I/I\mu_B$ [1], and μ_B is the Bohr magneton.

Energy differences between two states are given by the measured frequencies of the oscillating field (described below) which produces transitions between those states. By measuring these energy differences, I, g_J, a, b, and sometimes g'_I and c can be determined. In principle, these can then be used to calculate the nuclear moments μ, Q, Ω.

In the relatively simple case of an atom in an $S_{1/2}$ state, the energy dependence of a hyperfine level as a function of H can be expressed by the Breit-Rabi equation

$$W = -(\Delta W/[2(2I+1)]) + m_F g'_I \mu_B H \pm (\Delta W/2)[1 + 4m_F x/(2I+1) + x^2]^{1/2},$$

where ΔW is the energy splitting of the $^2S_{1/2}$ state caused by the nuclear field and $x = (g_J - g'_I)\,\mu_B H/\Delta W$. Figure 2 illustrates graphically the function $W/\Delta W$ for an atom in the $^2S_{1/2}$ state with a nucleus with $I = 4$, and $\mu > 0$.

A common arrangement of an atomic-beam magnetic-resonance system is shown in figure 1. The apparatus consists essentially of

(1) A source of neutral atoms at thermal energies.

(2) A detector of atomic-beam intensity.

(3) A pair of deflecting magnets (A and B of figure 1). In the regions A and B, the magnetic fields have a large field gradient so that the atoms will experience a transverse force, $F = -\partial W/\partial z = -(\partial W/\partial H) \times (\partial H/\partial z)$.

(4) A uniform adjustable magnetic field (C-field in figure 1). In this region, oscillating magnetic radiation can be introduced to cause transitions from one magnetic state to another.

In a strong field, the atomic state is characterized by magnetic quantum numbers m_I and m_J. For an atom in an $S_{1/2}$ state, m_J can take on the values $+^1/_2$ or $-^1/_2$. In the nonuniform A and B magnetic fields, atoms in the $m_F = +^1/_2$ states will be deflected toward the weak field (paths a, figure 1), while those in the $m_F = -^1/_2$ states will be deflected toward the strong field (paths b, figure 1). If, while in the C-region, an atom undergoes a transition from any of the magnetic substates associated with $m_F = \pm^1/_2$ to one with $m_F = \mp^1/_2$ (such as transitions α, β, γ, δ, or ϵ, figure 2), the deflection in the B-field will be opposite to that in the A-field and the atom will then be focused onto the detector. Such a transition can be induced if the frequency ν of the applied oscillating field satisfies the condition $W_1 - W_2 = h\nu$, where $W_1 - W_2$ is the energy separation of the two levels. This resonant frequency condition is observed by the accompanying maximum in beam intensity at the detector. From the observed resonant frequencies, the energy differences between pairs of states are determined and the quantities I, g_J, a, b, and sometimes g'_I and c can be derived. The nuclear moments μ, Q, and Ω can then be calculated from the interaction constants by use of the best available atomic wavefunctions. The magnetic dipole is the only moment which interacts directly with the applied magnetic field H and can thus be determined by very precise measurements of the appropriate energy separations.

In a magnetic field of a few gauss, where the variation of the energies of the individual m_F-states with respect to H is practically linear, the level separation is a function of I and H only. The observation of a transition such as α, in figure 2, can serve to determine I with no ambiguity.

In the intermediate field region, the energy expression for the transition β, figure 2, has terms non-linear in H which are functions of ΔW, the hyperfine-structure splitting. A measurement of this transition at such fields can permit calculation of ΔW

[1] Since the orientation of the spin and the associated magnetic moment are antiparallel for the electron and parallel for the proton, there is much confusion regarding the convention for signs of g_S and g'_I, the g-factors of an electron and a nucleus, and of μ_S and μ_I, the corresponding magnetic moments. There are variations in the literature, and some authors are not self-consistent. The convention adopted here is that g_S is positive for the electron (where μ_S is negative, i.e. antiparallel to the spin) and g'_I is positive for a nucleus when μ_I is negative or antiparallel to the nuclear spin.

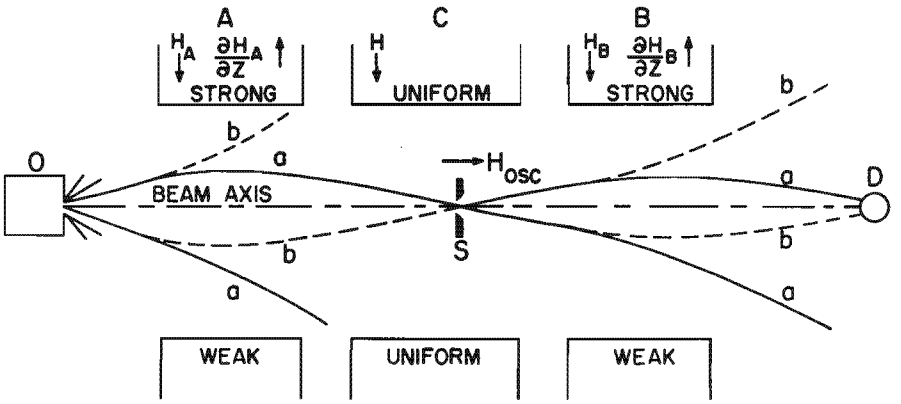

FIGURE 1. Schematic diagram of atomic beam apparatus. O—oven; S—slit: D—detector: A and B—regions with fields and field gradients in directions indicated: C—region with uniform field H and oscillating field H_{osc} in directions indicated: "a" and "b" represent paths of atoms with negative and positive effective magnetic moments, respectively.

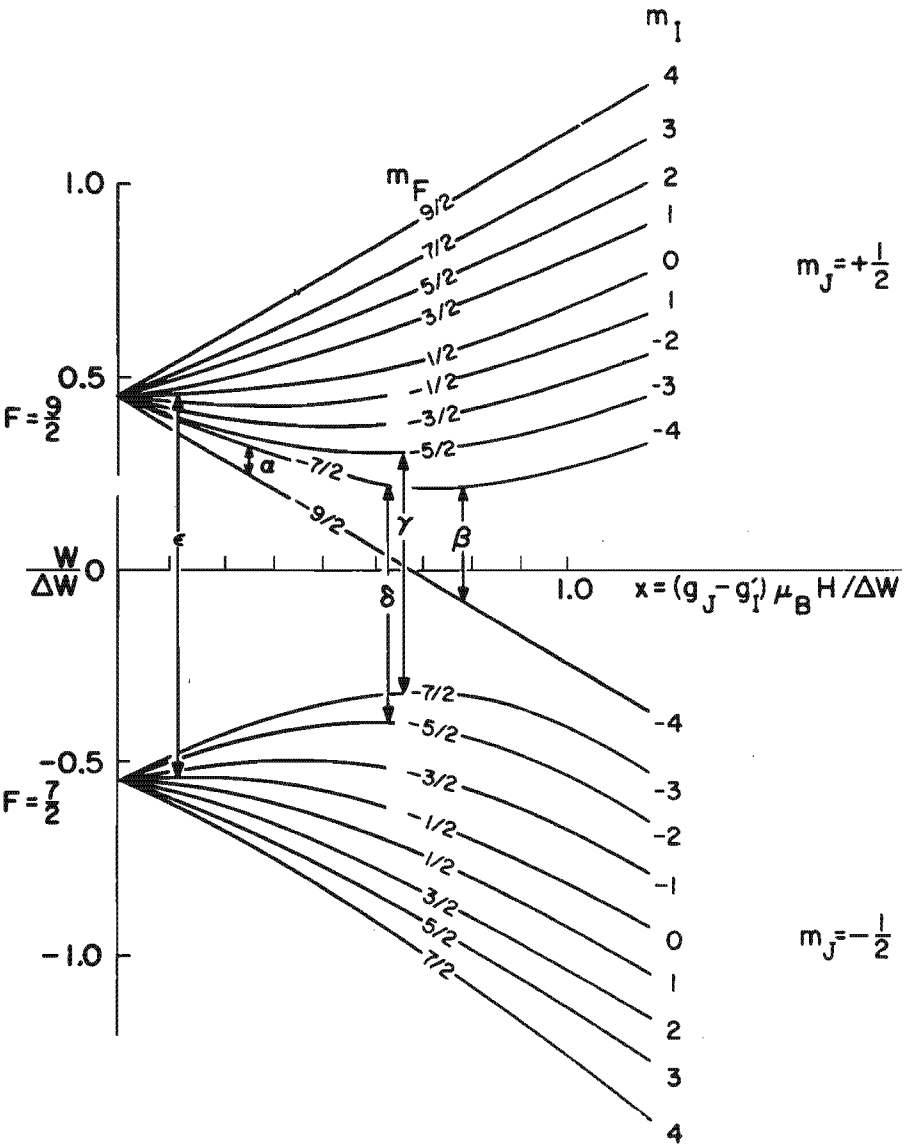

FIGURE 2. Breit-Rabi diagram of the energy levels of an atom in a $^2S_{1/2}$ state with a nucleus with $I=4$ and $\mu>0$. α, β, γ, δ, and ϵ represent some of the observable transitions which are useful for the determination of nuclear properties as explained in text.

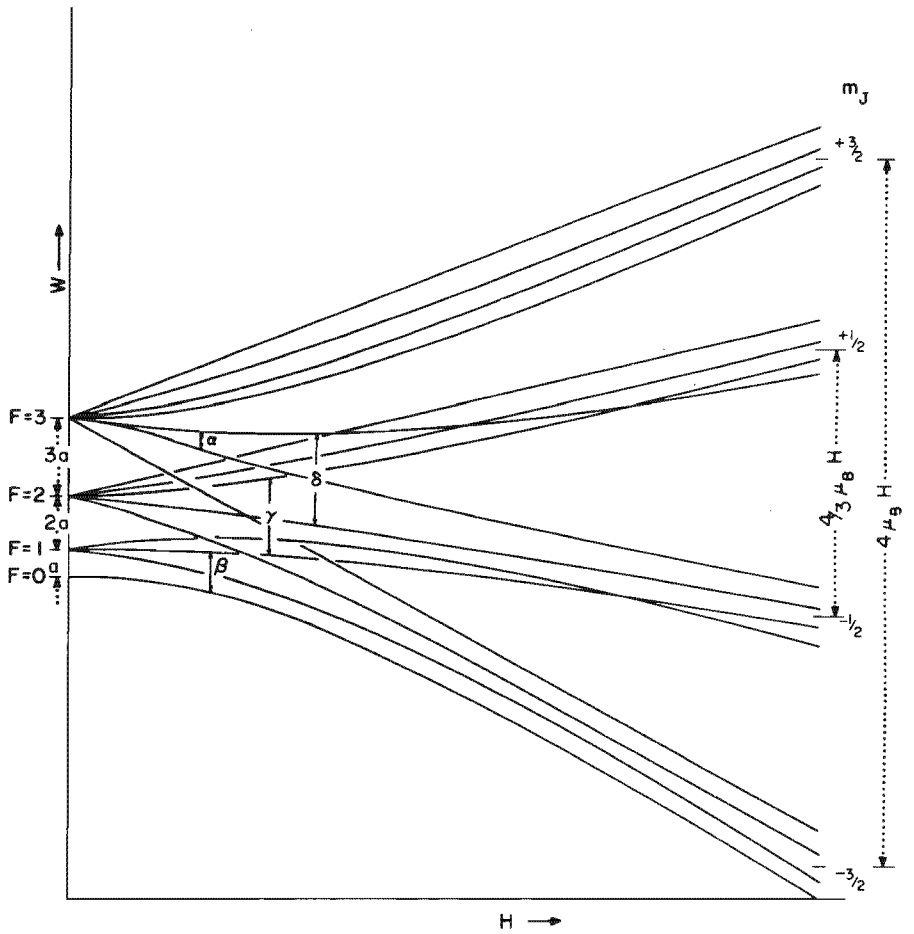

FIGURE 3. Schematic diagram of the energy levels of an atom in a $^2P_{3/2}$ state with a nucleus with $I = 3/2$, $\mu > 0$, $Q = 0$. Transitions α, β, γ, and δ may be used to determine the nuclear moments.

with moderate accuracy. Measurement of the field independent transition ϵ, figure 2 [$F = {}^9/_2$, $m_F = +{}^1/_2$ $\leftrightarrow$ $F = {}^7/_2$, $m_F = -{}^1/_2$], at very low field gives a measure of ΔW good to a precision of 1 part in 10^{10}.[2]

At intermediate fields the transitions γ and δ, figure 2, pass through frequency minima and at such fields their low field dependence permits very sharp lines to be obtained. For $J = {}^1/_2$ states, the difference between these two lines is exactly $2g'_J\mu_B H$ so that g'_J can be determined directly. In practice this evaluation of g'_J is limited by the precision with which one can evaluate H. Since H is usually measured in terms of a transition such as β, which depends on g_J, the determination of g'_J can be reduced to a measurement of the ratio g'_J/g_J.

In all nuclear magnetic moment measurements the measured quantity is $\mu_I H/I$ where H is the field at the nucleus. H differs from the applied field by the field induced by the core electrons. Unfortunately, this effect cannot be measured and the early general calculations of the diamagnetic corrections [41La03], [50Di10], [64Bo38] were assumed to have uncertainties of the order of 5%. The values of this correction range from 0.0006% for He to 1.16% for U. The tabulated magnetic moments include the corrections based on values in [50Di10]. More recent calculations of Lin, Feiock, and Johnson [72Jo18] yield values of the diamagnetic correction which are larger than those used (up to a factor of 2 larger for the heaviest atoms). The values of the correction factors used in the tables, as well as those of [72Jo18], have been tabulated in section 2 under Diamagnetic corrections.

A more complex case is illustrated in figure 3 drawn for a $^2P_{3/2}$ state and a nucleus with a spin of $^3/_2$, positive magnetic moment, and no quadrupole moment. The field dependence of transition α can be used to determine the nuclear spin I. Transitions β,

[2] The measurement of a frequency with a stated accuracy in terms of Hz presupposes that the second is determinate to an accuracy greater than that of the measurement. The second of time defined in terms of the rotation of the earth (Universal Time, UT1) is subject to difficult corrections for varying angular velocity of the earth, which can amount to 50 parts in 10^{10} per year. Measurements of the ^{133}Cs(4,0 $\leftrightarrow$ 3,0) hyperfine-structure splitting made in 1955 gave an approximate value of 9,192,631,840 Hz of UT [57Es32] which was adopted as a provisional definition of the second. Since then, however, a more precise measurement has been made in terms of Ephemeris Time (ET) which is not subject to the fluctuations in the earth's rotation. The value of the ^{133}Cs hyperfine-structure splitting has been determined as 9,192,631,770 ± 20 Hz of ET as measured at the year 1957.0 [58Ma18]. The definition of the second of Atomic Time (AT), adopted by the 13th General Conference of Weights and Measures (Paris, October 1967) and reported by Terrien [68Te02], is given in terms of $\Delta\nu(^{133}\text{Cs}) = 9,192,631,770$ Hz.

γ, and δ can be used to evaluate the separations $\Delta W(0,1)$, $\Delta W(1,2)$, and $\Delta W(2,3)$, respectively. If there were an electric quadrupole moment, the zero-field separations would be modified as shown in equation (3). In the $P_{3/2}$ state the evaluation of μ from doublet separations is not as simple as in the $^2S_{1/2}$ case.

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table F

Nucleus — Chemical symbol with Z- and A-number
States, other than ground states, are designated by "m" following the A-number.

$T_{1/2}$ — Half-life of radioactive nucleus

I — Nuclear spin, in units of $h/2\pi$

μ — Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction.
See Policies, Diamagnetic corrections, for factors used
A 5% uncertainty in the diamagnetic correction is assumed.

Values of μ calculated from $\Delta\nu$- or a-ratios do not include a hyperfine-structure anomaly correction unless so designated by a footnote. This correction can be the order of 0.001% to 1%. See [70FuCo].

Values of the magnetic octupole moment, in nuclear magneton-barns, are also tabulated in this column with the notation "Ω=...."

Q — Nuclear electric quadrupole moment, in barns, as given by the experimenter
Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment.
Values of the electric hexadecapole moment, given in $10^{-2}b^2$, are also tabulated in this column with the notation "Q_4=...".

Refer. — Reference key

Atomic State — Atomic state for which the hyperfine-structure splitting and the interaction constants are listed

F,F' — Total angular momentum quantum numbers which characterize hyperfine levels of the atomic state at zero magnetic field

$\Delta\nu(F,F')$ — The zero-field hyperfine-structure splitting between levels of total spin F and F', given without sign
Values are given in MHz unless otherwise noted.

Molecule Used — For molecular beam experiments, the formulae of the compounds used

Interaction Constants — Values of the interaction constants, a, b, and c, as given by the experimenter
Values are given in MHz unless otherwise noted.

When the nuclear g-factor is measured directly from the resonance frequencies or doublet separations, it is also tabulated, in Bohr magnetons.

Moment Ratios — Magnetic and electric moment ratios as determined by molecular beam techniques
Superscripts on the moment symbols designate A-values of isotopes

Quadrupole interactions, eqQ/h, are also tabulated in MHz

Table F: Nuclear Moments by Atomic and Molecular Beams

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{1}_{1}$H			+2.785 *2*		39K12		H_2, HD	
$^{1}_{1}$H			±2.79287 *14*		49T01		NaOH	g=30.4206x10^{-4} *15*
$^{1}_{1}$H					55K48	$^2S_{1/2}$:1,0	1420.40573 *5*	
$^{1}_{1}$H					56H94	$2^2S_{1/2}$:1,0	177.55686 *5*	
$^{1}_{1}$H					62Me09	$^2S_{1/2}$:1,0	1420.4057500[1] *4*	
$^{1}_{1}$H					63Cr12	$^2S_{1/2}$:1,0	1420.405751800[1] *28*	
$^{1}_{1}$H					63Ma31	$^2S_{1/2}$:1,0	1420.40575173[1] *2*	
$^{2}_{1}$H			+0.855 *6*		39K12		H_2, HD, D_2	μ^1/μ^2=3.257 *1*
$^{2}_{1}$H				+0.00273	40K10		D_2, HD	
$^{2}_{1}$H				+0.002766[c] *25*	50N03			(from 40K10)
$^{2}_{1}$H			±0.857415 *7*		52B40		HD, D_2	μ^2/μ^1=0.3070115 *24*
$^{2}_{1}$H				±0.002738 *14*	52K22		H_2, D_2	
$^{2}_{1}$H					55K48	$^2S_{1/2}$:$^3/_2$,$^1/_2$	327.384302 *30*	
$^{2}_{1}$H					56R57	$2^2S_{1/2}$:$^3/_2$,$^1/_2$	40.924439 *20*	
$^{2}_{1}$H				±0.002738 *19*	58Q02		HD	eqQ=−0.22454 *6*
$^{2}_{1}$H				±0.00282[c]	61Au01			(from 40K10,52K22)
$^{2}_{1}$H					66Cr08	$^2S_{1/2}$:$^3/_2$,$^1/_2$	327.38435230[1] *25*	
$^{2}_{1}$H				±0.002796[c] *5*	66Na06			
$^{3}_{1}$H	12y				57P46	$^2S_{1/2}$:1,0	1516.70170 *7*	
$^{3}_{1}$H	12y				67Ma16	$^2S_{1/2}$:1,0	1516.7014708087[1]‡ *71*	
							‡Based on $\Delta\nu(^1H)$=1420.4057518MHz	
$^{3}_{2}$He		1/2			53W01			
$^{3}_{2}$He					59W56	$^3S_1$:$^3/_2$,$^1/_2$	6739.7013 *4*	
$^{3}_{2}$He$^+$					58N39	$2^2S_{1/2}$:1,0	1083.35499 *20*	
$^{3}_{2}$He$^+$					66Fo14	$1^2S_{1/2}$:1,0	8665.649905[1] *50*	
$^{6}_{2}$He	0.8s	0[♦,b]	<±0.16, if I=1		58C68			
$^{6}_{3}$Li		1[b]	±0.840 *4*		37M06			μ^6/μ^7=0.258 *1*
$^{6}_{3}$Li			±0.82202 *2*		49K31		LiI, LiBr	g^7/g^6=2.64094 *5*
$^{6}_{3}$Li				≠0	53K43		^{6}LiCl	eqQ^6 positive
								Q^6/Q^7 positive
$^{6}_{3}$Li				−0.00080[E] *8*	64Wh01		^{6}LiF	Q^6/Q^7=+0.0176 *10*
								eqQ=+0.00725 *40*
$^{6}_{3}$Li					66Sc29	$^2S_{1/2}$:$^3/_2$,$^1/_2$	228.20528 *8*	
$^{6}_{3}$Li					73Co35	$^2S_{1/2}$:$^3/_2$,$^1/_2$	228.2052592 *80*	
$^{7}_{3}$Li		3/2[b]	±3.20		35F03			
$^{7}_{3}$Li			+3.254 *3*		41M08		Li_2, LiCl	g=2.169 2nm
$^{7}_{3}$Li				≈+0.02‡	49K29		Li_2, LiCl	eqQ=+0.060, +0.192
							‡Calculation of the magnitude and sign of Q is extremely sensitive to the assumed atomic wavefunctions	
$^{7}_{3}$Li				≈−0.04[c]‡	53H80		‡Calculation of the magnitude and sign of Q is extremely sensitive to the assumed atomic wavefunctions	
$^{7}_{3}$Li				negative?[c]‡	53S67		Li_2 ‡Calculation of the magnitude and sign of Q is extremely sensitive to the assumed atomic wavefunctions	
$^{7}_{3}$Li				−0.03[c]‡	58Ma20		Li_2 ‡Calculation of the magnitude and sign of Q is extremely sensitive to the assumed atomic wavefunctions	
$^{7}_{3}$Li				−0.016[c]	59Bu18			
$^{7}_{3}$Li				−0.044[cE]	63Ka32			(eqQ=+346 *2*)

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{7}_{3}$Li				−0.043[c]	64Br36		LiD, LiH	
$^{7}_{3}$Li					64Br37		Li_2	eqQ=0.068‡ *2*
							‡Zero external field	
$^{7}_{3}$Li				−0.045[E] *4*	64Wh01		^{7}LiH	eqQ=0.355 *2*
							^{7}LiF	eqQ=0.41602 *6*
$^{7}_{3}$Li					66Sc29	$^{2}S_{1/2}$: 2,1	803.50404 *48*	
$^{7}_{3}$Li				−0.043*[c] *3*	70Lu04		LiH	
$^{9}_{4}$Be			−1.176 *5*		39K09		$NaBeF_3$, $KBeF_3$	$g/g(^{7}Li)$=0.3613 *1*
$^{9}_{4}$Be				+0.049 *3*	67Bl09	$^{3}P_2$: $^{7}/_{2}$, $^{5}/_{2}$	435.4773 *21*	a=−124.5368 *17*
				+0.053* *3*		$^{5}/_{2}$, $^{3}/_{2}$	312.0226 *21*	b=+1.429 *8*
						$^{3}/_{2}$, $^{1}/_{2}$	187.6157 *42*	
						$^{3}P_1$: $^{5}/_{2}$, $^{3}/_{2}$	354.4365 *27*	a=−139.373 *12*
						$^{3}/_{2}$, $^{1}/_{2}$	202.9529 *15*	b=−0.753 *44*
$^{10}_{5}$B			+1.794 *9*		39M05		several molecules	$g/g(^{7}Li)$=0.2755 *15*
$^{10}_{5}$B				+0.0740 *5*	53W46			
					(52D21)			$(Q^{10}/Q^{11}$=2.084 *2*)
$^{10}_{5}$B					60Le05	$^{2}P_{1/2}$: $^{7}/_{2}$, $^{5}/_{2}$	429.048 *3*	
$^{10}_{5}$B				+0.0804*[c] *16*	68Sc18			
$^{10}_{5}$B				+0.08745*[c]	69Sc34			
$^{10}_{5}$B				+0.08472*[c] *56*	70Ne21			
$^{11}_{5}$B			+2.686 *8*		39M05		several molecules	$g/g(^{7}Li)$=0.825 *2*
$^{11}_{5}$B				+0.0355 *2*	53W46	$^{2}P_{3/2}$: 3,2	222.737 *10*	a=+73.347 *6*
						2,1	144.00 *2*	b=+2.695 *16*
						1,0	70.66 *20*	
						$^{2}P_{1/2}$: 2,1	732.4 *1*	
$^{11}_{5}$B					60Le05	$^{2}P_{1/2}$: 2,1	732.153 *3*	
$^{11}_{5}$B				+0.0357[c]	62Ko22			
$^{11}_{5}$B				+0.0386*[c] *8*	68Sc18			
$^{11}_{5}$B				+0.037*[c] *4*	69Go12			
$^{11}_{5}$B				+0.04196*[c]	69Sc34			
$^{11}_{5}$B				+0.04065*[c] *26*	70Ne21			
$^{11}_{6}$C	21m	3/2			61Sn01			
$^{11}_{6}$C	21m		±1.027 *10*	±0.0308 *6*	64Ha46	$^{3}P_2$: $^{7}/_{2}$, $^{5}/_{2}$	243.080 *30*	a=68.203 *7*
			μ/Q negative			$^{5}/_{2}$, $^{3}/_{2}$	167.402 *30*	b=4.949 *28*
						$^{3}P_1$: $^{5}/_{2}$, $^{3}/_{2}$	−0.200 *50*	a=1.242 *10*
							or +0.062 *50*	or 1.200 *10*
$^{11}_{6}$C	21m		±0.997[c]	±0.0322*[c] *6*	68Sc18			
$^{11}_{6}$C	21m		±0.97[c] *6*	±0.031*[c]‡ *3*	69Go12		‡For μ<0	
$^{11}_{6}$C	21m		±1.015[c]	±0.03426*[c]	69Sc34			
$^{11}_{6}$C	21m		(−?)0.964[c]‡ *1*		70Wo11	$^{3}P_1$		a=−1.308[c] *24*
								or +1.202[c] *24*
							‡From comparison with $a(^{3}P_1)/a(^{3}P_2)$ for ^{13}C, find $a(^{3}P_1)$~−1.30	
$^{13}_{6}$C			+0.7018 *20*		41H14		$K^{13}CN$, $Na^{13}CN$	$g/g(^{7}Li)$=0.6464 *18*
$^{13}_{6}$C					70Wo11	$^{3}P_1$: $^{3}/_{2}$, $^{1}/_{2}$	4.257 *25*	a=2.838 *17*
						$^{3}P_2$: $^{5}/_{2}$, $^{3}/_{2}$	372.636 *25*	a=149.055 *10*
$^{13}_{7}$N	10m	1/2			61Sn01			
$^{13}_{7}$N	10m	1/2	±0.32212* *36*		64Be24	$^{4}S_{3/2}$: 2,1	33.347 *20*	a=16.673 *10*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{14}_{7}$N			+0.403 *2*		39K10		NaCN,KCN	$\mu/\mu(^7\text{Li})$=0.1237 *6*
$^{14}_{7}$N					70Cr02	$^4S_{3/2}$		a=10.45092906[1] *19*
								b=+1.32[1] *20*Hz
$^{15}_{7}$N			±0.280 *3*		40Z02		$^{15}N_2$	
$^{15}_{8}$O	2.1m	1/2	±0.7189[a] *8*		63Co17	$^3P_2$:$^5/_2$,$^3/_2$	1037.23 *7*	a=414.87 *3*
								$a(^{17}\text{O})$=218.569 *10*
$^{19}_{9}$F			+2.625 *2*		41M08		NaF	g=5.248 *5*nm
$^{19}_{9}$F					61Ra14	$^2P_{3/2}$:2,1	4020.01‡ *2*	
							‡Hyperfine splitting obtained by paramagnetic resonance experiment	
$^{19}_{9}$F			±2.6289 *9*		64Bo37		TlF	
$^{19}_{10}$Ne	18s	1/2[f]	−1.887 *1*		63Co22	$^1S_0$		$\nu/\nu(^1\text{H})$=0.6754 *2*
$^{20}_{10}$Ne		0[g]	$\leq 4\times10^{-4}$,if I=1		60Lu06			a<250kHz
$^{21}_{10}$Ne		3/2			56H70	$^3P_2$		
$^{21}_{10}$Ne			−0.66176 *2*		57L08		20.5% ^{21}Ne	$g/g(^2\text{H})$=0.514274 *4*
$^{21}_{10}$Ne				+0.093 *10*	58G65	$^3P_2$:$^7/_2$,$^5/_2$	1034.48 *10*	a=−267.68 *3*
						$^5/_2$,$^3/_2$	599.44 *10*	b=−111.55 *10*
						$^3/_2$,$^1/_2$	303.93 *10*	
$^{23}_{10}$Ne	38s		−1.08 *1*		68Do07			
$^{21}_{11}$Na	23s	3/2	+2.38612[a] *10*		65Am01	$^2S_{1/2}$:2,1	1906.466 *21*	
$^{22}_{11}$Na	2.6y	3	+1.746[a] *3*		49D01	$^2S_{1/2}$:$^7/_2$,$^5/_2$	1220.64 *4*	
$^{23}_{11}$Na		3/2[b]			34R01			
$^{23}_{11}$Na			+2.215 *2*		41M08		Na_2	g=1.4761 *15*nm
$^{23}_{11}$Na			±2.2175 *2*		51L28	$^2S_{1/2}$:2,1	1771.631 *2*	$g/g(^1\text{H})$=0.26451 *2*
$^{23}_{11}$Na				+0.108 *12*	55P33	$^2P_{3/2}$		a=19.06 *36*
				or −0.909 *30*				b=+2.58 *30* or
								b=−21.64 *70*
						$^2P_{1/2}$		a=94.45 *50*
$^{23}_{11}$Na				+0.087*[a] *10*	60Be34			
$^{23}_{11}$Na				+0.103[c]	62Ko22			
$^{23}_{11}$Na					64Br37		Na_2	eqQ=0.424‡ *2*
							‡Zero external field	
$^{23}_{11}$Na					70Ch40	$^2S_{1/2}$: 2,1	1771.6261275[p] *5*	
					73Co35			
$^{23}_{11}$Na			±2.21740[dp] *7*		71Co34	$^2S_{1/2}$		
					73Co35			
$^{24}_{11}$Na	15h	4	+1.689[a] *5*		53B19	$^2S_{1/2}$:$^9/_2$,$^7/_2$	1139.35 *10*	
$^{24}_{11}$Na	15h		+1.6902[d] *10*		66Ch15	$^2S_{1/2}$:$^9/_2$,$^7/_2$	1139.33258 *10*	
					73Co36			
$^{25}_{12}$Mg			−0.855 *2*		59K82	$^1S_0$		$g/g(^1\text{H})$=0.612
$^{25}_{12}$Mg				+0.22	62Lu04	$^3P_2$:$^9/_2$,$^7/_2$	567.291 *10*	a=−128.440 *5*
						$^7/_2$,$^5/_2$	452.338 *10*	b=16.009 *5*
						$^5/_2$,$^3/_2$	329.044 *10*	
						$^3/_2$,$^1/_2$	199.82 *4*	
						$^3P_1$:$^7/_2$,$^5/_2$	516.140 *10*	a=−144.945 *5*
						$^5/_2$,$^3/_2$	349.987 *10*	b=−8.029 *5*
$^{27}_{13}$Al		5/2	+3.637 *10*		39M08		$NaCl{\cdot}AlCl_3$	$g/g(^7\text{Li})$=0.6696
$^{27}_{13}$Al		5/2		+0.156 *3*	49L15	$^2P_{3/2}$:4,3	392.0 *2*	a=94.25 *4*
						3,2	274.3 *1*	b=18.76 *25*
$^{27}_{13}$Al				+0.155[e]	52K10			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{27}_{13}$Al				+0.149 *2*	53L15	$^2P_{1/2}$:3,2	1506.14 *5*	a=502.05 *2*
$^{27}_{13}$Al				+0.150[c]	62Ko22 (53L15)			
$^{27}_{13}$Al					68Ma23	$^2P_{3/2}$		a=94.27767[E] *10* b=18.9153[E] *7*
$^{27}_{13}$Al				±0.140*[c] *2*	71St44			
$^{30}_{15}$P	2.6m	1			68Ph02			
$^{31}_{15}$P					64Pe11	$^4S_{3/2}$		a=+55.061 *10*
$^{35}_{17}$Cl		3/2	positive	−0.0795 *5*	49D14	$^2P_{3/2}$		a=205.288 *10* b=55.347 *20*, $b/a>0$
$^{35}_{17}$Cl				−0.07894 *2*	51J20	$^2P_{3/2}$		a=205.050 *5* b=54.873 *5* Q^{35}/Q^{37}=1.2686 *4*
$^{35}_{17}$Cl			±0.82 *8*		51K31	$^2P_{1/2}$: 2,1	2074.383 *8*	
$^{35}_{17}$Cl				−0.0782[c]	52K10			
$^{35}_{17}$Cl			Ω=−0.0191 *32*		56Ho02	$^2P_{3/2}$: 3,2	670.013455 *90*	a=205.046870 *30*
						2,1	355.221030 *70*	b=54.872905 *55*
						1,0	150.173560 *75*	c=−7.15 *120*Hz
$^{35}_{17}$Cl			Ω=−0.0188[c] *30*		57S28			(c=9.3[j] *12*Hz)
								c=−6.95 *120*Hz
$^{35}_{17}$Cl				−0.0793[c]	62Ko22 (51J20)			
$^{35}_{17}$Cl			Ω=−0.0188[c]	−0.108[c]	71Am02	$^2P_{3/2}$		a=205.046860[c]
			Ω=−0.0162*[c]	−0.104*[c]	(49D14)			b=54.872934[c]
								c=−7.015[c]Hz
$^{37}_{17}$Cl		3/2		−0.0621 *5*	49D14	$^2P_{3/2}$		a=170.686 *10* b=43.256 *20*, $b/a>0$
$^{37}_{17}$Cl				−0.06213 *2*	51J20	$^2P_{3/2}$		a=170.681 *10* b=43.255 *10*
$^{37}_{17}$Cl			±0.68* *7*		51K31	$^2P_{1/2}$:2,1	1726.700 *15*	
$^{37}_{17}$Cl				−0.0616[c]	52K10			
$^{37}_{17}$Cl			Ω=−0.0148 *32*		56Ho02	$^2P_{3/2}$: 3,2	555.304315 *90*	a=170.686370 *30*
						2,1	298.127655 *70*	b=43.245245 *55*
						1,0	127.440815 *75*	c=−5.55 *120*Hz
$^{37}_{17}$Cl			Ω=−0.0146[c] *30*		57S28			(c=5.35[j] *120*Hz)
								c=−5.41 *120*Hz
$^{35}_{18}$Ar	1.8s	3/2[f]	+0.632 *2*		65Ca04			
$^{38}_{19}$K	7.7m	3	+1.3740* *10*		65Ph02	$^2S_{1/2}$:$^7/_2$,$^5/_2$	1415.292 *9*	
$^{39}_{19}$K		3/2[b]	±0.397		35M08	$^2S_{1/2}$		
$^{39}_{19}$K			positive		37T04			
$^{39}_{19}$K			+0.391 *2*		39K10		K_2, KCN	$g/g(^7Li)$=0.120
$^{39}_{19}$K					50O01	$^2S_{1/2}$		g^{39}/g^{41}=1.8218 *2*
$^{39}_{19}$K			±0.39149[d] *15*		52E09	$^2S_{1/2}$		g^{40}/g^{39}=1.24346[d] *24*
$^{39}_{19}$K				±0.07 *2*	57B19	$P_{1/2}$		a=28.85 *3*
						$P_{3/2}$		$a_{3/2}=5a_{1/2}$ assumed
								b=2.8 *8*
$^{39}_{19}$K					59M70	$^2S_{1/2}$:2,1	461.71971 *15*	
$^{39}_{19}$K				+0.070[c]	62Ko22 (57B19)			
$^{39}_{19}$K					67Da04	$^2S_{1/2}$:2,1	461.719723 *38*	

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{39}_{19}$K				+0.053 *8*	68Sp03	$^4F_{9/2}$:6,5	568.8 *1*	a=103.56 *9*
								b=78.86 *80*,$b/a<0$
						$^4D_{7/2}$		a=150.03 *90*
								b=78.5 *32*,$b/a<0$
$^{39}_{19}$K					69Zi01	$4^2P_{3/2}$		a=+6.10 *25*
								b=+1.8 *12*
$^{39}_{19}$K					70Ch40	$^2S_{1/2}$: 2,1	461.7197204[p] *5*	
					73Co35			
$^{39}_{19}$K			±0.391427[dp] *27*		73Co35			
$^{40}_{19}$K	1.3Gy	4	−1.291[a] *5*		49D01	$^2S_{1/2}$:$^9/_2$,$^7/_2$	1285.73 *5*	
$^{40}_{19}$K	1.3Gy		−1.2981[d] *4*		52E09	$^2S_{1/2}$:$^9/_2$,$^7/_2$	1285.790 *7*	
$^{41}_{19}$K		3/2[b]			36M03			
$^{41}_{19}$K				±0.067[E]	53L33		^{39}KCl,^{41}KCl	Q^{41}/Q^{39}=1.220[E] *2*
$^{41}_{19}$K			±0.2153[a] *4*		60Sa23	$^2S_{1/2}$:2,1	254.014 *1*	
$^{41}_{19}$K				+0.067[E]	67Bo40		^{39}KF;^{41}KF	Q^{39}/Q^{41}=+0.8215[E] *1*
$^{41}_{19}$K					70Ch40	$^2S_{1/2}$: 2,1	254.0138700[p] *5*	
					73Co35			
$^{42}_{19}$K	12h	2	−1.138[a] *5*		53B19	$^2S_{1/2}$:$^5/_2$,$^3/_2$	1258.9 *1*	
$^{42}_{19}$K	12h		−1.141[d] *3*		64Kh01	$^2S_{1/2}$:$^5/_2$,$^3/_2$	1258.877 *4*	
$^{42}_{19}$K	12h		±1.1424[k] *8*		69Ch20	$^2S_{1/2}$:$^5/_2$,$^3/_2$	1258.876947 *15*	a=−503.550779 *5*
					73Co36			g=3.10672x10^{-4} *45*
$^{43}_{19}$K	22h	3/2	±0.163[a] *2*		59P26	$^2S_{1/2}$:2,1	192.64 *5*	
$^{45}_{19}$K	20m	3/2	±0.1734[a] *4*		67Ga08	$^2S_{1/2}$:2,1	204.5873 *15*	a=102.2936 *7*
					68Ga28			
$^{43}_{20}$Ca			±1.317 *3*		59K82	$^1S_0$		$g/g(^1H)$=0.0673
$^{43}_{21}$Sc	3.9h	7/2	+4.62[a] *4*	−0.26 *6*	66Co13	$^2D_{5/2}$		a=+105.7 *9*
								b=−44 *10*
$^{44}_{21}$Sc	3.9h	2	+2.56[a] *3*	+0.10 *5*	66Co13	$^2D_{5/2}$		a=+102.5 *12*
								b=+18 *8*
$^{44m}_{21}$Sc	2.4d	6	+3.88[a] *1*	−0.19 *2*	66Co13	$^2D_{5/2}$		a=+51.7 *2*
								b=−33 *3*
$^{45}_{21}$Sc				−0.22 *1*	59F53	$^2D_{3/2}$:5,4	1328.96 *10*	a=+269.560 *20*
						4,3	1085.772 *15*	b=−26.37 *10*
						$^2D_{5/2}$:6,5	635.003 *50*	a=+109.034 *10*
						5,4	543.841 *50*	b=−37.31 *10*
						4,3	444.652 *50*	c=−3.5 *35*kHz
$^{46}_{21}$Sc	84d	4	+3.03 *2*	+0.119 *6*	62Pe21	$^2D_{3/2}$:$^{11}/_2$,$^9/_2$	838.06 *11*	a=+150.576 *9*
						$^9/_2$,$^7/_2$	674.12 *6*	b=+14.38 *14*
						$^7/_2$,$^5/_2$	517.13 *10*	
						$^2D_{5/2}$:$^{13}/_2$,$^{11}/_2$	405.84 *6*	a=+60.906 *4*
						$^{11}/_2$,$^9/_2$	336.19 *2*	b=+20.41 *10*
						$^9/_2$,$^7/_2$	270.14 *3*	
						$^7/_2$,$^5/_2$	207.05 *3*	
						$^5/_2$,$^3/_2$	146.25 *3*	
$^{47}_{21}$Sc	3.4d	7/2	+5.34[a] *2*	−0.22 *3*	66Co13	$^2D_{5/2}$		a=+122.2 *5*
								b=−38 *6*
$^{48}_{21}$Sc	1.8d	6			67Re06	$^2D_{5/2}$		
$^{45}_{22}$Ti	3.1h	7/2	±0.095[a] *2*	±0.015 *15*	66Co19	J=3:$^{13}/_2$,$^{11}/_2$	30.5 *3*	a=4.59 *7*
			μ/Q positive			$^{11}/_2$,$^9/_2$	25.4 *3*	b=1.5 *15*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{47}_{22}$Ti				+0.29 *1*	65Ch19	$^3F_2$		a=−85.7033[j] *3*
								b=+25.700[j] *3*
						$^3F_3$		a=−52.9047[j] *7*
								b=+28.082[j] *9*
						$^3F_4$		a=−37.9918[j] *6*
								b=+37.681[j] *10*
$^{49}_{22}$Ti				+0.24 *1*	65Ch19	$^3F_2$		a=−85.7261[j] *3*
								b=+21.070[j] *3*
						$^3F_3$		a=−52.9183[j] *5*
								b=+23.030[j] *10*
						$^3F_4$		a=−38.0042[j] *5*
								b=+30.842[j] *13*
								Q^{49}/Q^{47}=+0.819 *1*
$^{47}_{23}$V	31m	3/2			67Re06	$^4F_{9/2}$, ^6D		
$^{48}_{23}$V	16d	4			66Re06	$^4F_{9/2}$, $^4F_{7/2}$		
$^{51}_{23}$V				−0.052 *1*	67Ch10	$^4F_{9/2}$		a=227.136 *1*
								b=8.259 *60*
								c=0.002 *2*
						$^4F_{7/2}$		a=249.752 *2*
								b=5.595 *60*
								c=−0.001 *2*
						$^4F_{5/2}$		a=321.251 *3*
								b=3.964 *55*
								c=0.000 *2*
						$^4F_{3/2}$		a=560.069 *2*
								b=3.982 *24*
				−0.052 *1*		$^6D_{9/2}$		a=406.852 *2*
								b=14.344 *65*
								c=0.006 *9*
						$^6D_{7/2}$		a=382.369 *1*
								b=2.442 *30*
								c=0.001 *3*
						$^6D_{5/2}$		a=373.529 *1*
								b=−4.942 *35*
								c=0.000 *2*
						$^6D_{3/2}$		a=405.648 *2*
								b=−6.916 *50*
						$^6D_{1/2}$		a=751.545 *3*
$^{49}_{24}$Cr	42m	5/2	±0.476[a] *3*		70Jo27	$^7S_3$: $^{11}/_2$, $^9/_2$	273.657 *20*	a=49.754 *2*
						$^9/_2$, $^7/_2$	223.893 *9*	b=0.018 *17*
						$^7/_2$, $^5/_2$	174.134 *12*	b/a>o
$^{51}_{24}$Cr	28d	7/2			59C24			
$^{51}_{24}$Cr	28d		±0.934[a] *5*		70Ad07	$^7S_3$		a=69.701 *2*
								b=0.015 *23*
								b/a<0
$^{53}_{24}$Cr					63Ch17	$^7S_3$: $^9/_2$, $^7/_2$	371.691 *11*	a=82.5985 *15*
						$^7/_2$, $^5/_2$	289.095 *7*	b=0.003 *8*
						$^5/_2$, $^3/_2$	206.499 *7*	b/a<0
$^{53}_{24}$Cr					64Pe11	$^7S_3$		a=−82.5994 *16*
								b=+0.008 *12*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{51}_{25}$Mn	45m	5/2	±3.56[a]		68Jo19	$^6S_{5/2}$		a=74.835 *2*
								b=0.024 *7*
$^{52}_{25}$Mn	5.7d	6	±3.058[a] *1*		66Ad03	$^6S_{5/2}$ + admixtures		a=26.759 *3*
								$\|b\|$<0.100
$^{52m}_{25}$Mn	21m	2	±0.0076[a] *4*		65Ph04	$^6S_{5/2}$		a=±0.200 *4*
$^{52m}_{25}$Mn	21m	2	±0.0076[a] *3*		65Sa22	$^6S_{5/2}$		a=0.200 *3*
$^{55}_{25}$Mn		5/2			57W46	$^6S_{5/2}$		
$^{55}_{25}$Mn					65Ev07	$^6S_{5/2}$		a=−72.42083 *7*
								b=−0.0183 *8*
								(c=0 assumed)
$^{56}_{25}$Mn	2.6h	3	+3.223[a] *2*		61Ch05	$^6S_{5/2}$: $^{11}/_2$, $^9/_2$	310.173 *15*	a=56.3924 *23*
						$^9/_2$, $^7/_2$	253.766 *10*	b≤0.050
						$^7/_2$, $^5/_2$	197.375 *8*	
$^{57}_{26}$Fe					66Ch16	$^5D_4$		a=+38.0795 *10*
						$^5D_3$		a=+26.351 *2*
						$^5D_2$		a=+18.762 *2*
						$^5D_1$		a=+14.077 *5*
$^{59}_{26}$Fe	45d	3/2			65Do11	$^5D_4$		
$^{59}_{27}$Co				±0.404 *40*	61Eh01	$^4F_{9/2}$:8,7	3655.470 *200*	a=450.284 *10*
						7,6	3169.440 *50*	b=139.63 *50*
						6,5	2695.056 *100*	
						5,4	2230.638 *50*	
						4,3	1774.548 *50*	
$^{59}_{27}$Co					65Ch19	$^4F_{7/2}$		a=+490.5779[j] *8*
								b=+95.153[j] *16*
						$^4F_{5/2}$		a=+613.3762[j] *8*
								b=+68.255[j] *14*
$^{59}_{27}$Co			+4.64 *21*	+0.380	68Ch09	$^4F_{9/2}$:($3d^74s^2$)		a=450.283 *1*
								b=139.230 *30*
								c=0.000 *3*
						$^4F_{7/2}$		a=490.567 *2*
								b=94.501 *36*
								c=0.000 *4*
						$^4F_{5/2}$		a=613.349 *3*
								b=67.541 *50*
								c=−0.002 *3*
						$^4F_{3/2}$		a=1042.981 *1*
								b=67.618 *2*
				+0.345		$^4F_{9/2}$:($3d^84s$)		a=828.799 *4*
								b=−118.8 *3*
								c=0.002 *4*
						$^4F_{7/2}$		a=668.919 *1*
								b=−79.2 *2*
								c=0.004 *4*
						$^4F_{5/2}$		a=562.183 *3*
								b=−54.8 *3*
				+0.36‡ *7*			‡Average value	
$^{60m}_{27}$Co	10.5m	2			68Ro08			
$^{60m}_{27}$Co	10.5m	2	+4.40[ap] *9*	+0.3[p] *4*	69Hu12			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{61}_{28}$Ni				+0.126	68Ch10	$^3F_4$:($3d^84s^2$)		a=−215.040 *2*
								b=−56.868 *18*
								c=0.000 *1*
						$^3F_3$		a=−299.311 *2*
								b=−42.063 *13*
				+0.130		$^3D_3$:($3d^94s$)		a=−454.972 *3*
								b=−102.951 *16*
								c=0.000 *1*
						$^3D_2$		a=−171.584 *7*
								b=−56.347 *23*
				+0.16*‡ *2*			‡Average value	
$^{60}_{29}$Cu	24m	2			58R10			
$^{60}_{29}$Cu	24m		+1.219* *3*		68Ph01	$^2S_{1/2}$:$^5/_2$,$^3/_2$	6033 *4*	a=2413.1 *16*
$^{61}_{29}$Cu	3.3h	3/2			57N09			
$^{61}_{29}$Cu	3.3h	3/2			58R10			
$^{61}_{29}$Cu	3.3h		+2.13* *4*		66Do01	$^2S_{1/2}$:2,1	11225 *200*	
$^{62}_{29}$Cu	9.9m	1			66Do01	$^2S_{1/2}$		
$^{62}_{29}$Cu	9.9m		−0.380* *4*		68Ph01	$^2S_{1/2}$:$^3/_2$,$^1/_2$	2257.2 *5*	a=−1504.8 *3*
$^{63}_{29}$Cu					57T12	$^2S_{1/2}$:2,1	11733.83 *1*	
$^{63}_{29}$Cu			+2.2228 *4*		67Fi11	$^2S_{1/2}$: 2,1	11733.817412 *40*	
$^{63}_{29}$Cu					69Bl08	$^4P_{5/2}$		a=2031.239 *1*
								b=78.993 *4*
								c=−100 *180*Hz
						$^4F_{9/2}$		a=1323.891 *1*
								b=137.874 *5*
								c=−340 *350*Hz
								g^{63}/g^{65}=0.933524 *5*
$^{64}_{29}$Cu	13h	1	±0.216* *4*		54L40	$^2S_{1/2}$:$^3/_2$,$^1/_2$	1278 *20*	
$^{64}_{29}$Cu	13h		−0.216* *2*		66Do01	$^2S_{1/2}$:$^3/_2$,$^1/_2$	1282.140 *8*	
$^{65}_{29}$Cu					57T12	$^2S_{1/2}$:2,1	12568.81 *1*	
$^{65}_{29}$Cu			+2.3812 *4*		67Fi11	$^2S_{1/2}$: 2,1	12568.779943 *120*	
$^{65}_{29}$Cu					69Bl08	$^4P_{5/2}$		a=2175.811 *2*
								b=73.111 *9*
								c=−10 *32*Hz
						$^4F_{9/2}$		a=1418.123 *2*
								b=127.586 *19*
$^{66}_{29}$Cu	5.2m	1	±0.283* *5*		64Ro04	$^2S_{1/2}$:$^3/_2$,$^1/_2$	1670 *15*	
$^{66}_{29}$Cu	5.2m	1	−0.281* *2*		69Cu09	$^2S_{1/2}$		a=1112.525 *4*
$^{67}_{30}$Zn				+0.16	62Lu04	$^3P_2$:$^9/_2$,$^7/_2$	2418.111 *25*	
						$^7/_2$,$^5/_2$	1855.690 *15*	
						$^5/_2$,$^3/_2$	1312.065 *15*	
						$^3/_2$,$^1/_2$	781.865 *15*	
$^{66}_{31}$Ga	9.5h	0•	<0.00004, if I=1		57W35	$^2P_{1/2}$		
$^{67}_{31}$Ga	78h	3/2			57H86			
$^{67}_{31}$Ga	78h		+1.8488 *4*	+0.22	68Eh02	$^2P_{1/2}$:2,1	2457.72726 *90*	a=1228.86582 *45*
								g=6.705x10^{-4} *13*
						$^2P_{3/2}$		a=175.09736 *15*
								b=71.95750 *55*
$^{68}_{31}$Ga	68m	1			58H114			
$^{68}_{31}$Ga	68m		±0.01175* *6*	±0.0313 *16*	62Eh02	$^2P_{1/2}$:$^3/_2$,$^1/_2$	17.574 *15*	a=11.716 *10*
			μ/Q negative			$^2P_{3/2}$:$^5/_2$,$^3/_2$	8.695 *33*	(a=1.660* *10*)
						$^3/_2$,$^1/_2$	25.611 *41*	b=10.276 *17*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{69}_{31}$Ga			+1.999‡ *5*	+0.186	48B17	$^2P_{1/2}$:2,1	2677.56 *10*	g=7.239x10^{-4} *15*
						$^2P_{3/2}$:3,2	634.890 *20*	a=190.790 *5*
						2,1	319.062 *10*	b=62.518 *12*
						1,0	128.274 *10*	c<100Hz
							‡Determined from Δm=±1 doublet separation for J=3/2 state. Value subject to error due to perturbation effects of nearby states	
$^{69}_{31}$Ga				+0.2318[c]	49D14			
$^{69}_{31}$Ga				+0.190[c]	52K10			
$^{69}_{31}$Ga			Ω=±0.107 *20*		54D26	$^2P_{3/2}$:3,2	634.90183 *20*	a=190.79428 *15*
						2,1	319.06706 *20*	b=62.52247 *30*
						1,0	128.27730 *20*	c=84 *6*Hz
$^{69}_{31}$Ga					56L53	$^2P_{1/2}$:2,1	2677.9875 *10*	
$^{69}_{31}$Ga			Ω=+0.137[c] *5*		57S28			(c=50.2[i] *33*Hz)
								c=93.0 *34*Hz
$^{69}_{31}$Ga				+0.183[c]	62Ko22 (54D26)			
$^{69}_{31}$Ga			+2.0145[h] *3*		68Fo10	$^2P_{1/2}$: 2,1	2677.98716 *20*	g=7.29530x10^{-4} *33*
						$^2P_{3/2}$		a=190.79436 *11*
								b=62.52319 *23*
								c=90 *6*Hz
							η=1.0886 *290*	a'''=−107.76 *98*
$^{70}_{31}$Ga	21m	1			62Eh01	$^2P_{1/2}$		
$^{71}_{31}$Ga			+2.547‡ *5*	+0.117	48B17	$^2P_{1/2}$:2,1	3402.09 *20*	g=9.218x10^{-4} *15*
						$^2P_{3/2}$:3,2	766.673 *20*	a=242.424 *5*
						2,1	455.450 *10*	b=39.398 *10*
						1,0	203.028 *10*	c<100Hz
							‡Determined from Δm=±1 doublet separation for J=3/2 state. Value subject to error due to perturbation effects of nearby states	
$^{71}_{31}$Ga				+0.1461[c]	49D14			
$^{71}_{31}$Ga				+0.120[c]	52K10			
$^{71}_{31}$Ga			Ω=±0.146 *20*		54D26	$^2P_{3/2}$:3,2	766.69580 *20*	a=242.43395 *20*
						2,1	445.46960 *20*	b=39.39904 *40*
						1,0	203.04340 *20*	c=115 *7*Hz
$^{71}_{31}$Ga					56L53	$^2P_{1/2}$:2,1	3402.6946 *13*	
$^{71}_{31}$Ga			Ω=+0.180[c] *5*		57S28			(c=86.0[f] *33*Hz)
								c=121.9 *34*Hz
$^{72}_{31}$Ga	14h	3	−0.13210[a] *5*	+0.58 *1*	60Ch13	$^2P_{1/2}$:$^7/_2$,$^5/_2$	153.653 *1*	a=−43.9009 *3*
						$^2P_{3/2}$:$^9/_2$,$^7/_2$	117.103 *3*	a=−6.2593 *27*
						$^7/_2$,$^5/_2$	89.700 *15*	b=+193.693 *16*
$^{72}_{31}$Ga	14h		−0.13211 *3*	+0.59	68Eh02	$^2P_{1/2}$:$^7/_2$,$^5/_2$	153.65266 *53*	a=−43.90076 *15*
						$^2P_{3/2}$		a=−6.25698 *11*
								b=193.67365 *80*
$^{69}_{32}$Ge	38h	5/2	±0.735[a] *7*	±0.028 *6*	70Ol02	$^3P_1$		a=23.40 *3*
			μ/Q positive					b=8.28 *8*
$^{71}_{32}$Ge	11d	1/2	+0.65 *20*		63Ch12	$^3P_1$:$^3/_2$,$^1/_2$		a=87.005 *3*
						$^3P_2$:$^5/_2$,$^3/_2$		a=357 *6*
$^{71}_{32}$Ge	11d		±0.546[a] *5*		66Ch02	$^3P_1$		(a=87.005 *3*)
$^{71}_{32}$Ge	11d		±0.547[a] *5*		70Ol02	$^3P_2$		a=+360.53 *6*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{73}_{32}$Ge				−0.18‡ *3*	66Ch02	$^3P_1$		a=+15.5480 *18*
								b=−54.566 *9*
						$^3P_2$		a=−64.4270 *7*
								b=+111.825 *13*
							‡Average value	
$^{73}_{32}$Ge				−0.173[c] *26*	70Ol02			
$^{75}_{32}$Ge	82m	1/2	+0.509[a] *5*		70Ol02	$^3P_1$		a=−81.06 *8*
						$^3P_2$		a=+335.94 *9*
$^{70}_{33}$As	55m	4			69Ph04			
$^{72}_{33}$As	26h	2	±2.2[ap]		69Ph04			
$^{75}_{33}$As					64Pe11	$^4S_{3/2}$		a=−66.204 *1*
								b=−0.535 *3*
$^{76}_{33}$As	26h	2		±7 *8*	61Ch10	$^4S_{3/2}$:$^7/_2$,$^5/_2$	117 *4*	a=30.5 *35*
						$^5/_2$,$^3/_2$	69 *16*	b=12 *14*
$^{76}_{35}$Br	17h	1	±0.5479[a] *1*	±0.26 *1*	60Li11	$^2P_{3/2}$:$^5/_2$,$^3/_2$	1256.47 *5*	a=345.422 *14*
			μ/Q negative			$^3/_2$,$^1/_2$	189.11 *5*	b=314.329 *22*
$^{77}_{35}$Br	58h	3/2			59G92			
$^{79}_{35}$Br			±2.110 *21*		47B24		CsBr, LiBr	
$^{79}_{35}$Br					53F33		^{39}KBr	Q^{79}/Q^{81}=1.1973[E] *6*
$^{79}_{35}$Br		3/2	positive	+0.32 *2*	54K11	$^2P_{3/2}$:3,2	2269.552	a=884.810 *3*
						2,1	2154.499	b=−384.878 *8*
						1,0	1269.702	$c\leq$0.0001
$^{79}_{35}$Br				+0.293[c]	62Ko22			
					(54K11)			
$^{79}_{35}$Br			Ω=+0.116		66Br03	$^2P_{3/2}$:3,2	2269.55564 *10*	a=884.80977 *6*
						2,1	2154.49879 *10*	b=−384.88284 *20*
						1,0	1269.70100 *50*	c=388 *8*Hz
$^{79}_{35}$Br					69He04		LiBr	Q^{79}/Q^{81}=1.197056 *6*
$^{79}_{35}$Br			Ω=+0.123[c]	+0.445[c]	71Am02	$^2P_{3/2}$		a=884.809720[c]
			Ω=+0.0928*[c]	+0.367*[c]				b=−384.882900[c]
								c=393[c]Hz
$^{80}_{35}$Br	18m	1			59L41			
$^{80}_{35}$Br	18m		±0.5138[a] *6*	±0.18 *8*	64Wh05	$^2P_{3/2}$:$^5/_2$,$^3/_2$	525.2 *12*	a=323.9 *4*
			μ/Q positive	±0.19*		$^3/_2$,$^1/_2$	998.0 *10*	b=227.62 *10*
$^{80m}_{35}$Br	4.5h	5			59L41			
$^{80m}_{35}$Br	4.5h		+1.3170 *6*	+0.71 *3*	64Wh05	$^2P_{3/2}$:$^{13}/_2$,$^{11}/_2$	510.62 *25*	a=+166.05 *2*
				+0.74*		$^{11}/_2$,$^9/_2$	1277.80 *18*	b=−874.9 *2*
$^{81}_{35}$Br			±2.271 *23*		47B24		CsBr, LiBr	
$^{81}_{35}$Br		3/2	positive	+0.27 *2*	54K11	$^2P_{3/2}$:3,2	2539.794	a=953.770 *3*
						2,1	2229.056	b=−321.516 *8*
						1,0	1275.271	$c\leq$0.0001
$^{81}_{35}$Br			Ω=+0.129		66Br03	$^2P_{3/2}$:3,2	2539.79156 *10*	a=953.76818 *6*
						2,1	2229.05377 *10*	b=−321.52428 *20*
						1,0	1275.30352 *50*	c=430 *8*Hz
$^{82}_{35}$Br	36h	5	±1.6264[a] *5*	±0.73 *3*	59G12	$^2P_{3/2}$:$^{13}/_2$,$^{11}/_2$	766.82 *60*	a=205.04 *5*
			μ/Q positive			$^{11}/_2$,$^9/_2$	1287.32 *43*	b=870.7 *9*
						$^9/_2$,$^7/_2$	1488.6 *11*	b/a=−4.246 *1*
$^{83}_{36}$Kr		9/2?	−0.971		46K05			
$^{83}_{36}$Kr		9/2		+0.251 *5*	61Ku07	$^3P_2$:$^{13}/_2$,$^{11}/_2$	1830.714 *10*	a=−243.970 *4*
						$^{11}/_2$,$^9/_2$	1341.820 *20*	b=−452.12 *8*
								($c\approx$−2 2kHz assumed)

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{83}_{36}$Kr			Ω=−0.18 *6*	+0.270 *13*	63Fa01	$^3P_2$: $^{13}/_2$, $^{11}/_2$	1830.7236 *5*	a=−243.9693 *1*
						$^{11}/_2$, $^9/_2$	1341.8217 *2*	b=−452.1697 *36*
						$^9/_2$, $^7/_2$	956.5583 *2*	c=−0.00080 *20*
						$^7/_2$, $^5/_2$	656.0844 *30*	
$^{85}_{36}$Kr	11y		±1.005	+0.42 *4*	61Ku07			($\mu/^{85}/\mu^{83}$=1.035 *2*)
					(55R13)			(Q^{85}/Q^{83}=1.66 *10*)
$^{81}_{37}$Rb	4.7h	3/2			56H52			
$^{81}_{37}$Rb	4.7h		+2.05[a] *2*		57H75	$^2S_{1/2}$:2,1	5097 *13*	
$^{81}_{37}$Rb	4.7h		+2.42[d] *44*		62Fa04	$^2S_{1/2}$:2,1	5111.589 *40*	
$^{81m}_{37}$Rb	32m	9/2			56H69			
$^{82m}_{37}$Rb	6.3h	5			56H52			
$^{82m}_{37}$Rb	6.3h		+1.50[a] *2*		57H75	$^2S_{1/2}$: $^{11}/_2$, $^9/_2$	3094.1 *24*	
$^{82m}_{37}$Rb	6.3h				62Fa04	$^2S_{1/2}$: $^{11}/_2$, $^9/_2$	3094.084 *6*	
$^{82m}_{37}$Rb	6.3h		±1.6427 *12*		68Co18	$^2S_{1/2}$: $^{11}/_2$, $^9/_2$	3094.08265 *30*	
$^{83}_{37}$Rb	83d	5/2			56H52			
$^{83}_{37}$Rb	83d		+1.42[a] *2*		57H75	$^2S_{1/2}$:(3.2)	3183.3 *58*	
$^{84}_{37}$Rb	33d	2			56H52			
$^{84}_{37}$Rb	33d		−1.32[a] *2*		57H75	$^2S_{1/2}$: $^5/_2$, $^3/_2$	3077.5 *51*	
$^{84}_{37}$Rb	33d				62Kh03	$^2S_{1/2}$: $^5/_2$, $^3/_2$	3083.159 *4*	
$^{85}_{37}$Rb		5/2[b]			36M01			
$^{85}_{37}$Rb			+1.346 *5*		39K07		Rb_2	$g/g(^7Li)$=0.247 *1*
$^{85}_{37}$Rb					54T35		$^{85}Rb^{35}Cl$	Q^{85}/Q^{87}=2.0669[E] *5*
$^{85}_{37}$Rb				±0.27 *2*	56S59	$^2P_{3/2}$:4,3	120.8	a=25.3 *2*
						3,2	65.0	b=24.4 *13*
						$^2P_{1/2}$:3,2	362 *3*	a=120.7 *10*
$^{85}_{37}$Rb				±0.30[c]	62Ko22			
					(56S59)			
$^{85}_{37}$Rb					62Pe14	$^2S_{1/2}$:3,2	3035.732439 *5*	
$^{85}_{37}$Rb					64Bo07		^{85}RbF	eqQ=−70.3406[E] *10*
$^{85}_{37}$Rb					67Bo40		RbF	Q^{85}/Q^{87}=+2.06694 *6*
$^{85}_{37}$Rb			±1.3521 *10*		67Gr08		^{85}RbF	
$^{85}_{37}$Rb			+1.3524[h] *2*		68Eh01			$g_J/g_{J'}$
								−1.466478x10^{-4} *22*
$^{85}_{37}$Rb			+1.3524[d] *2*		69De33			$g_J/g_{J'}$
								−1.466477x10^{-4} *34*
$^{86}_{37}$Rb	19d	2	−1.70[a] *1*		53B19	$^2S_{1/2}$: $^5/_2$, $^3/_2$	3960 *20*	
$^{86}_{37}$Rb	19d		−1.6912[d] *5*		61Br16	$^2S_{1/2}$: $^5/_2$, $^3/_2$	3946.883 *2*	g=4.590x10^{-4} *4*
$^{87}_{37}$Rb	47Gy	3/2[b]			36M01			
$^{87}_{37}$Rb	47Gy		+2.744 *9*		39K07		Rb_2	$g/g(^7Li)$=0.8399 *28*
$^{87}_{37}$Rb	47Gy			±0.13 *1*	56S59	$^2P_{3/2}$:3,2	265 *3*	a=85.8 *7*
								b=11.8 *6*
						$^2P_{1/2}$		a=409 *4*
$^{87}_{37}$Rb	47Gy				61Es03	$^2S_{1/2}$:2,1	6834.682614 *1*	
$^{87}_{37}$Rb	47Gy				62Pe14	$^2S_{1/2}$:2,1	6834.682614 *3*	
$^{87}_{37}$Rb	47Gy		+2.74996[d] *20*		67Fi11			
$^{87}_{37}$Rb	47Gy				68Du05	$5^2P_{1/2}$: 2,1	812 *15*	
$^{88}_{37}$Rb	18m	2	±0.508[a] *5*		68Va03	$^2S_{1/2}$: $^5/_2$, $^3/_2$	1186.084 *18*	
$^{87}_{38}$Sr			−1.0924 *9*		59K82		Sr metal	
$^{89}_{39}$Y					59F58	$^2D_{3/2}$:2,1	114.72 *20*	a=−57.217 *15*
						$^2D_{5/2}$:3,2	88.63 *60*	a=−28.749 *30*
$^{90}_{39}$Y				−0.15[c]	62Ko22			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{90}_{39}$Y	64h	2	−1.629[a] *8*	−0.155 *3*	62Pe01	$^2D_{5/2}$: $^9/_2$, $^7/_2$	403.719 *37*	a=−85.258 *6*
						$^7/_2$, $^5/_2$	293.203 *22*	b—29.716 *38*
						$^5/_2$, $^3/_2$	198.287 *24*	
						$^3/_2$, $^1/_2$	114.515 *19*	
						$^2D_{3/2}$: $^7/_2$, $^5/_2$	613.023 *34*	a=−169.749 *7*
						$^5/_2$, $^3/_2$	410.871 *24*	b=−21.602 *27*
						$^3/_2$, $^1/_2$	235.722 *26*	
$^{91}_{39}$Y	58d	1/2	±0.1640[a] *8*		62Pe21	$^2D_{3/2}$:2,1	136.69 *3*	a=68.34 *2*
						$^2D_{5/2}$:3,2	103.05 *4*	a=34.35 *3*
$^{103}_{45}$Rh					68Ch16	$^4F_{9/2}$		a=175.574 *1*
						$^4F_{7/2}$		a=87.416 *1*
						$^4F_{5/2}$		a=107.385 *2*
						$^4F_{3/2}$		a=32.377 *1*
						$^2F_{7/2}$		a=88.198 *1*
						$^2F_{5/2}$		a=210.88 *32*
						$^2D_{5/2}$		a=87.364 *2*
						$^2D_{3/2}$		a=91.718 *1*
$^{105}_{46}$Pd				+0.8 *1*	65Ch19	$^3D_3$		a=−391.178[j] *1*
								b=−652.906[j] *15*
						$^3D_2$		a=+66.359[j] *1*
								b=−398.192[j] *10*
						$^1D_2$		a=621[j] *5*
								b=490[j] *30*
$^{101}_{47}$Ag	9m	9/2			70Wa35			
$^{102}_{47}$Ag	13m	5			70Wa35			
$^{102m}_{47}$Ag	7m	2			68Gr01			
$^{102m}_{47}$Ag	7m		+4.2[ap] *2*		71Gr60	$^2S_{1/2}$: $^5/_2$, $^3/_2$	39400[p] *1800*	
$^{103}_{47}$Ag	66m	7/2			58E85	$^2S_{1/2}$		
$^{103}_{47}$Ag	66m		+4.45[d] *5*		70Wa35	$^2S_{1/2}$: 4,3	39700 *500*	a=9925 *125*
$^{104}_{47}$Ag	1.2h	5			59E89	$^2S_{1/2}$		
$^{104}_{47}$Ag	1.2h	5	$+4.0^{a+2}_{-1}$		61Am02	$^2S_{1/2}$: $^{11}/_2$, $^9/_2$	33500^{+2000}_{-1000}	
$^{104m}_{47}$Ag	27m	2			58R10	$^2S_{1/2}$		
$^{104m}_{47}$Ag	27m	2			59E89	$^2S_{1/2}$		
$^{104m}_{47}$Ag	27m	2	+3.7[a] *2*		61Am02	$^2S_{1/2}$: $^5/_2$, $^3/_2$	35000 *2000*	
$^{105}_{47}$Ag	40d	1/2			58E84			
$^{105}_{47}$Ag	40d		±0.1014[a] *10*		63Ew02	$^2S_{1/2}$:1,0	1529.057 *20*	
$^{106}_{47}$Ag	24m	1			58R10	$^2S_{1/2}$		
$^{106}_{47}$Ag	24m	1			59E89	$^2S_{1/2}$		
$^{106}_{47}$Ag	24m		positive large		61Am02			
$^{106}_{47}$Ag	24m		+2.88[a] *14*		68Ph02	$^2S_{1/2}$: $^3/_2$, $^1/_2$	32700 *1600*	
$^{106m}_{47}$Ag	8.3d	6			59E89	$^2S_{1/2}$		
$^{107}_{47}$Ag					53W33	$^2S_{1/2}$:1,0	1712.56 *4*	
$^{107}_{47}$Ag					66Bl11	$^2D_{5/2}$:3,2	378.8453 *3*	a=−126.2818 *1*
						$^4F_{9/2}$:5,4	1596.7506 *6*	a=−319.339 *5*
$^{107}_{47}$Ag					67Da04	$^2S_{1/2}$:1,0	1712.512111 *18*	
$^{107}_{47}$Ag			−0.113431[b] *70*		69De33			g=1.22982x10^{-4} *71*
$^{108}_{47}$Ag	2.4m	1			64Ro04			
$^{108}_{47}$Ag	2.4m		+2.80[a] *1*		69Cu09	$^2S_{1/2}$		a=20800 *150*
$^{109}_{47}$Ag					53W33	$^2S_{1/2}$:1,0	1976.94 *4*	
$^{109}_{47}$Ag					66Bl11	$^2D_{5/2}$:3,2	435.4750 *15*	a=−145.1584 *5*
						$^4F_{9/2}$:5,4	1841.1564 *9*	a=−368.214 *9*
$^{109}_{47}$Ag					67Da04	$^2S_{1/2}$:1,0	1976.932075 *17*	

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{109m}_{47}$Ag	40s	7/2			65St18			
$^{109m}_{47}$Ag	40s		±4.31[a] *4*		66St22			
$^{110}_{47}$Ag	24s	1	+2.85[a] *5*		69Cu09	$^2S_{1/2}$		*a*=21200 *300*
$^{110m}_{47}$Ag	253d	6			58E84	$^2S_{1/2}$		
$^{110m}_{47}$Ag	253d		+3.604[d] *4*		67Sc04	$^3S_{1/2}$: $^{13}/_2$, $^{11}/_2$	30313.756 *4*	
$^{111}_{47}$Ag	7.5d	1/2	±0.144[a] *7*		54L40	$^2S_{1/2}$:1,0	2180 *100*	
$^{111}_{47}$Ag	7.5d	1/2	−0.145[a] *2*		56W27	$^2S_{1/2}$:1,0	2204.54 *5*	
$^{112}_{47}$Ag	3.2h	2	±0.0548[a] *5*		64Ch06	$^2S_{1/2}$: $^5/_2$, $^3/_2$	518.332 *18*	
$^{113}_{47}$Ag	5.3h	1/2	±0.159[a] *2*		64Ch06	$^2S_{1/2}$:1,0	2408.065 *28*	
$^{111}_{48}$Cd					60Fa08	$^3P_2$: $^5/_2$, $^3/_2$	8232.341 *2*	
$^{113}_{48}$Cd					60Fa08	$^3P_2$: $^5/_2$, $^3/_2$	8611.586 *4*	
$^{109}_{49}$In	4.3h	9/2	+5.53[a] *6*	+1.20	59M19	$^2P_{3/2}$		*a*=242.38 *56*
								b=462.1 *64*
$^{110}_{49}$In	66m	2			67Pr13	$^2P_{3/2}$		
$^{110}_{49}$In	66m	2	+4.360 *4*	+0.36 *2*	68Ca10	$^2P_{3/2}$		*a*=429.20 *36*
					68Ca25			*b*=192.5 *7*
$^{110m}_{49}$In	4.9h	7	+10.4[a] *1*	−0.290	59M19	$^2P_{3/2}$	(for $\mu>0$)	*a*=291.4 *12*
			or	or				*b*=−112 *16*
			−10.7[a] *1*	+0.311		$^2P_{3/2}$	(for $\mu<0$)	or *a*=−301.4 *13*
								b=120 *17*
$^{111}_{49}$In	2.8d	9/2	+5.53[a] *6*	+1.18	59M19	$^2P_{3/2}$		*a*=241.78 *30*
								b=455.3 *34*
$^{112}_{49}$In	14m	1	+2.81 *3*	+0.089 *5*	68Ca10	$^2P_{3/2}$		*a*=554 *4*
					68Ca25			*b*=48.3 *25*
$^{112m}_{49}$In	21m	4			68Ca14			
$^{113}_{49}$In		9/2			38M05			
$^{113}_{49}$In				±1.144	50M02	$^2P_{3/2}$		(*a*=241.624[a] *24*)
						5,4	1115.807	*b*=443.102 *44*
$^{113}_{49}$In				±0.820[c]	52K10			
$^{113}_{49}$In			Ω=±0.574 *15*	±0.82 *2*	57E07	$^2P_{3/2}$:6,5	1745.4575 *5*	*a*=241.641293 *58*
						5,4	1115.8253 *5*	*b*=443.46626 *52*
						4,3	670.9552 *5*	*c*=0.001728 *45*
$^{113}_{49}$In					57E09	$^2P_{1/2}$:5,4	11385.4300 *20*	
$^{113}_{49}$In				+0.777[c]	62Ko22			
					(50M02)			
$^{113m}_{49}$In	1.7h	1/2	−0.21050[a] *6*		60Ch08	$^2P_{1/2}$:1,0	781.084 *10*	
$^{114m}_{49}$In	50d	5	+4.7[a] *1*		57G23	$^2P_{1/2}$: $^{11}/_2$, $^9/_2$	9700 *200*	
$^{115}_{49}$In	0.6Jy	9/2			38M05			
$^{115}_{49}$In	0.6Jy	9/2[b]		±0.84	39H12	$^2P_{3/2}$:6,3	3552.0 *45*	*a*=243.0 *30*
								b=458.8 *78*
$^{115}_{49}$In	0.6Jy	9/2	+5.52‡ *4*		42H07	$^2P_{1/2}$:6,5	11387 *3*	$\Delta\nu^{115}/\Delta\nu^{113}$= 1.00224 *10*
							‡Determined from $\Delta m=\pm1$ doublet separation for $J=3/2$ state. Value subject to error due to perturbation effects of nearby states	
$^{115}_{49}$In	0.6Jy			±1.161	50M02	$^2P_{3/2}$:6,5	1752.702 *35*	*a*=242.165 *2*
						5,4	1117.153 *24*	*b*=449.562 *17*
						4,3	668.960 *13*	
$^{115}_{49}$In	0.6Jy			±0.834[c]	52K10			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{115}_{49}$In	0.6Jy		Ω=±0.565 *12*		57E07	$^2P_{1/2}$:5,4	11409.7474 *39*	
						$^2P_{3/2}$:6,5	1752.6865 *2*	*a*=242.165057 *23*
						5,4	1117.1676 *2*	*b*=449.59656 *21*
						4,3	668.9631 *2*	*c*=0.001702 *35*
$^{115}_{49}$In	0.6Jy				57E09	$^2P_{1/2}$:5,4	11409.7506 *20*	
$^{115}_{49}$In	0.6Jy		Ω=+0.475[c] *11*		57S28			(*c*=82[j] *32*Hz)
								c=1682 *40*Hz
$^{115m}_{49}$In	4.5h	1/2			61Ki02			
$^{115m}_{49}$In	4.5h		−0.24371[a] *7*		62Ca14	$^2P_{1/2}$		*a*=−903.5 *11*
						$^2P_{3/2}$		*a*=−95.973 *10*
$^{116m}_{49}$In	54m	5	+4.21[a] *8*		56N12	$^2P_{1/2}$: $^{11}/_2$, $^9/_2$	8670 *170*	
$^{116m}_{49}$In	54m	5	+4.4[a] *1*		57G23	$^2P_{1/2}$: $^{11}/_2$, $^9/_2$	9000 *200*	
$^{117}_{49}$In	45m	9/2			63Ca05			
$^{117m}_{49}$In	1.9h	1/2	−0.25146 *3*		68Mu04	$^2P_{1/2}$		*a*=−932.996 *12*
						$^2P_{3/2}$		*a*=(−)99.005 *5*
$^{113}_{50}$Sn	118d	1/2	±0.879[a] *9*		69Pr07	$^3P_1$: $^3/_2$, $^1/_2$	728.91 *66*	*a*=485.911 *25*
$^{115}_{50}$Sn					65Ch06	$^3P_1$		*a*=+507.445 *4*
						$^3P_2$		*a*=−1113.770 *4*
$^{117}_{50}$Sn					65Ch06	$^3P_1$		*a*=+552.608 *4*
						$^3P_2$		*a*=−1212.956 *3*
$^{119}_{50}$Sn					65Ch06	$^3P_1$		*a*=+578.296 *4*
						$^3P_2$		*a*=−1269.419 *3*
$^{121}_{50}$Sn	27h	3/2	±0.699[a] *7*	±0.08 *4*	69Pr07	$^3P_1$		*a*=128.726 *8*
			μ/Q negative					*b*=32.374 *12*
$^{123m}_{50}$Sn	40m	3/2			68Ch38			
$^{115}_{51}$Sb	31m	5/2	+3.46[a] *1*	−0.28‡ *7*	68Ja05	$^4S_{3/2}$		*a*=−307.68 *19*
								b=−3.7 *5*
							‡For Q^{121}=−0.28	
$^{116}_{51}$Sb	15m	3			68Ga08			
$^{117}_{51}$Sb	2.8h	5/2	+2.67[a] *1*	−0.42‡ *8*	68Ja05	$^4S_{3/2}$		*a*=−237.91 *15*
								b=−5.5 *5*
							‡For Q^{121}=−0.28	
$^{118m}_{51}$Sb	3.5m	1	±2.46[a] *7*		68Ja05	$^4S_{3/2}$		*a*=547 *13*
$^{119}_{51}$Sb	38h	5/2	+3.45[a] *1*	−0.29‡ *7*	68Ja05	$^4S_{3/2}$		*a*=−307.16 *6*
								b=−3.8 *4*
							‡For Q^{121}=−0.28	
$^{120}_{51}$Sb	16m	1	±2.34[a] *22*		68Ja05	$^4S_{3/2}$		*a*=520 *47*
$^{121}_{51}$Sb				−0.20 *3*	60Fe07	$^4S_{3/2}$:4,3	1199.08 *1*	*a*=−299.034 *4*
						3,2	819.45 *1*	*b*=−3.68 *2*
						2,1	595.12 *1*	
$^{122}_{51}$Sb	2.8d	2	−1.90[a]	+0.66‡ *4*	60Fe08			*a*=+212.01 *6*
								b=+8.7 *5*
							‡For Q^{121}=−0.28	
$^{123}_{51}$Sb				−0.36‡ *5*	60Fe07	$^4S_{3/2}$:5,4	815.60 *1*	*a*=−162.451 *3*
						4,3	648.46 *1*	*b*=−4.67 *3*
						3,2	484.02 *1*	
							‡For Q^{121}=−0.28	
$^{124}_{51}$Sb	60d	3			60Fe08			
$^{116}_{52}$Te	2.5h	0[f]			61Ax04			
$^{117}_{52}$Te	61m	1/2			61Ax04			
$^{119}_{52}$Te	16h	1/2			61Ax04			
$^{119}_{52}$Te	16h		±0.25 *5*		65Ad03	*J*=2		*a*=425 *20*
$^{119m}_{52}$Te	4.5d	11/2			61Ax04			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{123}_{53}$I	13h	5/2			58G18			
$^{124}_{53}$I	4.0h	2			58G18			
$^{126}_{53}$I	13d	2			60Ga12			
$^{127}_{53}$I		5/2			53K14			
$^{127}_{53}$I				−0.819‡	53J23	‡Livingston et al. (53L24) quote the unpublished value of Q^{127}=0.819b of Jaccarino, King, and Stroke. The subsequent paper by Jaccarino et al. (54J07) does not give a value of Q but does present the interaction constants and a value of Ω^{127}. In a private communication, Stroke quotes a value of Q^{127}=0.789b. This was obtained from the interaction constants of 54J07, using the measured a^{127} to obtain $<1/r^3>$. It also includes relativistic corrections		
$^{127}_{53}$I			Ω=+0.3		54J07	$^2P_{3/2}$:4,3	4226.172 *15*	a=827.265 *3*
						3,2	1965.884 *10*	b=1146.356 *10*
						2,1	737.492 *8*	c=0.00245 *37*
$^{127}_{53}$I				−0.69[c] *3*	55M88			
$^{127}_{53}$I			Ω=+0.181[c] *47*		57S28			(c=0.00287[j] *37*)
								c=0.00201 *52*
$^{127}_{53}$I				−0.789[c]‡	59St46	‡Livingston et al. (53L24) quote the unpublished value of Q^{127}=0.819b of Jaccarino, King, and Stroke. The subsequent paper by Jaccarino et al. (54J07) does not give a value of Q but does present the interaction constants and a value of Ω^{127}. In a private communication, Stroke quotes a value of Q^{127}=0.789b. This was obtained from the interaction constants of 54J07, using the measured a^{127} to obtain $<1/r^3>$. It also includes relativistic corrections		
$^{127}_{53}$I				−0.64[c]	62Ko22 (54J07)			
$^{127}_{53}$I			Ω=+0.265[c]	−1.097[c]	71Am02	$^2P_{3/2}$		a=827.26502[c]
			Ω=+0.167*[c]	−0.750*[c]	(54J07)			b=1146.35920[c]
								c=2602[c]Hz
$^{128}_{53}$I	25m	1			59S63			
$^{130}_{53}$I	12h	5			58G20			
$^{130}_{53}$I	12h	5			59S63			
$^{131}_{53}$I	8d	7/2			58G18			
$^{131}_{53}$I	8d		+2.738* *1*	−0.40 *1*	60Li13	$^2P_{3/2}$:5,4	3292.99 *9*	a=575.903 *7*
				−0.41* *1*				
						4,3	2138.22 *5*	b=578.866 *75*
						3,2	1314.24 *7*	
$^{132}_{53}$I	2.3h	4			59S64			
$^{132}_{53}$I	2.3h	4			60Ga12			
$^{132}_{53}$I	2.3h		±3.08* *2*	±0.075 *15*	62Wh11	$^2P_{3/2}$		a=567.6 *26*
			μ/Q negative					b=128.2 *206*
$^{133}_{53}$I	21h	7/2			60Ga12			
$^{133}_{53}$I	21h		+2.836* *5*	−0.26 *1*	61Al20	$^2P_{3/2}$:5,4	3260.1 *73*	a=597.0 *10*
				−0.27* *1*		4,3	2277.9 *46*	b=385.2 *74*
						3,2	1515.9 *61*	
$^{135}_{53}$I	6.7h	7/2			60Ga12			
$^{129}_{54}$Xe					61Fa05	$^3P_2$:$^5/_2$,$^3/_2$	5961.2577 *9*	
$^{131}_{54}$Xe			Ω=+0.048 *12*	−0.120 *12*	61Fa05	$^3P_2$:$^7/_2$,$^5/_2$	2693.6234 *7*	a=+706.4714 *7*
						$^5/_2$,$^3/_2$	1608.3475 *8*	b=+252.5145 *64*
						$^3/_2$,$^1/_2$	838.7636 *4*	c=+0.000728 *105*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{125}_{55}Cs$	45m	1/2	+1.41[a] *2*		71Da01	$^2S_{1/2}$:1,0	8754 *40*	
$^{127}_{55}Cs$	6.2h	1/2			56N16			
$^{127}_{55}Cs$	6.2h		+1.43[a] *4*		58N27	$^2S_{1/2}$:1,0	8950 *200*	
$^{127}_{55}Cs$	6.2h		+1.43[a] *2*		62Kh03	$^2S_{1/2}$:1,0	8900 *150*	
$^{127}_{55}Cs$	6.2h		+1.46[a] *2*		71Da01	$^2S_{1/2}$:1,0	9109 *45*	
$^{129}_{55}Cs$	31h	1/2			56N16			
$^{129}_{55}Cs$	31h		+1.47[a] *4*		58N27	$^2S_{1/2}$:1,0	9200 *200*	
$^{129}_{55}Cs$	31h		+1.479[a] *6*		62Kh03	$^2S_{1/2}$:1,0	9229 *30*	
$^{130}_{55}Cs$	30m	1			56N16			
$^{130}_{55}Cs$	30m		+1.37[a] *8*		58N27	$^2S_{1/2}$:$^3/_2$,$^1/_2$	6400 *350* if $\mu>0$	
			or −1.45[a] *8*				or 6800 *350* if $\mu<0$	
$^{131}_{55}Cs$	10d	5/2	+3.53[a] *4*		53B19	$^2S_{1/2}$:3,2	13200 *110*	
$^{131}_{55}Cs$	10d	5/2			56N14			
$^{131}_{55}Cs$	10d		+3.537[d] *2*		65Wo05	$^2S_{1/2}$:3,2	13181.375 *2*	g=7.663x10^{-4} *4*
$^{132}_{55}Cs$	6.2d	2	+2.22[a] *2*		58N27	$^2S_{1/2}$:$^5/_2$,$^3/_2$	8648 *35*	
$^{133}_{55}Cs$		7/2			34C04			
$^{133}_{55}Cs$			+2.574 *13*		39K10		Cs_2,CsF,CsCl	$g/g(^7Li)$=0.3369
$^{133}_{55}Cs$				−0.0033 *39*	56Bu19	$^2P_{3/2}$:5,4	252.5 *10*	a=50.67 *11*
						4,3	203.0 *11*	b=−0.46 *53*
						3,2	152.0 *8*	
$^{133}_{55}Cs$					58Ma18	$^2S_{1/2}$:4,3	9192.631770 *20*	
$^{133}_{55}Cs$					66En03		^{133}CsF	eqQ=1.241[E] *11*
$^{133}_{55}Cs$					67Ma09	$6^2P_{1/2}$:4,3	1167[E] *40*	
$^{134}_{55}Cs$	2.2y	4	+2.98[a] *1*		52J18	$^2S_{1/2}$:$^9/_2$,$^7/_2$	10465 *12*	
$^{134}_{55}Cs$	2.2y	4	+2.98[a] *1*		53B19	$^2S_{1/2}$:$^9/_2$,$^7/_2$	10440 *30*	
$^{134}_{55}Cs$	2.2y		+2.9889[d]‡ *12*		57S111	$^2S_{1/2}$:$^9/_2$,$^7/_2$	10473.626 *15*	g/g^{133}=1.01447[d] *29*
							‡Using μ_{unc}^{133}=2.563189 *15* (68Ha01)	
$^{134m}_{55}Cs$	2.9h	8	+1.10[a] *1*		55G04	$^2S_{1/2}$:$^{17}/_2$,$^{15}/_2$	3684.594 *20*	
$^{134m}_{55}Cs$	2.9h	8	+1.10[a] *1*		55G31	$^2S_{1/2}$:$^{17}/_2$,$^{15}/_2$	3684.5 *5*	
$^{134m}_{55}Cs$	2.9h		+1.0960[d]‡ *3*		62Co14	$^2S_{1/2}$:$^{17}/_2$,$^{15}/_2$	3684.578640 *175*	
							‡Using μ_{unc}^{133}=2.563189 *15* (68Ha01)	
$^{134m}_{55}Cs$	2.9h				67Ma09	$6^2P_{1/2}$:$^{17}/_2$,$^{15}/_2$	473[E] *60*	
$^{135}_{55}Cs$	2My	7/2	+2.728[a] *2*		49D01	$^2S_{1/2}$:4,3	9724 *8*	
$^{135}_{55}Cs$	2My		+2.7280[d]‡ *8*		57S111	$^2S_{1/2}$:4,3	9724.023 *15*	g/g^{133}=1.05820[d] *8*
							‡Using μ_{unc}^{133}=2.563189 *15* (68Ha01)	
$^{136}_{55}Cs$	13d	5	+3.70[a] *4*		71Da01	$^2S_{1/2}$:$^{11}/_2$,$^9/_2$	12702 *28*	
$^{137}_{55}Cs$	30y	7/2	+2.831[a] *2*		49D01	$^2S_{1/2}$:4,3	10126.5 *70*	
$^{137}_{55}Cs$	30y		+2.8372[d]‡ *9*		57S111	$^2S_{1/2}$:4,3	10115.527 *15*	g/g^{135}=1.04005[d] *8*
								g/g^{133}=1.10058[d] *13*
							‡Using μ_{unc}^{133}=2.563189 *15* (68Ha01)	
$^{138}_{55}Cs$	32m	3	±0.48[a] *10*		67St22	$^2S_{1/2}$		a=500 *100*
$^{135}_{56}Ba$		3/2	+0.836 *2*		41H14			$g/g(^7Li)$=0.2553 *7*
								g/g^{137}=0.8949 *8*
$^{135}_{56}Ba$			+0.8370 *8*		59K82			g/g^{137}=0.8939 *2*
$^{137}_{56}Ba$		3/2	+0.935 *3*		41H14			$g/g(^7Li)$=0.2856 *8*
$^{137}_{56}Ba$			+0.9364 *9*		59K82			
$^{131}_{57}La$	59m	3/2			73In04			
$^{132}_{57}La$	4.5h	2			73In04			
$^{132m}_{57}La$	25m	6			73In04			
$^{133}_{57}La$	4.0h	5/2			73In04			
$^{135}_{57}La$	19.4h	5/2			73In04			
$^{136}_{57}La$	9.9m	1			73In04			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{139}_{57}$La				+0.230 *10*	57T30	$^2D_{5/2}$:6,5	1120.902 *5*	a=182.1706 *6*
						5,4	912.793 *5*	b=54.213 *14*
						4,3	716.288 *3*	c=−0.6 *10*kHz
						3,2	529.090 *10*	
						$^2D_{3/2}$:5,4	737.967 *15*	a=141.1959 *16*
						4,3	551.987 *5*	b=44.781 *14*
						3,2	391.603 *10*	c=0.15 *44*kHz
$^{139}_{57}$La				+0.21[c] *1*	58Mu08 (57T30)			
$^{139}_{57}$La				+0.229[c]	62Ko22 (57T30)			
$^{139}_{57}$La				+0.26,0.23, or 0.28	71Ch02	$^4F_{3/2}$:5,4	2390.631 *11*	a=−480.224 *8*
						4,3	1925.510 *11*	b=14.2 *2*
						$^4F_{5/2}$:6,5	1808.938 *12*	a=300.631 *8*
						5,4	1503.210 *18*	b=14.0 *3*
						4,3	1199.787 *15*	c=0.002 *3*
						$^4F_{7/2}$:7,6	3247.744 *6*	a=462.889 *7*
						6,5	2779.047 *7*	b=19.3 *2*
						5,4	2312.531 *20*	c=−0.002 *2*
						4,3	1847.837 *12*	
						$^4F_{9/2}$:8,7	3928.536 *27*	a=489.533 *2*
						7,6	3430.754 *13*	b=31.9 *2*
						6,5	2935.669 *10*	c=0.003 *4*
						5,4	2442.885 *22*	
						4,3	1952.018 *20*	
				—		$^2F_{5/2}$:6,5	1840.665 *15*	a=304.381 *4*
						5,4	1522.871 *15*	b=27.8 *1*
						4,3	1211.072 *15*	c=−0.002 *3*
						$^2F_{7/2}$:5,4	989.482 *20*	a=−197.068 *7*
						4,3	796.567 *12*	b=41.4 *2*
				—		$^4P_{1/2}$:4,3	9840.632 *15*	a=2460.173 *70*
						$^4P_{3/2}$:4,3	3707.836 *22*	a=929.6 *2*
								b=37.2 *25*
						$^4P_{5/2}$:4,3	3216.524 *20*	a=801.9 *5*
								b=−40 *8*
				+0.30,0.31,		$^2D_{3/2}$		a=−424.9 *20*
				or 0.28				b=−13 *4*
						$^2D_{5/2}$		a=881 *6*
								b=22 *36*
				+0.22*‡ *3*				
							‡Average value	
$^{140}_{57}$La	40h	3			60Pe09			
$^{140}_{57}$La	40h		±0.728[p] *15*	±0.15*[p] *7*	69Hu12	$^2D_{5/2}$		a=55.8[p] *15*
			μ/Q positive		69Pi15			b=40[p] *25*
$^{130}_{58}$Ce	25m	0♦			73In04	$^1G_4$;$^3H_4$		
$^{132}_{58}$Ce	4.2h	0♦			73In04	$^1G_4$;$^3H_4$		
$^{133}_{58}$Ce	5.4h	9/2			73In04			
$^{133m}_{58}$Ce	97m	1/2			73In04			
$^{134}_{58}$Ce	72h	0♦			73In04	$^1G_4$, $^3H_4$		
$^{135}_{58}$Ce	17.0h	1/2			73In04			
$^{137}_{58}$Ce	9.0h	3/2			73In04			
$^{137m}_{58}$Ce	34.4h	11/2			73In04			
$^{139}_{58}$Ce	140d	3/2			73In04			
$^{143}_{58}$Ce	33h	3/2			65Ma19			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{133}_{59}$Pr	7.5m	5/2			72Ek04			
$^{134}_{59}$Pr	18.5m	2			72Ek04			
$^{135}_{59}$Pr	24m	3/2			72Ek04			
$^{136}_{59}$Pr	13.5m	2			72Ek04			
$^{137}_{59}$Pr	1.28h	5/2			72Ek04			
$^{138}_{59}$Pr	2.0h	7			72Ek04			
$^{139}_{59}$Pr	4.5h	5/2			72Ek04			
$^{140}_{59}$Pr	3.4m	1			72Ek04			
$^{141}_{59}$Pr			+3.8 *4*	−0.054	53L22	$^4I_{9/2}$:4,3	3708.05 *5*	a=+926.03 *10*
						3,2	2782.25 *5*	b=−13.9 *10*
$^{141}_{59}$Pr				−0.02*	58Mu08			
$^{141}_{59}$Pr			±5.09[c] *25*	±0.070[c] *4*	62Ca10			
			μ/Q negative					
$^{141}_{59}$Pr			+4.98	−0.074	62Wy04			
$^{141}_{59}$Pr			+4.28[c] *8*	−0.0589[c] *42*	63Bl25			
$^{141}_{59}$Pr			+4.162[kp] *2*		70Le26	$^4I_{9/2}$		a=926.2087 *1*
								b=−11.878 *2*
								c=220 *80*Hz
			+4.43[kp] *11*			$^4I_{11/2}$		a=730.3929 *1*
								b=−11.877 *3*
								c=−0.0003 *2*
			+4.42[kp] *12*			$^4I_{13/2}$		a=613.2399 *1*
								b=−12.850 *2*
								c=−0.0001 *2*
			+4.48[kp] *5*			$^4I_{15/2}$		a=541.5746 *2*
								b=−14.558 *6*
								c=0.0003 *6*
$^{142}_{59}$Pr	19h	2	±0.243‡ *15*	±0.035 *15*	62Ca10	$^4I_{9/2}$		a=67.5 *5*
			μ/Q positive					b=7.0 *20*
							‡For μ^{141}=4.16	
$^{142}_{59}$Pr	19h		±0.250[c]	±0.0297[c] *85*	63Bl25			
$^{142m}_{59}$Pr	?	5[p]			69Hu12			
$^{143}_{59}$Pr	14d	7/2			64Bu09	$^4I_{9/2}$		
$^{134}_{60}$Nd	8m	0[♦]			72Ek04			
$^{135}_{60}$Nd	15m	9/2			72Ek04			
$^{136}_{60}$Nd	55m	0[♦]			72Ek04	$^5I_4$:5,4	<40kHz, if I=1	
$^{137}_{60}$Nd	37m	1/2			72Ek04			
$^{138}_{60}$Nd	5.2h	0[♦]			72Ek04			
$^{139}_{60}$Nd	29.7m	3/2			72Ek04			
$^{139m}_{60}$Nd	5.5h	11/2			72Ek04			
$^{140}_{60}$Nd	3.4d	0[♦]			72Ek04			
$^{141}_{60}$Nd	2.5h	3/2			62Al04	$^5I_4$: $^{11}/_2$, $^9/_2$	≥1630	
$^{143}_{60}$Nd		7/2			62Sp03			
$^{143}_{60}$Nd			−1.25 *13*	−0.57 *6*	63Sp08	$^5I_4$: $^{15}/_2$, $^{13}/_2$	1418.25 *14*	a=−195.649 *9*
						$^{13}/_2$, $^{11}/_2$	1257.53 *4*	b=+122.25 *28*
						$^{11}/_2$, $^9/_2$	1084.70 *4*	
						$^9/_2$, $^7/_2$	901.47 *6*	
						$^7/_2$, $^5/_2$	710.0 *1*	Q^{143}/Q^{145}=+1.893 *16*
$^{143}_{60}$Nd			−1.063[h] *5*	−0.484[e] *20*	65Sm04			g=−1.6430x10^{-4} *69*
$^{143}_{60}$Nd					70Ch41	$^5I_4$		a=−195.652[p] *2*
								b=122.608[p] *34*
						$^5I_5$		a=−153.679[p] *2*
								b=115.741[p] *36*

$^{143}_{60}$Nd(70Ch41) continued

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{143}_{60}$Nd(70Ch41) continued								
						$^5I_6$		a=−130.611[p] *2*
								b=119.284[p] *46*
						$^5I_7$		a=−117.604[p] *2*
								b=129.281[p] *48*
						$^5I_8$		a=−110.4[p] *2*
								b=141.9[p] *62*
$^{145}_{60}$Nd		7/2			62Sp03			
$^{145}_{60}$Nd			−0.78 *8*	−0.30 *3*	63Sp08	$^5I_4$: $^{15}/_2$, $^{13}/_2$	886.25 *6*	a=−121.627 *27*
						$^{13}/_2$, $^{11}/_2$	783.08 *4*	b=+64.60 *37*
						$^{11}/_2$, $^9/_2$	673.49 *3*	
						$^9/_2$, $^7/_2$	558.27 *3*	
						$^7/_2$, $^5/_2$	439.10 *5*	
						$^5I_5$: $^{17}/_2$, $^{15}/_2$	789.83 *20*	a=−95.531 *19*
						$^{15}/_2$, $^{13}/_2$	708.38 *20*	b=+60.65 *70*
						$^{13}/_2$, $^{11}/_2$	622.80 *15*	
						$^{11}/_2$, $^9/_2$	533.36 *20*	
$^{145}_{60}$Nd			−0.654[h] *4*	−0.253[c] *10*	65Sm04			g=−1.0106x10^{-4} *61*
$^{145}_{60}$Nd					70Ch41	$^5I_4$		a=−121.628[p] *2*
								b=64.637[p] *28*
						$^5I_5$		a=−95.535[p] *2*
								b=61.044[p] *42*
						$^5I_6$		a=−81.195[p] *2*
								b=62.926[p] *58*
						$^5I_7$		a=−73.108[p] *2*
								b=68.165[p] *74*
$^{147}_{60}$Nd	11d	5/2			60Ca03			
$^{147}_{60}$Nd	11d		±0.553[ap] *10*	±0.7[p] *3*	70Pi11	J=4		a=144[p] *3*
			μ/Q negative					b=181[p] *64*
$^{149}_{60}$Nd	1.9h	5/2			64Bu09	$^5I_4$		
$^{149}_{60}$Nd	1.9h		±0.350[ap] *10*	±1.0[p] *3*	70Pi11	J=4		a=91.0[p] *19*
			μ/Q negative					b=260[p] *43*
$^{140m}_{61}$Pm	5.8m	‡			72Ek05			Nd(45MeVp,)
							‡Could not observe this activity; searched for I=0 through 8	
$^{141}_{61}$Pm	20.9m	5/2			72Ek05			
$^{147}_{61}$Pm	2.6y	7/2			60Ca03			
$^{147}_{61}$Pm	2.6y		±2.77[c] *8*		63Bl25			
$^{147}_{61}$Pm	2.6y	7/2	±3.2 *3*	±0.7 *3*	63Bu14	$^6H_{7/2}$		a=447 *9*
			μ/Q positive					b=267 *71*
$^{148}_{61}$Pm	5.4d	1	+2.07[a] *21*	+0.2 *2*	65Al10	$^6H_{7/2}$		a=+1038 *75*
					65Al16			b=−98 *10*
$^{149}_{61}$Pm	54h	7/2			61Ca07			
$^{151}_{61}$Pm	28h	5/2			61Ca07			
$^{151}_{61}$Pm	28h	5/2	±1.8 *2*	±1.9 *3*	63Bu14	$^6H_{7/2}$		a=358 *22*
			μ/Q positive					b=778 *93*
$^{140}_{62}$Sm	15m	0♦			72Ek05			
$^{141}_{62}$Sm	11.3m	1/2			72Ek05			
$^{141m}_{62}$Sm	22.9m	11/2			72Ek05			
$^{142}_{62}$Sm	1.2h	0♦			72Ek05	^7F	<40kHz, if I=1	
$^{143}_{62}$Sm	8.8m	3/2			72Ek05			
$^{147}_{62}$Sm	0.1Ty	7/2			62Sp03			
$^{147}_{62}$Sm	0.1Ty		−0.796[c] *16*	−0.208[c] *4*	63Bl25			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{147}_{62}$Sm	0.1Ty		−0.8129 *7*	−0.20 *2*	66Wo05	$^7F_1$		a=−33.4936 *1*
								b=−58.6920 *8*
						$^7F_2$		a=−41.1845 *2*
								b=−62.2260 *32*
						$^7F_3$		a=−50.2401 *1*
								b=−33.6812 *16*
						$^7F_4$		a=−59.7068 *20*
								b=+21.230 *72*
$^{147}_{62}$Sm	0.1Ty				68Ro16	J=5: $^{17}/_2$, $^{15}/_2$	551.009[j] *42*	A_1‡=1209.870 *23*
						$^{15}/_2$, $^{13}/_2$	505.364[j] *32*	A_2=25.1448 *130*
						$^{13}/_2$, $^{11}/_2$	452.498[j] *17*	A_3=0
						$^{11}/_2$, $^9/_2$	393.414[j] *11*	A_1/A_2<0
						$^9/_2$, $^7/_2$	329.071[j] *15*	
							‡See 68Ro16 for definitions of A's	
$^{147}_{62}$Sm	0.1Ty			−0.18[c] *3*	69Ro29	$^7F_{1,2,3,4,5}$		
$^{149}_{62}$Sm		7/2			62Sp03			
$^{149}_{62}$Sm			−0.643[c] *15*	+0.060[c] *1*	63Bl25			
$^{149}_{62}$Sm			−0.6702 *7*	+0.058 *6*	66Wo05	$^7F_1$		a=−27.6109 *1*
								b=+16.9624 *4*
						$^7F_2$		a=−33.9508 *2*
								b=+17.9872 *32*
						$^7F_3$		a=−41.4176 *4*
								b=+9.7488 *64*
						$^7F_4$		a=−49.2177 *29*
								b=−6.161 *80*
								Q^{149}/Q^{147}=0.28901 *3*
$^{149}_{62}$Sm					68Ro16	J=5: $^{17}/_2$, $^{15}/_2$	495.031[j] *27*	A_1‡=997.364 *38*
						$^{15}/_2$, $^{13}/_2$	431.239[j] *14*	A_2=7.258 *23*
						$^{13}/_2$, $^{11}/_2$	369.563[j] *20*	A_3=0
								A_1/A_2>0
							‡See 68Ro16 for definitions of A's	
$^{149}_{62}$Sm				+0.052[c]‡ *3*	Compilers		‡Using Q of 69Ro29 and Q−ratio of 66Wo05	
$^{153}_{62}$Sm	47h	3/2			60Ca05			
$^{153}_{62}$Sm	47h		−0.021[a] *1*	+1.1 *3*	64Su02	$^7F_1$		a=−2.100 *5*
								b=+289.042 *4*
						$^7F_2$		a=−2.573 *6*
								b=+306.521 *21*
						$^7F_3$		a=−3.115 *4*
								b=+165.824 *20*
						$^7F_4$		a=−3.753 *9*
								b=−104.452 *68*
$^{153}_{62}$Sm	47h		−0.0215 *1*	+1.0 *1*	68Wa10			
$^{155}_{62}$Sm	24m	3/2		large	68Ea02	^7F		
$^{155}_{62}$Sm	24m			±0.9 *1*	68Wa10			Q^{155}/Q^{153}=±0.894
$^{145}_{63}$Eu	5.9d	5/2			72Ek05			
$^{146}_{63}$Eu	4.65d	4			72Ek05			
$^{147}_{63}$Eu	22d	5/2			72Ek05			
$^{148}_{63}$Eu	54d	5			72Ek05			
$^{149}_{63}$Eu	93d	5/2			72Ek05			
$^{150}_{63}$Eu	12.5h	0[♦]			72Ek05	$^8S_{7/2}$	<40kHz, if I=1	
$^{151}_{63}$Eu					60Sa23	$^8S_{7/2}$:6,5	120.675 1	a=−20.0523 *2*
						5,4	100.286 *1*	b=−0.7012 *35*
						4,3	80.049 *1*	
$^{151}_{63}$Eu			+3.4631[h] *12*		65Ev08	$^8S_{7/2}$		μ^{151}/μ^{153}=2.26505 *42*
								a^{151}/a^{153}=2.26498 *8*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{152}_{63}$Eu	13y		±1.937 *2*	±3.0 *3*	63Al06	$^8S_{7/2}$: $^{13}/_2$, $^{11}/_2$	59.848 *86*	a=9.345 *6*
						$^{11}/_2$, $^9/_2$	51.246 *35*	b=1.930 *165*
						$^9/_2$, $^7/_2$	42.343 *37*	Q^{152}/Q^{151}=±2.75 *24*
						$^7/_2$, $^5/_2$	33.191 *48*	Q^{152}/Q^{153}=±1.08 *9*
$^{152m}_{63}$Eu	9h	0♦	≤4x10^{-3}, if I=1		59C52			a≤60kHz
$^{153}_{63}$Eu				+2.8 *3*	60Sa23	$^8S_{7/2}$:6,5	54.038 *1*	a=−8.8532 *2*
						5,4	44.004 *1*	b=−1.7852 *35*
						4,3	35.004 *1*	
$^{153}_{63}$Eu			+1.5292[b] *9*		65Ev08	$^8S_{7/2}$		
$^{145}_{64}$Gd	22.9m	1/2			72Ek05			
$^{147}_{64}$Gd	38.5h	7/2			72Ek05			
$^{149}_{64}$Gd	9.4d	7/2			72Ek05			
$^{151}_{64}$Gd	120d	7/2			72Ek05			
$^{153}_{64}$Gd	242d	3/2			65Al16			
$^{155}_{64}$Gd			−0.2584[b] *5*	+1.59 *16*	69Un02	$^9D_3$		a=4.9204 *18*
			Ω=−1.6 *6*					b=−406.670 *6*
								c=−0.0015 *5*
						$^9D_2$		a=36.5753[j] *9*
								b=179.407[j] *44*
						$^9D_4$		a=−6.8612[j] *49*
								b=−352.834[j] *38*
						$^9D_5$		a=−11.5125[j] *39*
								b=41.977[j] *40*
						$^9D_6$		a=−12.2424[j] *12*
								b=587.893[j] *12*
$^{157}_{64}$Gd			−0.339*‡ *3*	+1.69‡ *17*	69Un02	$^9D_2$		a=47.9591[j] *76*
								b=191.161[j] *72*
						$^9D_3$		a=6.4456[j] *22*
								b=−433.234[j] *13*
						$^9D_4$		a=−8.9967[j] *49*
								b=−375.884[j] *38*
						$^9D_5$		a=−15.0955[j] *38*
								b=44.744[j] *39*
						$^9D_6$		a=−16.0573[j] *57*
								b=626.275[j] *60*
							‡Using ratios from paramagnetic resonance	
$^{159}_{64}$Gd	18h	3/2			61Ca07			
$^{151}_{65}$Tb	18h	1/2			70Ad09			
$^{152}_{65}$Tb	18h	2			70Ad09			
$^{153}_{65}$Tb	2.3d	5/2			70Ad09			
$^{154}_{65}$Tb	21h	0♦	<10^{-4}, if I=1		70Ad09			
$^{154m}_{65}$Tb	8.5h	3			70Ad09			
$^{155}_{65}$Tb	5.6d	3/2			70Ad09			
$^{156}_{65}$Tb	5.4d	3			70Ad09			
$^{159}_{65}$Tb				+1.45*† *17*	70Ch26	$^6H_{15/2}$		a=673.753 *2*
								b=1449.330 *40*
								c=−0.001 *2*
						$^6H_{13/2}$		a=682.911 *3*
								b=1167.489 *50*
								c=−0.001 *2*
							†For all ($4f^96s^2$)−states	

$^{159}_{65}$Tb(70Ch26) continued

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{159}_{65}$Tb(70Ch26) continued				+1.33*‡ *12*	70Ch26	$^8C_{13/2}$		a=532.204 *2*
				or +1.28*‡ *14*				b=928.861 *30*
								c=0.001 *2*
						Interaction constants and g_J-values for 14 other $(4f^96s^2)$ or $(4f^85d\ 6s^2)$ states given		
				+1.34*† *11*			‡For all $(4f^85d6s^2)$-states	
							†Weighted average	
$^{160}_{65}$Tb	73d	3			61Ca07			
$^{161}_{65}$Tb	6.9d	3/2			64Bu09			
$^{149}_{66}$Dy	?	‡			70Ro21		‡Could not observe activity. If I=7/2, then $T_{1/2}$<10m or ≈ $T_{1/2}(^{151}Dy)$	
$^{151}_{66}$Dy	18m	7/2			70Ro21			
$^{152}_{66}$Dy	2.4h	0♦			70Ro21	$^5I_8$	<20kHz, if I=1	
$^{153}_{66}$Dy	6.4h	7/2			70Ro21			
$^{153}_{66}$Dy	6.4h		±0.71*‡ *9*	±0.14*‡ *8*	72Ro36	$^5I_8$		a=123.5 *8*
			μ/Q positive					b=65 *40*
							‡Based on μ^{161} and Q^{*161}(72Ro36)	
$^{155}_{66}$Dy	10h	3/2			70Ro21			
$^{155}_{66}$Dy	10h		±0.34*‡ *3*	±0.91*‡ *10*	72Ro36	$^5I_8$		a=136.5 *5*
			μ/Q negative					b=421 *5*
							‡Based on μ^{161} and Q^{*161} (72Ro36)	
$^{157}_{66}$Dy	8.1h	3/2			70Ro21			
$^{157}_{66}$Dy	8.1h		±0.30*‡ *4*	±1.22*‡ *13*	72Ro36	$^5I_8$		a=121.605 *4*
			μ/Q negative					b=564.65 *7*
							‡Based on μ^{161} and Q^{*161} (72Ro36)	
$^{159}_{66}$Dy	144d	3/2			65Al16	$^5I_8$		
$^{161}_{66}$Dy		5/2			62Sp03			
$^{161}_{66}$Dy			−0.47 *9*	+2.36 *4*	67Eb01	$^5I_8$		a=−115.8 *10*
								b=+1102 *15*
$^{161}_{66}$Dy			−0.46 *5*	+2.37 *28*	70Ch31	$^5I_8$		a=−116.231 *2*
								b=1091.577 *50*
								c=−0.002 *5*
						$^5I_7$		a=−126.787 *2*
								b=1009.742 *60*
								c=0.000 *5*
$^{161}_{66}$Dy				Q_4~+58[p]	72Da38	$^5I_8(4f^{10}6s^2)$		a=−116.23218 *20*
								b=1091.5740 *75*
								c=−790 *650*Hz
								d=−95 *75*Hz
$^{161}_{66}$Dy			−0.4792[ikp] *50*		72Fe20			
$^{161}_{66}$Dy			−0.48[c] *4*	+2.35*[c] *26*	72Ro36 (70Ch31)	$^5I_8, ^5I_7$		
$^{163}_{66}$Dy		5/2			62Sp03			
$^{163}_{66}$Dy			+0.66 *13*	+2.46 *4*	67Eb01	$^5I_8$		a=+162.9 *6*
								b=+1150 *20*
$^{163}_{66}$Dy			+0.65 *6*	+2.51 *30*	70Ch31	$^5I_8$		a=162.754 *2*
								b=1152.869 *40*
								c=0.001 *4*
						$^5I_7$		a=177.535 *2*
								b=1066.430 *60*
								c=0.002 *6*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{163}_{66}$Dy				Q_4~+67[p]	72Da38	$^5I_8(4f^{10}6s^2)$		a=162.754272 *20* b=1152.8635 *12* c=−20 *130*Hz d=−109 *35*Hz
$^{163}_{66}$Dy			+0.6707[ikp] *35*		72Fe20			
$^{163}_{66}$Dy			+0.67[ac]‡ *6*	+2.48*[c]‡ *27*	72Ro36	$^5I_8$		
					(70Ch31)		‡Based on μ and Q^{*161} (72Ro36)	
$^{165}_{66}$Dy	2.3h	7/2			61Ca07			
$^{165}_{66}$Dy	2.3h		±0.50 μ/Q negative	±3.2	68Ra03	$^5I_8$		a=89.8 *7* b=1521 *30*
$^{165}_{66}$Dy			±0.52[ac]‡ *4*	±3.27*[c]‡ *37*	72Ro36	$^5I_8$		
					(68Ra03)		‡Based on μ^{161} and Q^{*161} (72Ro36)	
$^{166}_{66}$Dy	82h	0♦	≤10^{-4}, if I=1		61Ca07	$^5I_8$		
$^{153}_{67}$Ho	?	‡			69Ek01		‡Did not observe resonances at frequencies for I=1/2 to 11/2. $T_{1/2}$ possibly less than 9m.	
$^{154}_{67}$Ho	12m	1			69Ek01			
$^{155}_{67}$Ho	50m	5/2			69Ek01			
$^{156}_{67}$Ho	55m	1			69Ek01			
$^{157}_{67}$Ho	14m	7/2			69Ek01			
$^{158}_{67}$Ho	11m	5			69Ek01			
$^{158m}_{67}$Ho	29m	2			69Ek01			
$^{159}_{67}$Ho	33m	7/2			69Ek01			
$^{160}_{67}$Ho	26m	5			69Ek01			
$^{160m}_{67}$Ho	5.0h	2			69Ek01			
$^{161}_{67}$Ho	2.5h	7/2			64Bu09	$J=^{15}/_2$		
$^{161}_{67}$Ho	2.5h	7/2			69Ek01			
$^{162}_{67}$Ho	15m	1			69Ek01			
$^{162m}_{67}$Ho	68m	6			69Ek01			
$^{164}_{67}$Ho	29m	1			69Ek01			
$^{164m}_{67}$Ho	38m	6			69Ek01			
$^{165}_{67}$Ho					62Go20	$^4I_{15/2}$		a=800.583 *3* b=−1667.950 *50*
$^{165}_{67}$Ho			+4.23	+2.99	62Wy04			
$^{165}_{67}$Ho			+4.01[c] *8*	+2.82[c] *5*	63Bl25			
$^{165}_{67}$Ho			+4.1 *4*	+2.4	64Go09	$^4I_{15/2}$:9,8	7184.829 *10*	a=800.58389 *50*
						8,7	6540.836 *10*	b=−1667.997 *50*
						7,6	5842.368 *10*	
						6,5	5096.265 *10*	
						5,4	4309.281 *10*	
$^{165}_{67}$Ho			+4.12 *2*		68Ha25			
$^{165}_{67}$Ho			+4.08[ci] *8*		68Su04			
					(64Go09)			
$^{165}_{67}$Ho				Q_4~+80[p]	72Da38	$^4I_{15/2}$		a=800.583169 *36* b=−1668.0789 *33* c=−217 *140*Hz d=−151 *16*Hz
$^{165}_{67}$Ho			+4.125[k] *44*		72Ha45	$^4I_{15/2}$		g=6.370x10^{-4} *70*
$^{165}_{67}$Ho					72Me16	$^4I_{15/2}$		a=800.5828 *14* b=−1668.100 *91* c=−2224 *7520*Hz d=−398 *790*Hz
$^{166}_{67}$Ho	27h	0♦	≤10^{-4}, if I=1		61Ca07	$^4I_{15/2}$		
$^{166}_{67}$Ho	27h	0♦			61Ch06	$^4I_{15/2}$		a<5kHz, if I=1

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{157}_{68}$Er	20m	3/2			69Ek01			
$^{158}_{68}$Er	2.3h	0+			69Ek01	$^3H_6$	<20kHz, if I=1	
$^{159}_{68}$Er	36m	3/2			69Ek01			
$^{160}_{68}$Er	29h	0+			69Ek01	$^3H_6$	<20kHz, if I=1	
$^{161}_{68}$Er	3.2h	3/2			69Ek01			
$^{161}_{68}$Er	3.2h		−0.369* *5*	+1.20* *9*	72Ek03	$^3H_6$		a=183.8 *14*
								b=1738 *10*
$^{163}_{68}$Er	1.2h	5/2			69St05	$^3H_6$		
$^{163}_{68}$Er	1.2h		+0.56* *3*	+2.2* *2*	72Ek03	$^3H_6$		a=167 *7*
								b=3275 *130*
$^{165}_{68}$Er	10h	5/2			64Bu09	J=6		
$^{165}_{68}$Er	10h		±0.65* *3*	±2.2 *1*	65Al10	$^3H_6$		a=195 *6*
			μ/Q positive					b=3502 *115*
$^{167}_{68}$Er		7/2			62Sp02			
$^{167}_{68}$Er			−0.564[cb] *7*	+2.82[c]	63Bl25			
$^{167}_{68}$Er			−0.5647[h] *24*	+2.827 *12*	65Sm04	$^3H_6$		a=−120.4864 *5*
								b=−4552.959 *23*
								g=−0.8720x10^{-4} *37*
$^{169}_{68}$Er	9.4d	1/2			61Ca07	$^3H_6$		
$^{169}_{68}$Er	9.4d		±0.513 *25*		63Do09	$^3H_6$		g=5.55x10^{-4} *27*
								a=725.46 *31*
$^{171}_{68}$Er	7.5h	5/2			61Ca07	$^3H_6$		
$^{171}_{68}$Er	7.5h		±0.70* *5*	±2.4 *2*	64Bu09	$^3H_6$		a=197.0 *29*
			μ/Q negative					b=3646 *106*
$^{159}_{69}$Tm	9m	5/2			71Ek01			
$^{160}_{69}$Tm	9m	1			71Ek01			
$^{161}_{69}$Tm	37m	7/2			71Ek01			
$^{161m}_{69}$Tm	7m	‡			71Ek01		‡Could not observe this activity; searched for $I=^1/_2$ through $^9/_2$	
$^{162}_{69}$Tm	21m	1			71Ek01			
$^{162m}_{69}$Tm	77m	‡			71Ek01			Er(80MeV p,)
							‡Could not observe this activity; searched for I=0 through 7	
$^{163}_{69}$Tm	1.8h	1/2	±0.082 *2*		67Sc33	$^2F_{7/2}$		a=133.4 *15*
$^{163m}_{69}$Tm	11m	‡			71Ek01		‡Could not observe this activity; searched for $I=^1/_2$ through $^9/_2$	
$^{164}_{69}$Tm	2m	1			71Ek01			
$^{164m}_{69}$Tm	5m	6			71Ek01			
$^{165}_{69}$Tm	29h	1/2			68Ek01			
$^{165}_{69}$Tm	29h	1/2	±0.138* *2*		68Sc26	$^2F_{7/2}$		a=224.4 *30*
$^{165m}_{69}$Tm	12m	‡			71Ek01		‡Could not observe this activity; searched for $I=^1/_2$ through $^9/_2$	
$^{166}_{69}$Tm	7.7h	2			61Wa04			
$^{166}_{69}$Tm	7.7h		±0.05* *3*	±4.6 *7*	62Wa27	$^2F_{7/2}$: $^{11}/_2$, $^9/_2$	4640 *20*	a=19 *6*
			μ/Q positive			$^9/_2$, $^7/_2$	−330 *30*	b=7700 *300*
						$^7/_2$, $^5/_2$	−2800 *100*	
						$^5/_2$, $^3/_2$	−3390 *130*	
$^{166}_{69}$Tm	7.7h		±0.0465[c] *15*	±4.36[c] *17*	63Bl25			
$^{166}_{69}$Tm	7.7h		±0.047[mc] *15*		67Gi04			(a=19 *6*)
$^{166}_{69}$Tm	7.7h		±0.092* *2*	±1.85* *15*	72Ad14	$^2F_{7/2}$		a=37.1 *5*
			μ/Q positive					b=2935 *40*
$^{167}_{69}$Tm	9.6d	1/2			61Wa04			
$^{167}_{69}$Tm	9.6d		−0.197[ap] *2*		73An12	$^2F_{7/2}$		a=318.5 *5*
$^{168}_{69}$Tm	85d	3			71Ek01			

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{169}_{69}$Tm			±0.24[c]		62Li06			
$^{169}_{69}$Tm			−0.229 *3*		62Ri11	$^2F_{7/2}$:4,3	1496.555 *10*	a=−374.1374 *16*
								g=2.478x10^{-4} *32*
$^{169}_{69}$Tm			−0.2310[h] *15*		67Gi04	$^2F_{7/2}$:4,3	1496.550667[j] *12*	a=−374.137661 *3*
						4,3	1496.550642 *12*	g=+2.498x10^{-4} *15*
$^{170}_{69}$Tm	127d	1	±0.26 *2*	±0.61 *5*	60Ca15	$^2F_{7/2}$: $^9/_2$, $^7/_2$	74 *20*	a=200 *3*
			μ/Q positive			$^7/_2$, $^5/_2$	1960 *22*	b=1010 *15*
$^{170}_{69}$Tm	127d		±0.245[c] *4*	±0.574[c] *9*	63Bl25			
$^{170}_{69}$Tm	127d		±0.247[ac] *4*		67Gi04			(a=200 *3*)
$^{171}_{69}$Tm	1.9y	1/2			61Ca07			
$^{171}_{69}$Tm	1.9y		±0.227[a] *5*		64Bu09	$^2F_{7/2}$		a=372.1 *59*
$^{171}_{69}$Tm	1.9y		±0.230[ac] *4*		67Gi04			(a=372.1 *59*)
$^{167}_{71}$Lu	54m	7/2			72Ek01			
$^{169}_{71}$Lu	1.5d	7/2			68Ek01			
$^{170}_{71}$Lu	2.0d	0[♦]			68Ek01	$^2D_{3/2}$		a<0.020, if $I\neq0$
$^{171}_{71}$Lu	8.3d	7/2			68Ek01			
$^{175}_{71}$Lu			+2.17 *19*	+5.68 *6*	62Ri04	$^2D_{3/2}$:5,4	2051.2305 *40*	a=194.3316 *4*
						4,3	345.4974 *24*	b=1511.4015 *30*
						3,2	−496.5777 *8*	g=3.50x10^{-4} *10*
						$^2D_{5/2}$:6,5	1837.579 *10*	a=146.7790 *8*
						5,4	800.3467 *43*	b=1860.6480 *80*
						4,3	161.8248 *56*	g=3.13x10^{-4} *24*
						3,2	−157.7283 *51*	
						2,1	−238.0556 *40*	
$^{175}_{71}$Lu					71Fi03	$^2D_{3/2}$:5,4	2051.220129 *90*	a=194.33292 *30*
					73Fi08	4,3	345.49662 *30*	b=1511.39627 *32*
						3,2	496.57800 *10*	c=−70 *19*Hz
						$^2D_{5/2}$:6,5	1837.57010 *40*	a=146.77647 *14*
						5,4	800.34261 *33*	b=1860.65613 *84*
						4,3	161.81548 *50*	c=913 *162*Hz
						2,1	238.05836 *10*	d=−16 *24*Hz
$^{176}_{71}$Lu	20Gy	7	±3.184[a]‡ *15*	±8.0 *7*	62Sp03	$^2D_{3/2}$: $^{17}/_2$, $^{15}/_2$	2486 *10*	a=138.80 *46*
						$^{15}/_2$, $^{13}/_2$	775 *5*	b=2151 *10*
						$^{13}/_2$, $^{11}/_2$	−404 *9*	
							‡Using μ^{175}_{unc}=2.211 *10*, 62Re02	
$^{176m}_{71}$Lu	3.7h	1	+0.318[a] *3*	−2.39 *4*	65Wh03	$^2D_{3/2}$		a=+97.19644 *30*
								b=−635.19314 *70*
						$^2D_{5/2}$		a=+73.17285 *30*
								b=−781.97469 *70*
$^{177}_{71}$Lu	6.8d	7/2	+2.235[a] *10*	+5.51 *6*	62Pe07	$^2D_{3/2}$:5,4	2021.850 *130*	a=194.84 *2*
						4,3	360.300 *85*	b=1466.71 *12*
						3,2	−463.130 *105*	
						$^2D_{5/2}$:6,5	1811.784 *95*	a=147.17 *1*
						5,4	800.348 *50*	b=1805.93 *14*
						4,3	175.896 *50*	
						3,2	−138.968 *55*	
						2,1	−221.640 *45*	
$^{177}_{72}$Hf			+0.7902[h] *7*	+4.5* *5*	73Bu25	$^3F_2$: $^{11}/_2$, $^9/_2$	991.79202 *24*	a=113.43314 *7*
						$^9/_2$, $^7/_2$	477.00847 *21*	b=624.3293 *13*
						$^7/_2$, $^5/_2$	162.88685 *15*	c=270 *180*Hz
						$^5/_2$, $^3/_2$	4.86356 *32*	d=45 *40*Hz
								g_F=−1.2194x10^{-4} *9*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{179}_{72}$Hf			−0.6382[b] *13*	+5.1* *5*	73Bu25	$^3F_2$: $^{13}/_2$, $^{11}/_2$	82.13214 *60*	a=−71.42891 *9*
						$^{11}/_2$, $^9/_2$	392.84775 *37*	b=705.5181 *24*
						$^9/_2$, $^7/_2$	541.91044 *7*	c=−430 *200*Hz
						$^7/_2$, $^5/_2$	558.67174 *24*	d=70 *60*Hz
								g_F=0.7660x10^{-4} *15*
$^{181}_{73}$Ta					71Bu10	$^4F_{3/2}$:5,4	1822.389 *6*	a=509.0801 *8*
						4,3	2325.537 *2*	b=−1012.251 *8*
						$^4F_{5/2}$:6,5	1451.476 *7*	a=313.4681 *8*
						5,4	1537.530 *8*	b=834.820 *12*
						4,3	1444.685 *2*	
						$^4F_{7/2}$:4,3	1218.372 *2*	
$^{183}_{73}$Ta	5.0d	7/2			63Do13			
$^{185}_{74}$W	74d	3/2			63Do13			
$^{187}_{74}$W	24h	3/2			63Do13			
$^{186}_{75}$Re	90h	1			63Do13			
$^{186}_{75}$Re	90h		+1.730[b] *3*		65Ar01	$^6S_{5/2}$		a=−78.3060 *10*
								b=+8.3595 *16*
								g=+9.34x10^{-4} *2*
$^{186}_{75}$Re	90h		positive		65Sc13	$^6S_{5/2}$: $^7/_2$, $^5/_2$	265.292 *14*	a=78.3058 *24*
						$^5/_2$, $^3/_2$	208.305 *14*	b=8.3601 *50*, b/a<0
$^{186}_{75}$Re	90h			~0.4[c]	66Ku07			
					(65Ar01)			
$^{188}_{75}$Re	17h	1			63Do13			
$^{188}_{75}$Re	17h		+1.780[b] *5*		65Ar01	$^6S_{5/2}$		a=80.4326 *8*
								b=7.7463 *11*, b/a<0
								g=+9.61x10^{-4} *3*
$^{188}_{75}$Re	17h		positive		65Sc13	$^6S_{5/2}$: $^7/_2$, $^5/_2$	273.379 *13*	a=80.4320 *32*
						$^5/_2$, $^3/_2$	212.698 *17*	b=7.7455 *60*, b/a<0
$^{188}_{75}$Re	17h			~0.4[c]	66Ku07			
					(65Ar01)			
$^{191}_{77}$Ir				±0.78 *20*	73Bu15	$^4F_{9/2}$:6,5	659.26496 *12*	a=57.52148 *4*
						5,4	189.44002 *9*	b=471.20425 *57*
						4,3	84.05040 *80*	c=−20 *30*Hz
$^{192}_{77}$Ir	74d	4			63Do13			
$^{193}_{77}$Ir				±0.70 *18*	73Bu15	$^4F_{9/2}$:6,5	660.09043 *12*	a=62.65556 *5*
						5,4	224.47848 *13*	b=426.23546 *64*
						4,3	33.53453 *89*	c=20 *30*Hz
$^{194}_{77}$Ir	19h	1			63Do13			
$^{195}_{78}$Pt					67Ch26	$^3D_3$		a=5717 *21*
						$^3D_2$		a=2608 *3*
$^{195}_{78}$Pt					71Gr61	$^3F_4$: $^9/_2$, $^7/_2$	3820.564 *7*	a=849.014 *2*
$^{197}_{78}$Pt	20h	1/2	±0.50[a] *2*		68Ch18			
$^{190}_{79}$Au	40m	1	±0.063		64Li06	$^2S_{1/2}$: $^3/_2$, $^1/_2$	3004 *7*	
$^{190}_{79}$Au	40m	1	±0.065[a] *9*		66Ch05	$^2S_{1/2}$: $^3/_2$, $^1/_2$	3105 *425*	
$^{191}_{79}$Au	3.0h	3/2			60Ew06			
$^{191}_{79}$Au	3.0h		±0.137[a] *7*		64Ew02	$^2S_{1/2}$:2,1	5770 *6*	
$^{192}_{79}$Au	4.1h	1	±0.0079[a] *1*		60Ew06	$^2S_{1/2}$: $^3/_2$, $^1/_2$	372.1 *1*	
					(59E88)			
$^{193}_{79}$Au	18h	3/2			60Ew06			
$^{193}_{79}$Au	18h		±0.139[a] *7*		64Ew02	$^2S_{1/2}$:2,1	5882 *10*	

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{194}_{79}$Au	39h		±0.076[a] *3*		57H69	$^2S_{1/2}$:$^3/_2$,$^1/_2$	3600 *120*	
$^{194}_{79}$Au	39h	1			60Ew06			
$^{194}_{79}$Au	39h		±0.074[a] *4*		65Ch08	$^2S_{1/2}$:$^3/_2$,$^1/_2$	3489.865 *32*	
$^{195}_{79}$Au	192d	3/2			60Ew06			
$^{195}_{79}$Au	192d		±0.147[a] *7*		65Ch08	$^2S_{1/2}$:2,1	6220 *38*	
$^{196}_{79}$Au	6.2d	2			60Ew06			
$^{196}_{79}$Au	6.2d		+0.5879[b] *14*		70Sc07	$^2S_{1/2}$:$^5/_2$,$^3/_2$	21347.2522 *15*	
$^{196m}_{79}$Au	9.7h	12			62Ch13	$^2S_{1/2}$		
$^{197}_{79}$Au			±0.13 *1*		53W33	$^2S_{1/2}$:2,1	6107.1 *10*	
$^{197}_{79}$Au				+0.585	66Ch03	$^2D_{5/2}$:4,3	518.880 *17*	a=80.236 *3*
						3,2	713.101 *8*	b=1049.781 *11*, b/a<0
						2,1	1000.304 *10*	c=0.0004 *4*, c/a>0
				+0.598[c]		$^2D_{3/2}$		
				+0.592‡ *12*			‡Average value	
$^{197}_{79}$Au			Ω=+0.0098 *7*	+0.604	67Bl16	$^2D_{3/2}$:3,2	311.5473 *2*	a=199.8425 *2*
			to +0.014 *1*			2,1	1310.7555 *12*	b=−911.0766 *5*
						1,0	1110.9315 *5*	c=0.000212 *14*
			Ω=+0.15			$^4F_{9/2}$:6,5	2233.7160 *14*	a=432.276 *1*
						5,4	2273.8874 *6*	b=−540.026 *1*
						4,3	2089.1430 *4*	c=0.00326 *10*
			Ω=+0.06 *6*	(+0.585)	(66Ch03)	$^2D_{5/2}$		
				+0.594‡			‡Average value	
$^{197}_{79}$Au			+0.144865[b] *70*		67Da04	$^2S_{1/2}$:2,1	6099.320184 *13*	
$^{198}_{79}$Au	2.7d	2	+0.552[a] *4* if μ>0		56C08	$^2S_{1/2}$:$^5/_2$,$^3/_2$	21800 *150* if μ>0	
			−0.570[a] *4* if μ<0				22500 *150* if μ<0	
$^{198}_{79}$Au	2.7d		+0.5898[d] *5*		67Va16	$^2S_{1/2}$:$^5/_2$,$^3/_2$	21450.7167 *4*	g=1.5908x10^{-4} *6*
$^{199}_{79}$Au	3.2d	3/2	±0.264[a] *5*		56C08	$^2S_{1/2}$:2,1	11110 *130* if μ>0	
							11180 *130* if μ<0	
$^{199}_{79}$Au	3.2d		+0.2699[d] *7*		67Va16	$^2S_{1/2}$:2,1	10962.7227 *3*	g=0.9706x10^{-4} *12*
$^{199}_{80}$Hg					60Mc11	$^3P_2$:$^5/_2$,$^3/_2$	22666.559 *5*	a=9066.449 *3*
$^{201}_{80}$Hg			Ω=−0.13 *1*	+0.50 *4*	60Mc11	$^3P_2$:$^7/_2$,$^5/_2$	11382.6288 *8*	a=−3352.0292 *8*
						$^5/_2$,$^3/_2$	8629.5218 *5*	b=399.150 *2*
						$^3/_2$,$^1/_2$	5377.4918 *20*	c=−0.00184 *9*
$^{201}_{80}$Hg				+0.36[c]	62Ko22 (60Mc11)			
$^{201}_{80}$Hg				+0.39[c]	65Mu15 (60Mc11)	$^3P_2$		
$^{193}_{81}$Tl	23m	1/2			73Ek03			
$^{194}_{81}$Tl	33m	2	±0.135 *3*		73Ek03	$^2P_{1/2}$		a=443 *9*
$^{195}_{81}$Tl	1.2h	1/2			62Ax02			
$^{195}_{81}$Tl	1.2h		+1.66 *13*		73Ek03			g=+1.79x10^{-3} *14*
$^{196}_{81}$Tl	1.8h	2	±0.0699 *2*		73Ek03	$^2P_{1/2}$		a=228.8 *6*
$^{197}_{81}$Tl	2.8h	1/2			57B132			
$^{197}_{81}$Tl	2.7h		+1.66 *13*		73Ek03			g=+1.79x10^{-3} *14*
$^{198}_{81}$Tl	5.3h	2	±<2x10^{-3}		58L45			
$^{198}_{81}$Tl	5.3h		±0.0012063 *9*		73Ek03	$^2P_{1/2}$		a=3.9499 *6*
$^{198m}_{81}$Tl	1.8h	7			57B132			
$^{198m}_{81}$Tl	1.8h		±0.640 *74*		74EkZX	$^2P_{1/2}$		a=599 *69*
$^{199}_{81}$Tl	7.4h	1/2			57B132			
$^{199}_{81}$Tl	7.4h		+1.65 *10*		73Ek03			g=+1.78x10^{-3} *11*
$^{200}_{81}$Tl	26.1h	2			58M21			
$^{200}_{81}$Tl	26.1h		±0.035675 *28*		73Ek03	$^2P_{1/2}$		a=116.814 *8*

Table F: Nuclear Moments by Atomic and Molecular Beams — Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{201}_{81}$Tl	73.5h	1/2			58L45			
$^{201}_{81}$Tl	73.5h	1/2			58M21			
$^{201}_{81}$Tl	73.5h		+1.71 *11*		73Ek03			g=+1.84x10^{-3} *12*
$^{202}_{81}$Tl	12.2d	2			58M35			
$^{202}_{81}$Tl	12.2d		±0.565		73Ek03	$^2P_{1/2}$		a=185.1 *7*
$^{203}_{81}$Tl					56L53	$^2P_{1/2}$:1,0	21105.447 *5*	
$^{203}_{81}$Tl			+1.6109[bp] *14*		68Fo10	$^2P_{3/2}$:2,1	524.05994 *10*	g=17.375x10^{-4} *14*
$^{203}_{81}$Tl					68Pa07	$^2P_{1/2}$:1,0	21105.4497638 *5*	
$^{203}_{81}$Tl					68Pe18	$6^2P_{3/2}$:2,1	524.059953 *3*	
$^{204}_{81}$Tl	3.9y	2	±0.062[a] *6*		56B124			a=200 *20*
$^{204}_{81}$Tl	3.9y	2	±0.0894[a] *20*		57B132	$^2P_{1/2}$:$^5/_2$,$^3/_2$	732 *5*	
$^{204}_{81}$Tl	3.9y		±0.0893[a] *1*		58W44	$^2P_{1/2}$:$^5/_2$,$^3/_2$	730.837 *5*	
$^{205}_{81}$Tl					56L53	$^2P_{1/2}$:1,0	21310.835 *5*	
$^{205}_{81}$Tl			±1.6265 *9*		64Bo37		TlF	
$^{205}_{81}$Tl					67La23	$^2P_{1/2}$:1,0	21310.8339466 *2*	
$^{205}_{81}$Tl			+1.6271[bp] *15*		68Fo10	$^2P_{3/2}$:2,1	530.07655 *10*	g=17.549x10^{-4} *14*
$^{205}_{81}$Tl					68Pe18	$6^2P_{3/2}$:2,1	530.076546 *3*	
$^{206}_{81}$Tl	4.2m	0[♦]	$<10^{-5}$, if I=1		69Cu09	$J=^1/_2$		a<163kHz
$^{207}_{82}$Pb					70Lu09	$^1D_2$:$^5/_2$,$^3/_2$	1524.545 *20*	a=609.820 *8*
$^{199}_{83}$Bi	25m	9/2			59A198			
$^{200}_{83}$Bi	35m	7			59A198			
$^{201}_{83}$Bi	1.8h	9/2			59A198			
$^{201m}_{83}$Bi	62m	I>21/2 or μ<0.1‡			59A198		‡If this activity were produced with about the same probability as the ground state, a resonance should have been observed unless I were very large or μ very small	
$^{202}_{83}$Bi	1.6h	5			59A198			
$^{203}_{83}$Bi	12h	9/2	+4.59[a] *5*	−0.64 *5*	59L50	$J=^3/_2$:6,5	3386 *30*	a=−502.4 *30*
						5,4	2396 *15*	b=−558 *25*
$^{204}_{83}$Bi	12h	6	+4.25[a] *5*	−0.41 *5*	59L50	$J=^3/_2$:$^{15}/_2$,$^{13}/_2$	2841 *25*	a=−349.0 *20*
						$^{13}/_2$,$^{11}/_2$	2216 *15*	b=−358 *20*
$^{205}_{83}$Bi	15d	9/2	≈+5.5[a]‡		59L50	$J=^3/_2$:6,5	≈4000	a≈−600
							‡Value very uncertain due to large configuration interaction corrections which are not included	
$^{206}_{83}$Bi	6.3d	6			57M24			
$^{206}_{83}$Bi	6.3d	6	+4.56[a] *5*	−0.19 *5*	59L50	$J=^3/_2$:$^{15}/_2$,$^{13}/_2$	2914 *25*	a=−374.7 *30*
						$^{13}/_2$,$^{11}/_2$	2411 *20*	b=−166 *30*
$^{209}_{83}$Bi	>2Ay			−0.34	60Ti01	$J=^3/_2$:6,5	2884.7 *2*	a=−446.97 *4*
						5,4	2171.5 *1*	b=−304.25 *83*
$^{209}_{83}$Bi	>2Ay			−0.29[c]	62Ko22			
$^{209}_{83}$Bi	>2Ay			−0.35	68Lu08	$^2P_{3/2}$:6,5	3598.647 *6*	
						5,4	2251.038 *10*	
						4,3	1311.930 *10*	
$^{209}_{83}$Bi	>2Ay		Ω=+0.43		70Hu05	$^4S_{3/2}$:6,5	2884.666 *2*	a=−446.937 *1*
						5,4	2171.419 *2*	b=−305.067 *2*
						4,3	1584.502 *2*	c=0.0183 *1*
$^{209}_{83}$Bi	>2Ay		+4.25 *14*	−0.383 *40*	70La07	$^2P_{3/2}$		a=491.028 *1*
			Ω=+0.55‡ *3*					b=978.639 *9*
								c=0.0193 *5*
							‡Used μ=4.08	
$^{209}_{83}$Bi	>2Ay			−0.46[c]	72Ro37	$^4S_{3/2}$,$^2D_{3/2}$,$^2P_{3/2}$		
			Ω=0.62[c] *8*			$^4S_{3/2}$,$^2P_{3/2}$		

Table F: Nuclear Moments by Atomic and Molecular Beams – Continued

Nucleus	$T_{1/2}$	I	μ	Q	Refer.	Atomic State: (F,F')	$\Delta\nu(F,F')$ or Molecule Used	Interaction Constants or Moment Ratios
$^{210}_{83}$Bi	5d	1			54S96			
$^{210}_{83}$Bi	5d		±0.0442[a] *1* μ/Q negative	±0.13 *1*	62Al02	$J=^3/_2,^5/_2,^3/_2$ $^3/_2,^1/_2$	194.93 *9* 220.19 *8*	a=21.78 *3* b=112.38 *3*
$^{210}_{83}$Bi	5d		negative‡	positive‡	64Po04		‡From fitting experimental values of μ and Q and β-decay data to deduce reasonable Ψ's	
$^{201}_{84}$Po	18m	3/2			61Ax02			
$^{202}_{84}$Po	51m	0♦			61Ax02			a<0.02, if I=1
$^{203}_{84}$Po	42m	5/2			61Ax02			
$^{204}_{85}$Po	3.5h	0♦			61Ax02			a<0.02, if I=1
$^{205}_{84}$Po	1.8h	5/2			61Ax02			
$^{205}_{84}$Po	1.8h		≈±0.26[a]‡	+0.17	68Jo19			a=134.14 *2* b=232.3 *2*
							‡Value very uncertain due to large configuration interaction corrections which are not included	
$^{206}_{84}$Po	8.8d	0♦			61Ax02			a<0.02, if I=1
$^{207}_{84}$Po	6.0h	5/2			61Ax02			
$^{207}_{84}$Po	6.0h		≈+0.27[a]‡ Ω=+0.11 *1*	+0.28	61Ol01	$J=2:^9/_2,^7/_2$ $^7/_2,^5/_2$ $^5/_2,^3/_2$	884.785 *13* 421.950 *8* 158.567 *12*	a=139.551 *2* b=380.548 *16* c=−0.0120 *10*
							‡Value very uncertain due to large configuration interaction corrections which are not included	
$^{210}_{84}$Po	138d	0♦			61Al20			
$^{211}_{85}$At	7.2h	9/2			58G16			
$^{233}_{91}$Pa	27d	3/2			58H115			
$^{233}_{91}$Pa	27d	3/2	+3.4 *8*	−3.0	61Ma42			g=12.5x10^{-4} *30* a=+595 *30* b=−2400 *300*
$^{238}_{93}$Np	2.1d	2			58A92			
$^{239}_{93}$Np	2.3d	5/2			58H111			
$^{239}_{94}$Pu	24ky	1/2	±0.02		58H70	$^7F_1:^3/_2,^1/_2$	7.683 *60*	a=5.14
$^{239}_{94}$Pu	24ky		+0.200[b] *4*		65Fa02			
$^{241}_{95}$Am	460y	5/2			60Ma30	$^8S_{7/2}$		a=17.144 *8* b=123.82 *10* b/a<0
$^{241}_{95}$Am	460y		+1.59[b] *3*		66Ar04	$^8S_{7/2}$		a=17.1437 *28* b=123.848 *32*, b/a<0 g=3.42x10^{-4} *6*
$^{242}_{95}$Am	16h	1	±0.33 μ/Q negative	±2.76	61Ma27			a=10.124 *10* b=69.639 *40*
$^{242}_{95}$Am	16h		+0.3826[b] *15*		66Ar04	$^8S_{7/2}$		a=10.1282 *14* b=69.6339 *13* g=2.059x10^{-4} *8*
$^{242}_{96}$Cm	160d	0♦	<2x10^{-4}, if I=1		59H115			
$^{253}_{99}$Es	20.5d		±4.06[ik] *20*	±6.1	72Go42			a=816.57 *60* b=−4335 *16*

Table F: Nuclear Moments by Atomic and Molecular Beams – Continued

* Polarization or Sternheimer correction included
♦ No hyperfine structure observed
[a] Calculated from the $\Delta\nu$– or a–ratio for two isotopes
[b] Non–resonance or zero–moment experiment
[c] Recalculation of earlier data
[d] Determined from $\Delta m = \pm 1$ doublet separation
[E] Electric resonance experiment
[f] Inferred from intensity or polarization distribution across the beam
[g] Calculated from the b–ratio for two isotopes
[h] Direct measurement by triple resonance
[i] No diamagnetic correction added. Unsure if authors already corrected for it.
[j] Not corrected for mixing of other states or higher order perturbation effects
[k] Direct measurement
[l] MASER experiment
[m] Metastable or excited state
[p] Preliminary value from meeting abstract, thesis, private communication, etc.

Table G: Nuclear Moments by Optical Spectroscopy

Introduction

A nuclear angular momentum, designated by I, and an associated magnetic moment, μ_I, were first postulated by Pauli [24Pa01] and by Goudsmit and Back [27Go01] to explain an observed hyperfine structure (hfs) in spectral lines of the order of magnitude of $1 cm^{-1}$ or roughly 1/2000 of the fine structure which is due to different orientations of the electron's spin with respect to its orbital angular momentum.

This hyperfine structure is attributed to the splitting of the energy levels of the atom as a result of the interaction between the nuclear magnetic moment and the magnetic field due to the electrons. Deviations from the expected magnitude of this splitting can be ascribed to the interaction of the nuclear electric quadrupole moment with the electric field.

The individual electronic states are split by the magnetic interaction into $2I + 1$ or $2J + 1$ substates depending upon whether I is less than or greater than J, the electronic spin. An observed spectral line, arising from a transition between two such electronic states, will have a multiplicity greater than $2I + 1$ or $2J + 1$ unless J is zero for one of the states. Two typical transitions are illustrated in figure 1. If J is known for each of the states involved in the transition, I can be determined by the multiplicity and the relative spacings of the components. The statistical weights of the hyperfine substates are also functions of I so that the relative intensities of the hfs components may also indicate the nuclear spin.

A few nuclei have also been studied by molecular band spectroscopy. This technique has been used to make unequivocal assignments of zero spin by the observation of the absence of alternating intensities in the band spectra of diatomic homonuclear molecules. The method of atomic spectroscopy cannot establish a zero spin since only an upper limit can be placed on the hfs splitting by a study of the spectral lines.

Values of the nuclear magnetic dipole and electric quadrupole moments are calculated from the hyperfine interaction constants which are in turn computed from the wavelengths of the observed lines. Since the values of μ determined in this way

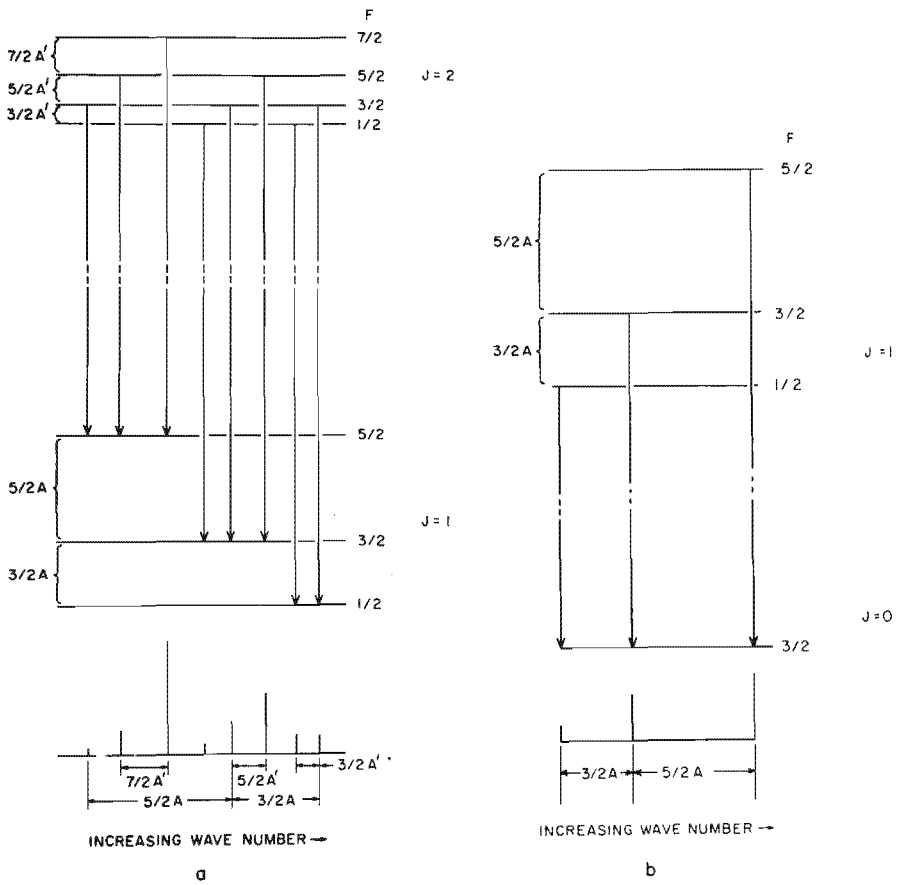

FIGURE 1. Schematic level diagram showing transitions between an upper and lower state in an atom where the nucleus has $I = 3/2$ and $Q = 0$ (a) for $J_{upper} = 2$ and $J_{lower} = 1$, (b) for $J_{upper} = 1$, and $J_{lower} = 0$. The lower part of each diagram graphically depicts the relative wave numbers and intensities of the corresponding multiplets. The magnetic dipole interaction constants for the $J = 1$ and $J = 2$ states are denoted by A and A', respectively.

are accurate only to a few percent, this table does not list all values measured by the optical method but only those not measured by more accurate techniques and those for which the sign of the moment was determined.

The calculation of the quadrupole moment Q from the interaction constant depends upon the determination of the electric field gradient at the nucleus. In some of the earlier calculations the wavefunctions used were very crude. No attempt has been made by the compilers to reevaluate the Q's with newer wavefunctions. In addition, the nuclear quadrupole moment causes a polarization of the atomic core electrons (Sternheimer effect). The correction for this effect can be of the order of tens of percent.

There have been a few errors or ambiguities in assignment of spin by optical spectroscopy. These can be caused by such factors as

(1) Errors in assignment of J to the states involved.

(2) Isotopic impurities which may produce lines masking those under study.

(3) Distortion of intensity ratios resulting from self-absorption, diffuse radiation background, or in the case of photographic recording, a nonlinearity of density response of the photographic material.

The precision with which hyperfine interactions can be determined by optical spectroscopy is limited by

(1) Lifetimes of the excited energy levels, which are of the order of 10^{-8} seconds and produce a line broadening of about $3\times10^{-3}\text{cm}^{-1}$.

(2) Doppler effect due to atomic motion. This can be reduced by cooling the source or using an atomic beam in which the motion of the atoms is perpendicular to the optical path.

(3) The finite resolving power of the optical equipment. This involves both the inherent limitations of the system and the imperfections of preparation of optical surfaces.

A general review of the optical method can be found in F.M. Kelly, *Determination of Nuclear Spins and Magnetic Moments by Atomic Spectroscopy* [58Ke25]. Details of the techniques and apparatus are discussed in S. Tolansky, *High Resolution Spectroscopy* [47To19].

A few measurements of nuclear moments from the analysis of meson–atomic X–rays have also been included in this table. These values have been marked by a '[1]'.

The last systematic literature search for information included in the table was in early 1971.

Explanation of Table G

Nucleus — Chemical symbol with Z– and A–number
States, other than ground states, are designated by "m" following the A–number.

$T_{1/2}$ — Half–life of radioactive nucleus

I — Nuclear spin, in units of $h/2\pi$

μ or μ^1/μ^2 — Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction, or magnetic moment ratio. See Policies, Diamagnetic corrections, for factors used
A 5% uncertainty in the diamagnetic correction is assumed.

Q or Q^1/Q^2 — Nuclear electric quadrupole moment, in barns, as given by the experimenter, or quadrupole moment ratio.
Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer corrections in computing the moment.

Refer. — Reference key

Table G: Nuclear Moments by Optical Spectroscopy

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{1}_{1}H$		1/2[b]			29M01
$^{1}_{1}H$		1/2[b]			30C01
$^{1}_{1}H$		1/2[b]			30H02
$^{2}_{1}H$		1[b]			33L02
$^{2}_{1}H$		1[b]			34M03
$^{3}_{1}H$	12y	1/2[b]			49D31
$^{3}_{2}He$		1/2[b]			49D24
$^{3}_{2}He$			negative		50F51
$^{4}_{2}He$		0[b]			29M01
$^{7}_{3}Li$		3/2[b]			30H01
$^{7}_{3}Li$		3/2			32C03
$^{12}_{6}C$		0[b]			29M01
$^{13}_{6}C$		1/2[bE]			48J21
$^{14}_{6}C$	5.6ky	0[bE]			48J21
$^{14}_{7}N$		1[b]			28O01
$^{15}_{7}N$		1/2[bE]			39K11
$^{15}_{7}N$		1/2[b]			40W10
$^{16}_{8}O$		0[b]			29M01
$^{19}_{9}F$		1/2[b]			29G01
$^{19}_{9}F$		1/2			33C04
$^{20}_{10}Ne$		0[♦]			27H01
$^{21}_{10}Ne$		≥3/2[E]	negative[E]		49K21
$^{21}_{10}Ne$				±0.0926[q] *16*	71Du05
$^{22}_{10}Ne$		0[♦]			27H01
$^{23}_{11}Na$		3/2			33G03
$^{23}_{11}Na$		3/2[b]			33J04
$^{23}_{11}Na$		3/2	±1.99[a]		34E02
$^{23}_{11}Na$			+2.14		34S05
$^{23}_{11}Na$			±2.218 *13*		67Dr09
$^{24}_{12}Mg$		0[♦]			31M02
$^{25}_{12}Mg$		5/2	−0.96 *7*		49C18
$^{26}_{12}Mg$		0[♦]			31M02
$^{27}_{13}Al$		5/2	+3.7		38H06
$^{31}_{15}P$		1/2[b]			33A01
$^{31}_{15}P$		1/2	+1.15 *5*		49C31
$^{32}_{16}S$		0[b]			31N01
$^{32}_{16}S$		0[b]			36O01
$^{36}_{18}Ar$		0[♦]			37K03
$^{36}_{18}Ar$		0[♦E]			53M73
$^{37}_{18}Ar$	34d	3/2	+0.95 *20*		65Ro13
$^{38}_{18}Ar$		0[♦E]			53M73
$^{39}_{18}Ar$	265y	7/2	−1.3 *3*		67Tr12
$^{40}_{18}Ar$		0[♦]			37K03
$^{40}_{18}Ar$		0[♦E]			53M73
$^{39}_{19}K$		3/2	positive		37J02

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{40}_{20}Ca$		0♦			31F01
$^{43}_{20}Ca$		7/2	−1.2		54K14
$^{45}_{21}Sc$		7/2			34K01
$^{45}_{21}Sc$		7/2			34S01
$^{45}_{21}Sc$			+4.8		37K02
$^{51}_{23}V$		7/2			36K04
$^{51}_{23}V$				+0.28 *15*	56M36
$^{51}_{23}V$				+0.26[c]	62Ko22
$^{55}_{25}Mn$		5/2			30W01
$^{55}_{25}Mn$			+3.0		39F03
$^{55}_{25}Mn$				+0.4* *2*	55M56
$^{55}_{25}Mn$				+0.3 *1*	58R54
$^{55}_{25}Mn$				+0.35 *5*	62Wa30
$^{59}_{27}Co$		7/2			35K05
$^{59}_{27}Co$		7/2	+2.7		35M07
$^{59}_{27}Co$				+0.5 *2*	53M65
$^{59}_{27}Co$				±0.49 *3*	69Mu11
				±0.42* *3*	
$^{61}_{28}Ni$			±≤0.25[E]		50K55
$^{63}_{29}Cu$		3/2			32R02
$^{63}_{29}Cu$		3/2	+2.5	−0.1 *1*	36S07
$^{63}_{29}Cu$				−0.13 *6*	53K39
$^{63}_{29}Cu$				−0.28 *7*	56K64
$^{63}_{29}Cu$				−0.20[E] *4*	61Fi01
$^{63}_{29}Cu$				−0.181[c]	62Ko22
					(61Fi01)
$^{63}_{29}Cu$				−0.212* *4*	69St24
$^{63}_{29}Cu$				−0.212* *4*	70Fi17
$^{65}_{29}Cu$		3/2			32R02
$^{65}_{29}Cu$			+2.6	−0.1 *1*	36S07
$^{65}_{29}Cu$				−0.15 *10*	49B61
$^{65}_{29}Cu$				−0.22 *6*	56K64
$^{65}_{29}Cu$				−0.19[E] *4*	61Fi01
$^{65}_{29}Cu$				−0.196* *4*	69St24
					(67Fi02)
$^{65}_{29}Cu$				−0.161[E] *3*	70Fi17
				−0.196* *4*	(67Fi02)
$^{64}_{30}Zn$		0♦			29S01
$^{64}_{30}Zn$		0♦			31M02
$^{66}_{30}Zn$		0♦			29S01
$^{66}_{30}Zn$		0♦			31M02
$^{67}_{30}Zn$		5/2	+0.9		37L07
$^{67}_{30}Zn$		5/2[E]			48A06
$^{68}_{30}Zn$		0♦			29S01
$^{68}_{30}Zn$		0♦			31M02
$^{69}_{31}Ga$		3/2			32J04
$^{69}_{31}Ga$		3/2			33C02
$^{69}_{31}Ga$			+2.0	+1	36S10
$^{69}_{31}Ga$			$^{71}/_{69}$=1.2700 *8*		56J29

Table G: Nuclear Moments by Optical Spectroscopy — Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{71}_{31}$Ga		3/2			32J04
$^{71}_{31}$Ga		3/2			33C02
$^{71}_{31}$Ga			+2.5	±≤0.5	36S10
$^{75}_{33}$As		3/2			32T01
$^{75}_{33}$As			+1.5 *3*	+0.3 *2*	36S05
$^{75}_{33}$As				+0.27* *4*	58Mu08
$^{75}_{33}$As				+0.29[c]	62Ko22
$^{76}_{34}$Se		0♦			33R02
$^{77}_{34}$Se		1/2[bE]			54D05
$^{78}_{34}$Se		0♦			33R02
$^{78}_{34}$Se		0[bE]			54D05
$^{80}_{34}$Se		0[b]			34O01
$^{80}_{34}$Se		0[bE]			54D05
$^{82}_{34}$Se		0♦			33R02
$^{79}_{35}$Br		3/2			30B01
$^{79}_{35}$Br		3/2			32T02
$^{81}_{35}$Br		3/2			30B01
$^{81}_{35}$Br		3/2			32T02
$^{82}_{36}$Kr		0♦			33K02
$^{83}_{36}$Kr		9/2			32M06
$^{83}_{36}$Kr			negative		33K02
$^{83}_{36}$Kr		9/2		+0.15	38K02
$^{83}_{36}$Kr		9/2[E]		+0.22[E] *2*	55R46
$^{83}_{36}$Kr			−0.982[E]	+0.17[E] *5*	59B08
$^{84}_{36}$Kr		0♦			33K02
$^{85}_{36}$Kr	11y	9/2	±1.005 *2*	+0.43 *3*	55R13
			$^{85}/_{83}$=1.035 *2*	$^{85}/_{83}$=+1.66 *10*	
$^{86}_{36}$Kr		0♦			33K02
$^{85}_{37}$Rb		5/2	±1.4		33K01
$^{87}_{37}$Rb	47Gy	3/2	±2.8		33K01
$^{87}_{37}$Rb	47Gy			+0.14 *6*	56K12
$^{86}_{38}$Sr		0♦			31F01
$^{87}_{38}$Sr		9/2	−1.1		38H05
$^{88}_{38}$Sr		0♦			31F01
$^{88}_{38}$Sr		0♦			38H05
$^{89}_{39}$Y		1/2	≤0.1		40W08
$^{89}_{39}$Y		1/2	−0.14		49C17
$^{89}_{39}$Y		1/2	negative		50K69
$^{91}_{40}$Zr		5/2[E]			49A06
$^{91}_{40}$Zr			−1.9 *2*		55M88
$^{93}_{41}$Nb		9/2	≈3.7		34B01
$^{93}_{41}$Nb		9/2	+5.3	≈0	47M27
$^{93}_{41}$Nb				−0.25 *15*	58Mu04
$^{93}_{41}$Nb				−0.20[c]	62Ko22
$^{92}_{42}$Mo		0♦			51A29
$^{94}_{42}$Mo		0♦			51A29
$^{95}_{42}$Mo		5/2			51A29
$^{95}_{42}$Mo		5/2	negative		54W07
$^{96}_{42}$Mo		0♦			51A29

Table G: Nuclear Moments by Optical Spectroscopy — Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{97}_{42}$Mo		5/2			51A29
$^{97}_{42}$Mo		5/2	negative		54W07
$^{98}_{42}$Mo		0♦			51A29
$^{100}_{42}$Mo		0♦			51A29
$^{99}_{43}$Tc	210ky	9/2	+5.5 *3*	+0.34 *17*	53K49
$^{99}_{44}$Ru		5/2	−0.63 *15*		55M78
			μ_{ave}(Ru)=−0.66 *2*		
			$(\mu^{101}/\mu^{99}=\pm 1.09$ *3*		52G19)
$^{101}_{44}$Ru		5/2	−0.69 *15*		55M78
$^{103}_{45}$Rh		1/2	−0.10 *3*		51K41
$^{105}_{46}$Pd		5/2	−0.57 *5*		52S56
$^{105}_{46}$Pd		5/2	−0.57		53B28
$^{107}_{47}$Ag		1/2	−0.10		37J01
$^{107}_{47}$Ag		1/2	−0.086		50C26
$^{107}_{47}$Ag			-0.111^{E} *8*		51B32
$^{109}_{47}$Ag		1/2	−0.19		37J01
$^{109}_{47}$Ag		1/2	−0.159		50C26
$^{109}_{47}$Ag			-0.129^{E} *8*		51B32
$^{110}_{48}$Cd		0♦			29S01
$^{111}_{48}$Cd		1/2			31S01
$^{111}_{48}$Cd		1/2	−0.62		33J02
$^{112}_{48}$Cd		0♦			29S01
$^{113}_{48}$Cd	>3Jy	1/2			31S01
$^{113}_{48}$Cd	>3Jy	1/2	−0.62		33J02
$^{114}_{48}$Cd		0♦			29S01
$^{116}_{48}$Cd		0♦			29S01
$^{113}_{49}$In		9/2[f]	$^{113}/_{115}=1.0$[f]		37B08
$^{115}_{49}$In	600Ty	9/2			33J03
$^{115}_{49}$In	600Ty	9/2			34P01
$^{115}_{49}$In	600Ty			+0.82	37B08
$^{115}_{49}$In	600Ty		+5.3	+0.8	37S11
$^{115}_{50}$Sn		1/2	−0.86		49G02
$^{116}_{50}$Sn		0♦			31M02
$^{117}_{50}$Sn		1/2			33S03
$^{117}_{50}$Sn		1/2	−0.89		34T01
$^{118}_{50}$Sn		0♦			31M02
$^{119}_{50}$Sn		1/2			33S03
$^{119}_{50}$Sn		1/2	−0.89		34T01
$^{120}_{50}$Sn		0♦			31M02
$^{121}_{51}$Sb		5/2			32B01
$^{121}_{51}$Sb		5/2	+4.0		34C03
$^{121}_{51}$Sb				−1.3*	53S17
$^{121}_{51}$Sb				$-0.53*^{c}$ *10*	55M88
$^{121}_{51}$Sb				-0.50^{c}	62Ko22
					(55M88)
$^{121}_{51}$Sb				−0.54 *8*	61Le13

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{123}_{51}Sb$		7/2			32B01
$^{123}_{51}Sb$		7/2	+3.2		34C03
$^{123}_{51}Sb$				−1.2[c] *2*	49M48
					(40T03)
$^{123}_{51}Sb$				−1.7*	53S17
$^{123}_{51}Sb$				−0.68*[c] *10*	55M88
$^{123}_{51}Sb$				−0.69 *10*	61Le13
$^{123}_{52}Te$	>50Ty	1/2	$^{125}/_{123}$=1.208 *60*		49M47
$^{123}_{52}Te$	>50Ty	1/2[E]			50F08
$^{123}_{52}Te$	>50Ty		−0.6[E] *2*		52R05
$^{125}_{52}Te$		1/2			49M47
$^{125}_{52}Te$		1/2[E]			50F08
$^{125}_{52}Te$			−0.7[E] *2*		52R05
$^{126}_{52}Te$		0[♦]			33R02
$^{128}_{52}Te$		0[♦]			33R02
$^{130}_{52}Te$		0[♦]			33R02
$^{127}_{53}I$		5/2			38M06
$^{127}_{53}I$			+2.8	−0.5	39S15
$^{127}_{53}I$				−0.67[g]	58Mu10
				−0.62* *4*	
$^{127}_{53}I$				−0.49[b] *8*	64Mu11
$^{129}_{54}Xe$		1/2			34J01
$^{129}_{54}Xe$		1/2	negative		34K02
$^{129}_{54}Xe$		1/2[E]			50K09
$^{131}_{54}Xe$		3/2	positive		34K02
$^{131}_{54}Xe$		3/2[E]		≈−0.15[E]	50K09
				$^{131}/_{83}$Kr≈−1	
$^{131}_{54}Xe$			+0.687[E] *3*	−0.12[E] *2*	52B57
			$^{129}/_{131}$=−1.131 *5*		
$^{132}_{54}Xe$		0[♦]			34J01
$^{134}_{54}Xe$		0[♦]			34J01
$^{136}_{54}Xe$		0[♦]			34J01
$^{133}_{55}Cs$		7/2			31K01
$^{133}_{55}Cs$			±2.40[a]		34H03
$^{133}_{55}Cs$		7/2			34J02
$^{133}_{55}Cs$			±2.52		35S06
$^{133}_{55}Cs$				±≤0.3	40S09
$^{134}_{56}Ba$		0[♦E]			50A51
$^{135}_{56}Ba$		3/2			32M06
$^{135}_{56}Ba$		3/2			37B09
$^{135}_{56}Ba$		3/2[E]			50A51
$^{135}_{56}Ba$			$^{137}/_{135}$=1.11[E]	+0.25[E] *12*	60Ka24
$^{135}_{56}Ba$				+0.23[c]	62Ko22
$^{135}_{56}Ba$			$^{137}/_{135}$=+1.10[E] *3*	$^{137}/_{135}$=+1.6[E] *1*	63Ja15
$^{135}_{56}Ba$				+0.13 *5*	64Ja11
$^{135}_{56}Ba$				±0.41[i] *4*	66Co26
$^{135}_{56}Ba$			±0.843 *7*		66Co32
$^{135}_{56}Ba$				±0.17 *2*	68Be60
$^{136}_{56}Ba$		0[♦]			50A51

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{137}_{56}Ba$		3/2			32M06
$^{137}_{56}Ba$		3/2			37B09
$^{137}_{56}Ba$		$3/2^E$			50A51
$^{137}_{56}Ba$				$+0.2^E$ *1*	60Ka24
$^{137}_{56}Ba$				+0.21 *5*	64Ja11
$^{137}_{56}Ba$				±0.11 *5*	66Co26
$^{137}_{56}Ba$			±0.930 *7*		66Co32
$^{137}_{56}Ba$			$^{137}/_{135}$=1.120 *10*	($^2S_{1/2}$)	67Ke16
			$^{137}/_{135}$=1.144 *54*	($^2P_{1/2}$)	
$^{137}_{56}Ba$				±0.26 *3*	68Be60
				(Using $^{137}/_{135}$=1.54)	
$^{138}_{56}Ba$		$0^\bullet$			50A51
$^{137}_{57}La$	60ky	7/2	+2.690 *6*	+0.26 *8*	72Fi19
$^{138}_{57}La$	112Gy		$+3.702^E$ *4*	$+0.51^E$ *9*	72Fi14
			$^{138}/_{139}$=0.9328 *8*	$^{138}/_{139}$=2.3 *4*	
$^{139}_{57}La$		7/2			34A02
$^{139}_{57}La$			+2.76		40W08
$^{139}_{57}La$				+0.3 *1*	55L59
$^{139}_{57}La$				$+0.21*^E$ *4*	58Mu08
$^{141}_{59}Pr$		5/2			29W01
$^{141}_{59}Pr$			$+3.9^c$ *3*		53B26
					(29W01)
$^{141}_{59}Pr$			$+4.0^c$ *2*		60Mu11
$^{141}_{59}Pr$			+4.09 *6*		65Re03
$^{143}_{60}Nd$		$7/2^E$	-1.1^E *1*		54M91
$^{145}_{60}Nd$		$7/2^E$	-0.69^E *10*		54M91
$^{147}_{61}Pm$	2.6y	7/2			60Kl2
$^{147}_{61}Pm$	2.6y	7/2	+2.58 *7*	+0.74 *20*	66Re04
$^{147}_{62}Sm$	0.1Ty	$7/2^E$	-0.76^E *8*	$\pm\leq 1$	54M15
$^{149}_{62}Sm$		$7/2^E$	-0.64^E *6*	$\pm\leq 1$	54M15
$^{151}_{63}Eu$		5/2			35S01
$^{151}_{63}Eu$			+3.4	$\approx$+1.2	38S10
$^{151}_{63}Eu$			$^{151}/_{153}$=2.245 *5*		57K51
$^{151}_{63}Eu$			+3.39 *3*		60Kr07
$^{151}_{63}Eu$				$+0.95^b$ *10*	60Kr08
$^{151}_{63}Eu$				$\pm 1.16^{gk}$ *8*	65Mu07
$^{151}_{63}Eu$				$+1.15^g$ *9*	65Wi09
				($^{151}/_{153}$=0.393	60Sa23)
$^{151}_{63}Eu$				$\pm 1.12^{Eh}$ *7*	68Gu02
$^{152}_{63}Eu$	13y			$\pm 2.4^i$ *3*	64Ga12
$^{152}_{63}Eu$	13y		negative	positive	70He09
$^{153}_{63}Eu$		5/2			35S01
$^{153}_{63}Eu$			+1.5	$\approx$+2.5	38S10
$^{153}_{63}Eu$			+1.51 *2*		60Kr07
$^{153}_{63}Eu$				$+2.42^b$ *20*	60Kr08
$^{153}_{63}Eu$				$\pm 2.92^{gk}$ *20*	65Mu07
$^{153}_{63}Eu$				$+2.94^g$ *23*	65Wi09
$^{153}_{63}Eu$				$\pm 2.85^{Eh}$ *18*	68Gu02
$^{154}_{63}Eu$				positive	70He09

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{155}_{64}$Gd		3/2[E]	−0.30[E] *4*	+1.1[E] *3*	56S21
$^{155}_{64}$Gd			−0.32[E] *4*	+1.6[E]	59K10
$^{157}_{64}$Gd		3/2[E]	−0.37[E] *4*	+1.0[E] *3*	56S21
$^{157}_{64}$Gd			−0.40[E] *4*	+2[E]	59K10
$^{159}_{65}$Tb		3/2			34S02
$^{159}_{65}$Tb			positive	+1.26 *12*	65Ar05
$^{159}_{65}$Tb				+1.32 *13*	66Ar18
$^{159}_{65}$Tb				±1.18 *12*	70De05
$^{165}_{67}$Ho		7/2			35S02
$^{165}_{67}$Ho		7/2			57B39
$^{165}_{67}$Ho			+3.7 *7*		58B85
$^{165}_{67}$Ho			+3.97[h] *5*		68Su04
$^{169}_{69}$Tm		1/2			34S03
$^{169}_{69}$Tm		1/2	−0.205 *20*		55L49
$^{169}_{69}$Tm			−0.25[c]		60Ca15
$^{171}_{70}$Yb		1/2			38S10
$^{171}_{70}$Yb			+0.45		38S11
$^{171}_{70}$Yb			+0.49 *6*		55K33
			$^{171}/_{173}$=−0.724 *1*		
$^{173}_{70}$Yb		5/2		+3.9 *4*	38S10
$^{173}_{70}$Yb			−0.65		38S11
$^{173}_{70}$Yb		5/2			54K52
$^{173}_{70}$Yb			−0.67 *1*		55K33
$^{173}_{70}$Yb				+2.4	56K42
$^{173}_{70}$Yb				+2.8*[E] *2*	62Ro26
$^{175}_{71}$Lu		7/2	+1.7	+6.1	35S04
$^{175}_{71}$Lu			+2.6 *5*	+5.9	36G03
$^{175}_{71}$Lu				+5.7*[c] *3*	55K23
$^{175}_{71}$Lu				+3.6*[c] *2*	57M96
$^{175}_{71}$Lu			+2.0 *2*	+5.6 *6*	58S134
$^{175}_{71}$Lu			$^{175}/_{176}$=0.711 *5*	$^{175}/_{176}$=0.71 *1*	61Bl07
$^{175}_{71}$Lu				+5.0[c]	62Ko22
					(55K23)
$^{175}_{71}$Lu			±2.24 *11*		67He17
$^{176}_{71}$Lu	20Gy	≥7	+3.8 *7*	+7 *1*	39S14
$^{176}_{71}$Lu	20Gy	6 *1*	+2.8 *3*	+8 *1*	58S134
$^{176}_{71}$Lu	20Gy	7[E]			59K97
$^{176}_{71}$Lu	20Gy	7[E]	+2.8[E] *3*		61Bl07
$^{177}_{72}$Hf		7/2[E]	$^{177}/_{179}$=−1.276 *8*	$^{177}/_{179}$=0.99 *2*	56S22
$^{177}_{72}$Hf			+0.61[E] *3*	+3[E] *1*	56S53
$^{178}_{72}$Hf		0[♦]			35R01
$^{179}_{72}$Hf		9/2[E]			56S22
$^{179}_{72}$Hf			−0.47[E] *3*	+3[E] *1*	56S53
$^{180}_{72}$Hf		0[♦]			35R01
$^{181}_{73}$Ta		7/2			33G02
$^{181}_{73}$Ta		7/2			33M01
$^{181}_{73}$Ta			+2.1		35G01
$^{181}_{73}$Ta				≈+6	43S15

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{181}_{73}$Ta			+1.9	+5.9	52B71
$^{181}_{73}$Ta				+4.3* *4*	55K23
$^{181}_{73}$Ta				+2.7*[c] *3*	57M96
$^{181}_{73}$Ta			+2.4[c] *2*		58Mu08
$^{181}_{73}$Ta				+3.9[c]	62Ko22
					(55K23)
$^{182}_{74}$W		0+			34G04
$^{183}_{74}$W		1/2			48K30
$^{183}_{74}$W		1/2[E]			50F08
$^{183}_{74}$W			+0.08 *2*		51V06
$^{183}_{74}$W			+0.115		65Gl08
$^{184}_{74}$W		0+			34G04
$^{186}_{74}$W		0+			34G04
$^{185}_{75}$Re		5/2			31M01
$^{185}_{75}$Re		5/2			31Z01
$^{185}_{75}$Re			$^{187}/_{185}$=1.0108 *4*	+2.6	37S12
$^{185}_{75}$Re			+3.3		38S09
$^{185}_{75}$Re				≈+2.9	65Ho06
$^{185}_{75}$Re				±2.3[E] *9*	66Ku07
				$^{187}/_{185}$=0.95 *4*	
$^{185}_{75}$Re				±2.36 *50*	69Kr07
$^{186}_{75}$Re	90h		±1.38 *45*		64Wi09,
					65Sc13
$^{187}_{75}$Re	60Gy	5/2			31M01
$^{187}_{75}$Re	60Gy	5/2			31Z01
$^{187}_{75}$Re	60Gy			+2.6	37S12
$^{187}_{75}$Re	60Gy		+3.3		38S09
$^{187}_{75}$Re	60Gy			≈+2.9	65Ho06
$^{187}_{75}$Re	60Gy			±2.2[E] *9*	66Ku07
$^{187}_{75}$Re	60Gy			±2.24 *50*	69Kr07
$^{188}_{75}$Re	17h		±1.41 *45*		64Wi09,
					65Sc13
$^{187}_{76}$Os		1/2	positive		55M45
$^{187}_{76}$Os		1/2	+0.0658 *11*		61Gu08
$^{187}_{76}$Os			+0.0662 *6*		62Mu04
$^{189}_{76}$Os		3/2	+0.70 *9*	+2.0 *8*	52M40
$^{189}_{76}$Os		3/2			58B159
$^{189}_{76}$Os				+0.8[c]	62Ko22
					(57M96)
$^{189}_{76}$Os				+0.8* *2*	62Mu04
$^{189}_{76}$Os			+0.792		65Gl08
$^{189}_{76}$Os				±0.91[E] *10*	68Hi04
$^{191}_{77}$Ir		3/2	positive		50B75
$^{191}_{77}$Ir		3/2	+0.16 *3*	+1.2 *6*	52M40
$^{191}_{77}$Ir		3/2	+0.2 *1*	+1.5 *1*	53S61
$^{193}_{77}$Ir		3/2			35V01
$^{193}_{77}$Ir		3/2	positive		50B75
$^{193}_{77}$Ir		3/2	+0.17 *3*	+1.0 *5*	52M40
$^{193}_{77}$Ir		3/2	+0.2 *1*	+1.5 *1*	53S61
$^{194}_{78}$Pt		0+			35F06
$^{195}_{78}$Pt		1/2			36J01
$^{195}_{78}$Pt			+0.6		36S08
$^{195}_{78}$Pt		1/2			37T03
$^{196}_{78}$Pt		0+			35F06

Table G: Nuclear Moments by Optical Spectroscopy — Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{197}_{79}$Au		3/2	+0.195 *4*		39E03
$^{197}_{79}$Au			+0.136 *8*		52K07
$^{197}_{79}$Au			+0.14 *2*	+0.56 *10*	53S60
$^{197}_{79}$Au				$\pm 0.58^1$ *1*	66Ac02
$^{197}_{79}$Au				$\pm 0.54^1$ *2*	66Ha43
$^{193}_{80}$Hg	6h	3/2	−0.613 *20*		64Kl01
$^{193}_{80}$Hg	6h	3/2		−1.8 *10*	66Da07
$^{193m}_{80}$Hg	11h	13/2	−1.06	+1.2 *3*	64To05
				$^{193m}/_{201}$=2.74 *54*	
$^{193m}_{80}$Hg	11h	13/2			66Da07
$^{195}_{80}$Hg	9.5h		+0.526 *5*		63Kl03
$^{195}_{80}$Hg	9.5h	1/2	+0.54		64To05
$^{195m}_{80}$Hg	40h		−1.060 *10*	+1.5 *10*	63Kl03
$^{195m}_{80}$Hg	40h	13/2	−1.05	+1.3 *6*	64To05
				$^{195m}/_{201}$=2.81 *4*	
$^{197}_{80}$Hg	65h	1/2	+0.52 *1*		54B92
$^{197m}_{80}$Hg	24h	13/2	−1.04 *1*	+1.5 *3*	59M82
$^{198}_{80}$Hg		0+			31S03
$^{198}_{80}$Hg		0+			31T01
$^{199}_{80}$Hg		1/2			31S03
$^{199}_{80}$Hg			±0.547 *2*		40M10
$^{199}_{80}$Hg			+0.532		57Bl10
$^{199}_{80}$Hg			+0.51		61Ag3
$^{199}_{80}$Hg			+0.454		63Sc34
$^{199}_{80}$Hg			±0.506 *3*		67Dr09
$^{200}_{80}$Hg		0+			31S03
$^{200}_{80}$Hg		0+			31T01
$^{201}_{80}$Hg		3/2			31S03
$^{201}_{80}$Hg		3/2	−0.6	+0.5	35S04
$^{201}_{80}$Hg			±0.607		40M10
$^{201}_{80}$Hg				+0.47 *3*	59C34
$^{201}_{80}$Hg			−0.5582 *8*		60Ra27
			$^{201}/_{199}$=1.1090 *7*		
$^{201}_{80}$Hg			−0.504	+0.49	63Sc34
$^{201}_{80}$Hg				+0.45	65Mu15
				+0.41*	
$^{202}_{80}$Hg		0+			31S03
$^{202}_{80}$Hg		0+			31T01
$^{203}_{80}$Hg	47d	5/2	+0.830 *20*	±0.5 *8*	64Re03
$^{204}_{80}$Hg		0+			31S03
$^{204}_{80}$Hg		0+			31T01
$^{195}_{81}$Tl	1.2h		+1.56 *4*		69Go21
$^{197}_{81}$Tl	2.8h		+1.55 *2*		66Da15
$^{199}_{81}$Tl	7.4h		+1.57		61Hu04
$^{200}_{81}$Tl	26h		$\pm \leq 0.15$		61Hu04
$^{201}_{81}$Tl	72h		+1.58		61Hu04
$^{202}_{81}$Tl	12d		$\pm \leq 0.15$		61Hu04
$^{203}_{81}$Tl		1/2			31S02
$^{203}_{81}$Tl		1/2			32J02
$^{205}_{81}$Tl		1/2			31S02
$^{205}_{81}$Tl		1/2			32J02
$^{205}_{81}$Tl			$^{205}/_{203}$=1.00966 *46*		37S12
$^{203}_{81}$Tl			$^{205}/_{203}$=1.0089 *10*		60Od02

Table G: Nuclear Moments by Optical Spectroscopy — Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{206}_{82}$Pb		0[♦]			31M02
$^{206}_{82}$Pb		0[♦]			32K01
$^{207}_{82}$Pb		1/2			31M02
$^{207}_{82}$Pb		1/2			32K01
$^{208}_{82}$Pb		0[♦]			31M02
$^{208}_{82}$Pb		0[♦]			32K01
$^{206}_{83}$Bi	6.3d		+4.50		69Ma43
			$^{206}/_{209}$=+1.104		
$^{209}_{83}$Bi	>2Ay	9/2			28B01
$^{209}_{83}$Bi	>2Ay	9/2	+3.6	−0.4	35S04
$^{209}_{83}$Bi	>2Ay		+4.10 *8*		50K59
$^{209}_{83}$Bi	>2Ay			−0.37 *4*	67Di04
$^{209}_{83}$Bi	>2Ay			−0.379[h] *15*	68Ei04
$^{209}_{83}$Bi	>2Ay		+4.23[n] *10*	−0.4[h] *1*	70Cr01
			+3.7[hp] *5*	−0.79[p] to −20[p]	
$^{209}_{83}$Bi	>2Ay			−0.41 *4*	70Ge10
$^{209}_{84}$Po	103y	1/2			55V16
$^{209}_{84}$Po	103y		+0.77[d]		66Ch27
$^{227}_{89}$Ac	22y	3/2			51T19
$^{227}_{89}$Ac	22y		+1.1 *1*	+1.7 *2*	55F26
$^{229}_{90}$Th	7.3ky	5/2	+0.41 *10*	≈4.6	64Eg01
$^{229}_{90}$Th	7.3ky	5/2	+0.34 *7*		64To02
$^{231}_{91}$Pa	34ky	3/2			34S04
$^{231}_{91}$Pa	34ky	3/2			61Ri06
$^{233}_{92}$U	162ky	5/2	positive	large	54V01
$^{233}_{92}$U	162ky	5/2	$^{233}/_{235}\approx-1.5$		55K36
$^{233}_{92}$U	162ky	5/2	$^{233}/_{235}=-1.6$ *1*	$^{233}/_{235}=+0.8$ *3*	56K53
$^{233}_{92}$U	162ky		positive	positive	56V27
			$^{233}/_{235}=-1.6$	$^{233}/_{235}=+0.80$	
$^{233}_{92}$U	162ky	5/2		+13 *5*	56Z05
$^{233}_{92}$U	162ky		±0.74	±7.9	69Ba52,
					69Be29
$^{233}_{92}$U	162ky		(±0.74)	±4.9	compilers
			(using		
			μ/Q=0.152 *15*		57D40)
$^{235}_{92}$U	710My	7/2			55V07
$^{235}_{92}$U	710My	7/2			56K53
$^{235}_{92}$U	710My	7/2	$^{233}/_{235}=-1.5$	$^{233}/_{235}=+0.7$	57B66
$^{237}_{93}$Np	2.1My	5/2			48T08
$^{239}_{94}$Pu	24ky	1/2			54V06
$^{239}_{94}$Pu	24ky	1/2			55K36
$^{239}_{94}$Pu	24ky	1/2			55K40
$^{239}_{94}$Pu	24ky		+0.27 *6*		60Ch09
$^{239}_{94}$Pu	24ky		+0.21 *6*		62Ge11
$^{239}_{94}$Pu	24ky				63Be16
			±0.207[i] *33* or		(62Ge11)
			±0.175[i] *40*		(62Ko08)
$^{239}_{94}$Pu	24ky		+0.17 *4*		64Ba10
$^{239}_{94}$Pu	24ky		+0.19 *5*		66Ko24

Table G: Nuclear Moments by Optical Spectroscopy – Continued

Nucleus	$T_{1/2}$	I	μ or μ^1/μ^2	Q or Q^1/Q^2	Refer.
$^{241}_{94}$Pu	13y		±0.73 *12* or ±0.62 *15*		63Be16
			$(^{241}/_{239}=3.53\ 2$		54B72)
$^{241}_{94}$Pu	13y			+5.6 *2*	64Ch10
$^{241}_{94}$Pu	13y		-0.673^{E} *15* $^{241}/_{239}=-3.365\ 20$		69Ge04
$^{241}_{95}$Am	460y	5/2			53F01
$^{241}_{95}$Am	460y	5/2		large	56T18
$^{241}_{95}$Am	460y		+1.4 *3*	+4.9	56M31
$^{241}_{95}$Am	460y		$^{241}/_{243}=1.008$		57F53
$^{243}_{95}$Am	8ky	5/2	$^{241}/_{243}=1.00\ 2$		54C19
$^{243}_{95}$Am	8ky		+1.4 *3*	+4.9	56M31
$^{249}_{97}$Bk	314d	7/2			67Wo01
$^{249}_{97}$Bk	314d		±5.1 *7*	±4.7 *10*	69Wo07, 70Co34
$^{253}_{99}$Es	20d	≥7/2			68Wo07
$^{253}_{99}$Es	20d	7/2	+5.1 *13*	±5.1 *10*	70Wo14, 70Co34

* Polarization or Sternheimer correction included
♦ No hyperfine structure observed
[a] Polarization of resonance radiation
[b] Band spectra studied
[c] Recalculation of earlier data
[d] Reexamined spectra of 55V16
[E] Enriched sample
[f] ^{113}In-lines apparently coincident with ^{115}In-lines. Therefore, moments are believed to be the same. Lines 2% as intense as ^{115}In-lines should have been observed
[g] From I-spectra
[h] From II-spectra
[i] Q obtained from deformation which was estimated from isotope shifts
[j] Calculated from data on ionization potentials
[k] Average value of Q's determined for several states
[l] From μ-atom hyperfine structure
[m] Excited state
[n] From III-spectra
[p] From IV-spectra
[q] LASER
[r] From μ-atom nuclear transition

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques

Introduction

In this table, data obtained by several methods involving combinations of optical spectroscopy and magnetic resonance have been collected. Some values obtained from measurements combining optical pumping and nuclear magnetic resonance are tabulated here as well as in Table E.

The possibility of using optical radiation to alter the populations of atomic states in order to study hyperfine structure by magnetic resonance techniques was first discussed in a paper by Brossel and Kastler [49Br65] and later treated more fully in a paper by Kastler [50Ka16].

Most of the optical resonance methods involve three basic features: (1) excitation of an atom from the ground state to a metastable state by resonance radiation to increase the population of certain magnetic substates by choice of appropriate frequency and polarization; (2) observation of radiation either transmitted or scattered at right angles; and (3) application of an oscillating rf or microwave magnetic field to induce a transition between substates, altering their relative populations with a subsequent change in the polarization, frequency, or intensity of the observed radiation.

A schematic diagram of a typical experimental arrangement is shown in figure 1. Light originates in a resonance lamp S. It is focused by lens L and polarized by screen P. The gas in the vessel absorbs and re-emits the resonance radiation. Photocells at the positions PC_1 and PC_2 serve to measure the transmitted or scattered light, respectively. A uniform magnetic field can be applied by a pair of Helmholtz coils and an oscillating magnetic field by coils rf.

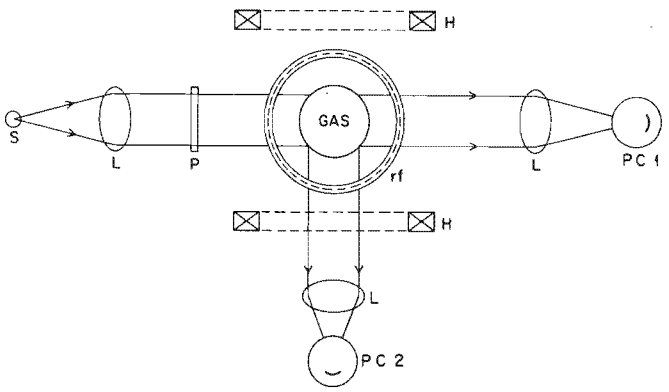

FIGURE 1. One possible arrangement of components of an optical double resonance experiment. Screen P can be used to polarize the resonance radiation from the source S. Photocells PC_1 and PC_2 respond to the transmitted and scattered light, respectively. The Helmholtz coils H produce a magnetic field along the axis of the scattered light, and the rf coils, an oscillating magnetic field perpendicular to the incident and scattered radiation.

One of the first such double resonance experiments was performed by Brossel and Bitter with Hg. The energy levels of the $^1S_0$ and $^3P_1$ states of the even isotopes are shown in figure 2. Absorption of incident plane-polarized, $\pi(\Delta m_J=0)$, resonance radiation of 2537 Å populates the $^3P_1$, $m_J=0$ substate. Application of an oscillating field at resonance frequency, inducing the $\Delta m_J=\pm1$ transitions, will make the circularly polarized, $\sigma(\Delta m_J=\pm1)$, lines appear in the scattered radiation.

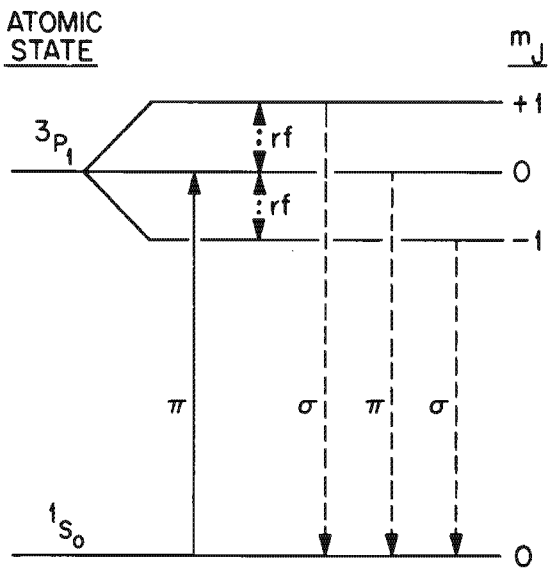

FIGURE 2. An energy level diagram for an even isotope of Hg showing transitions involved in a typical optical double resonance experiment. The levels shown are the $^1S_0$ and $^3P_1$ states as split by a magnetic field. The solid arrow indicates the optical absorption process while the broken arrows represent possible emission processes. Dotted arrows represent the induced rf transitions.

The optical pumping type of experiment is illustrated by the diagram for ^{199}Hg in figure 3. Absorption of incident, circularly polarized, $\sigma^+(\Delta m_F=+1)$, radiation of the appropriate energy selectively populates the $^3P_1$, $F=^1/_2$, $m_F=+^1/_2$ level which decays by π and σ emission to the $+^1/_2$ and $-^1/_2$ ground substates, respectively. Since the $m_F=+^1/_2$ state cannot absorb the σ^+ radiation, the $-^1/_2$ state is gradually depleted and the atoms are "pumped" into the upper state. When the atoms have been oriented in this manner, the application of an rf field to induce the $+^1/_2 \rightarrow -^1/_2$ transition in the ground state will produce an increase in the absorption and scattering of the σ^+ light.

In a variation of the optical pumping method, a mixture of two gases or vapors is used. If one of these is optically oriented, it is found that the second gas will become oriented by collisions with the atoms of the first gas by means of a spin-exchange process. A magnetic resonance experiment per-

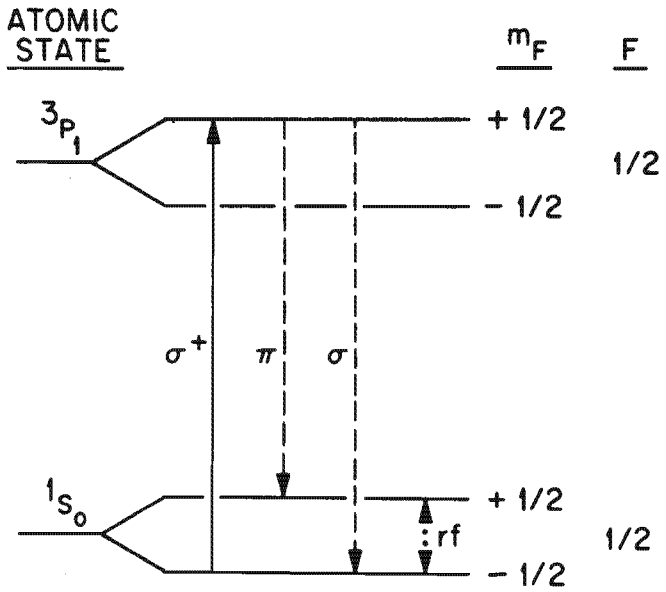

FIGURE 3. An energy level diagram showing the transitions involved in a typical optical pumping experiment. The levels shown are the $^1S_0$ and $^3P_1$, $F=1/2$, states of $^{199}Hg(I=1/2)$. The solid arrow represents the absorption process while the broken arrows represent the two possible emission processes. The dotted arrow represents the induced rf transition. Transitions to the $F=3/2$ state are not shown.

formed on the second gas results in a disorientation of the first gas. The existence of the resonance for the second gas is then observed as a change in the transmission of the resonant radiation for the first gas.

In level crossing experiments, the vapor or gas is illuminated while in a homgeneous but variable magnetic field. When the magnetic field is adjusted to a value for which two levels cross, a change in the angular distribution of the resonant radiation can be observed depending on the nature of the radiation used and the m_F-values of the levels. At a field such as H_1, figure 4, the resonant radiation will be made up of the transitions CA or BA. when the levels cross or approach degeneracy (a level separation less than the natural line-width) such as at field H_2, figure 4, the scattering is from a single state, made up of a combination of the two interfering levels, and there is a change in the scattering amplitudes. Since in this type of experiment no rf or microwave radiation is needed to induce transitions between the sublevels because the energy difference of the levels is zero, it has been called a double resonance experiment at zero frequency. This technique was first used by Colegrove *et al.*

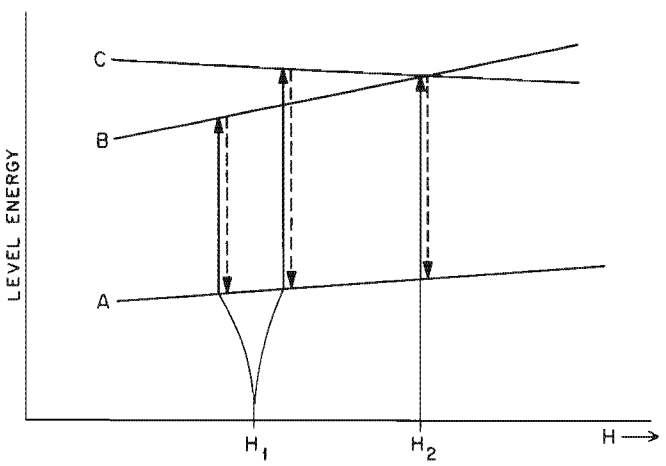

FIGURE 4. Diagram of the transitions in a level crossing experiment. Curves A, B, and C show the field dependence of the energies for the ground-state level *A* and two excited states *B* and *C*. Solid arrows indicate induced transitions; dashed arrows, the emitted radiation.

[59Co92] to measure the fine-structure separation of the $^3P_1$ and $^3P_2$ levels in helium. Additional information on the interference or coherence effects in resonance fluorescence can be found in papers by Franken [61Fr11] and by Rose and Carovillano [61Ro32].

In these experiments the interaction constants and hyperfine-structure splittings for the atomic states can be found from the energy differences (determined by the frequencies of the applied rf fields) of the hyperfine levels if transitions can be induced between them at known fields. A simple discussion of the energies of the atomic levels and the calculation of the nuclear moments from the hyperfine constants can be found in the Introduction to Table F: Nuclear Moments by Atomic and Molecular Beams.

There are many variations of double resonance techniques. In some experiments, electron bombardment is used to excite the atoms; in others, variable Zeeman scanning is used to alter the energy of the radiation emitted by the source. General discussions of optical orientation and its applications can be found in papers by Bell and Bloom [57Be36], Kopfermann [60Ko20], Dodd and Series [61Do10], Skrotskii and Izyumova [61Sk3], Bitter [62Bi21], Cohen-Tannoudji and Kastler [66Co42], and Budick [67Bu26]; as well as in the papers already referred to.

The last systematic literature search for the information included in the table was in early 1971.

Explanation of Table H

Nucleus	Chemical symbol with Z– and A–numbers States, other than ground states, are designated by "m" following the A–number.
$T_{1/2}$	Half–life of radioactive nucleus
I	Nuclear spin, in units of $h/2\pi$
μ	Nuclear magnetic dipole moment, in nuclear magnetons, given with diamagnetic correction. See Policies, Diamagnetic corrections, for factors used A 5% uncertainty in the diamagnetic correction is assumed. Values of μ, which are calculated from $\Delta\nu$– or a–ratios, do not include a hyperfine–structure anomaly correction. This correction can be of the order of 0.001% to 1%. See [70FuCo].
Q	Nuclear electric quadrupole moment, in barns, as given by the experimenter Values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer corrections in computing the moment.
Method	Symbols used to designate the various techniques are as follows: DR Optical double resonance EI Electron impact LX Level crossing OP Optical pumping SE Spin exchange
Refer.	Reference key
Atomic State:	Atomic state for which the hyperfine–structure splitting and interaction constants are listed
F,F'	Total angular momentum quantum numbers which characterize hyperfine levels of the atomic state at zero magnetic field
$\Delta\nu(F,F')$	Zero–field hyperfine–structure splitting between levels of total spin F and F', given without sign Values are given in MHz unless otherwise noted
Interaction Constants	Values of the interaction constants as given by the experimenter Values are given in MHz unless otherwise noted. See Introduction to Table F for discussion of interaction constants.

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{1}_{1}H$					SE 62Pi04	$^{2}S_{1/2}$:1,0	1420.405738 *6*	
$^{2}_{1}H$					SE 60An13	$^{2}S_{1/2}$:$^{3}/_{2}$,$^{1}/_{2}$	327.384347 *5*	
$^{2}_{1}H$					OP 68Ha24	$^{2}S_{1/2}$:$^{3}/_{2}$,$^{1}/_{2}$	327.3843526 *12*	
$^{2}_{1}H$					SE 69La29	$^{2}S_{1/2}$:$^{3}/_{2}$,$^{1}/_{2}$	327.38435251 *5*	
$^{3}_{1}H$	12y				SE 62Pi04	$^{2}S_{1/2}$:1,0	1516.701464 *6*	
$^{3}_{2}He$					LX 66Ge06	$2^{3}P$		a=−4283.5
$^{3}_{2}He$					EI 69Jo27	$3^{3}P$:J=1,F=$^{3}/_{2}$↔ J=2,F=$^{3}/_{2}$	6058	
$^{3}_{2}He$					OP 70Ro16	$2^{3}S_{1}$:$^{3}/_{2}$,$^{1}/_{2}$	6739.701177 *16*	
$^{3}_{2}He^{+}$					SE 69Sc26	$^{2}S_{1/2}$:1,0	8665.649867 *10*	
$^{6}_{3}Li$					DR 65Ri03	$2^{2}P_{1/2}$:$^{3}/_{2}$,$^{1}/_{2}$	26.0 *3*	a=17.3 *2*
$^{6}_{3}Li$					SE 69Wr01	$^{2}S_{1/2}$:$^{3}/_{2}$,$^{1}/_{2}$	228.205261[i] *12*	in He,Ne,Ar
$^{6}_{3}Li^{+}$					EI 69Ad11	$2^{3}P_{1}$:2,1	2880 *5*	
$^{7}_{3}Li$					DR 65Ri03	$2^{2}P_{1/2}$:2,1	93.3 *10*	a=46.65 *50*
$^{7}_{3}Li$				−0.03 *2*	LX 67Br05	$2^{2}P_{3/2}$		a=−3.40 *23*
								b=−0.18 *12*
$^{7}_{3}Li$				−0.039*[c] *26*	LX 69Ly05	$2^{2}P_{3/2}$		
$^{7}_{3}Li$				−0.0117**123*	LX 69Is05	$3^{2}P_{3/2}$		a=−0.965 *20*
								b=−0.019 *22*
$^{7}_{3}Li$					SE 69Wr01	$^{2}S_{1/2}$:1,0	803.504094[i] *25*	in He, Ne, Ar
$^{7}_{3}Li$				+0.00073[c]	LX 71Am02	$3^{2}P_{3/2}$		
				−0.0013*[c]				
$^{7}_{3}Li$					LX 71Ha70	$2^{2}P_{3/2}$		a=−3.01 *5*
						$3^{2}P_{3/2}$		a=−0.98 *4*
								b=−0.09 *1*
$^{8}_{3}Li$	0.85s	2	±1.653[j]		SE 71Ot04	$^{2}S_{1/2}$:$^{5}/_{2}$,$^{3}/_{2}$	382.542[j] *15*	
$^{14}_{7}N$					SE 59An34	$^{4}S_{3/2}$:$^{5}/_{2}$,$^{3}/_{2}$ $^{3}/_{2}$,$^{1}/_{2}$	26.12721 *18* 15.67646 *12*	a=+10.45091 *7* b=−0.00005 *8*
$^{14}_{7}N$					SE 62Ho17	$^{4}S_{3/2}$:$^{5}/_{2}$,$^{3}/_{2}$ $^{3}/_{2}$,$^{1}/_{2}$	26.127288[i] *40* 15.676390[i] *40*	a=10.450925[f] *20* b=7[f] *20*Hz
$^{14}_{7}N$					SE 70We11	^{4}S		a=10.4509294[i] *18* b=1.3‡5Hz
								‡b is independent of T and P
$^{15}_{7}N$					SE 59An34	$^{4}S_{3/2}$:2,1	29.29136 *16*	a=−14.64568 *8*
$^{15}_{7}N$					SE 62Ho17	$^{4}S_{3/2}$:2,1	29.290902[i] *40*	a=14.645441[f] *20*
$^{15}_{7}N$					SE 62La1	$^{4}S_{3/2}$:2,1	29.290913 *15*	
$^{20}_{11}Na$	408ms	2	±0.3694[j] *10*		SE 70Bo47 71Ot04	$^{2}S_{1/2}$:$^{5}/_{2}$,$^{3}/_{2}$	276.6[j] *3*	^{20}Ne(d,)
$^{21}_{11}Na$	23s	3/2	±2.46[j] *8*		SE 69Ko10 71Ot04			^{20}Ne(d,)
$^{23}_{11}Na$				+0.10 *6*	DR 54S34	$^{2}P_{3/2}$:3,2 2,1	61 *2* 36.6 *20*	a=19.5 *6* b=2.4 *14*
$^{23}_{11}Na$					OP 58A06	$^{2}S_{1/2}$:2,1	1771.6262 *1*	
$^{23}_{11}Na$				+0.13 *4*	DR 58K69			
$^{23}_{11}Na$					DR 60Ar9	$^{2}D_{5/2}$		a<0.33
$^{23}_{11}Na$				+0.097 *13*	DR 60Do1	$3^{2}P_{3/2}$		a=18.5 *6*
								b=2.25 *40*, b/a>0
$^{23}_{11}Na$				±0.146[b] *20*	DR 66Ac01	$3^{2}P_{3/2}$		a=18.7 *4*
				±0.145 *17*		(using $a(P_{1/2})$ and b)		b=3.4 *4*
$^{23}_{11}Na$				±0.138[b] *25*	DR 66Ba20	$3^{2}P_{3/2}$		a=18.5^{+6}_{-2}
								b=3.2 *5*
$^{23}_{11}Na$					LX 68Co21	$3^{2}P_{3/2}$		a=18.5 *4*
								b=3.0 *6*

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques – Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{23}_{11}$Na					OP 68Ma57	$^2S_{1/2}$:2,1	1771.626150[p] *50*	
$^{23}_{11}$Na				±0.121[b] *14*	LX 68Sc12	$3^2P_{3/2}$		a=18.65 *10*
				±0.097*				b=2.82 *30*
				±0.114[b] *12*	LX	$4^2P_{3/2}$		a=6.006‡ *30*
				±0.095*				b=0.86‡ *9*
							‡Assumed g_F=1.334	
$^{23}_{11}$Na				+0.124[b] *15*	LX 69Ba27	$3^2P_{3/2}$		a=18.80‡ *15*
								b=2.9‡ *3*
							‡Assumed g_F=1.3344 *4*	
$^{23}_{11}$Na					DR 70Ha59	$3^2P_{1/2}$		a=94.3 *2*
$^{23}_{11}$Na				±0.109*[b] *3*	LX 70Ma32	$3^2P_{3/2}$		a=19.74 *5*
								b=3.34 *4*
$^{23}_{11}$Na				±0.095[b] *20*	LX 70Sc33	$3^2P_{3/2}$		a=18.9 *3*
								b=2.4 *3*
						$4^2P_{3/2}$		a=6.2 *2*
								b=1.0 *1*
$^{23}_{11}$Na				±0.102*[c] *12*	LX 71St12	$3^2P_{3/2}$		
				±0.100*[c] *11*	(68Sc12)	$4^2P_{3/2}$		
$^{27}_{13}$Al					LX 66Bu15	$^2D_{5/2}$		a=182.1 *15*
								b=13.1 *30*, $b/a<0$
$^{27}_{13}$Al					LX 70St26	$^2D_{5/2}$		a=204‡ *3*
							‡For g_F=1.2	$\lvert b/a\rvert\leq 0.2$
						$^2D_{3/2}$		a=72‡ *8*
							‡For g_F=0.8	$\lvert b/a\rvert\leq 0.3$
$^{31}_{15}$P					SE 62La26	$^4S_{3/2}$		a=+55.055691[i] *8*
$^{31}_{15}$P					64Be42	$^4S_{3/2}$	expect $a<0$, unless exchange polarization model breaks down	
$^{36}_{19}$K	245ms	2	±0.548[i] *3*		SE 73Sc36			^{36}Ar(p,)
$^{37}_{19}$K	1.2s	3/2	+0.20320 *6*		SE 71Vo03	$^2S_{1/2}$:2,1	240.2672 *7*	^{36}Ar(d,)
$^{39}_{19}$K			+0.40 *2*	+0.11 *2*	DR 57R37	$5^2P_{3/2}$		a=1.97 *1*
								b=1.7 *3*, $b/a>0$
$^{39}_{19}$K					OP 60Bl15	$^2S_{1/2}$:2,1	461.719690 *30*	
$^{39}_{19}$K					DR 61Fo11	$5^2P_{1/2}$		a=8.99 *15*
$^{39}_{19}$K				±0.056[p] *22*	LX 67Ba64			
$^{39}_{19}$K					LX 68Sc09	$4^2P_{3/2}$		a=6.0 *1*
								b=2.9 *2*
				±0.053* *8*		$5^2P_{3/2}$		a=1.95 *5*
				±0.057 *4*				b=0.92 *10*
$^{39}_{19}$K				±0.0625[b] *24*	LX 69Ne03	$4^2P_{3/2}$		a=6.13 *5*
								b=2.72 *12*
				±0.061[b] *14*		$5^2P_{3/2}$		a=1.97 *2*
								b=0.85 *3*
$^{39}_{19}$K				+0.053*[c]	LX 70Fi17	$4^2P_{3/2}$		
				+0.053*[c]	(69Ne03)	$5^2P_{3/2}$		
$^{39}_{19}$K					DR 71Ch61	$6^2S_{1/2}$:2,1	45.8 *2*	
$^{39}_{19}$K				+0.049*[c] *4*	LX 71St12			
					(68Sc09)			
$^{40}_{19}$K	1.3Gy			−0.093[E] *25*	DR 62Bu10	$5^2P_{3/2}$: $^{11}/_2$, $^9/_2$	7.68 *30*	a=−2.45 *5*
				−0.078[EI] *25*		$^7/_2$, $^5/_2$	14.38 *12*	b=−1.31 *33*
$^{40}_{19}$K	1.3Gy			−0.07*[bE]	LX 68Ne05	$4^2P_{3/2}$		a=−7.59 *6*
								b=−3.5 *5*
						$5^2P_{3/2}$		a=−2.45 *2*
								b=−1.1 *2*

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques– Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{40}_{19}$K	1.3Gy			−0.068*[c]	LX 70Fi17	$4^2P_{3/2}$		
				−0.069*[c]	(68Ne05)	$5^2P_{3/2}$		
$^{40}_{19}$K	1.3Gy			−0.067*[c] *10*	LX 71St12	$4^2P_{3/2}$		
				−0.067*[c] *12*	(68Ne05)	$5^2P_{3/2}$		
$^{41}_{19}$K					OP 60Bl15	$^2S_{1/2}$:2,1	254.013870 *35*	
$^{41}_{19}$K				±0.0761[b] *36*	LX 69Ne03	$4^2P_{3/2}$		*a*=3.40 *8*
								b=3.34 *24*
				±0.0760[b] *15*		$5^2P_{3/2}$		*a*=1.08 *2*
								b=1.06 *4*
$^{41}_{19}$K				+0.065*[c]‡	LX 70Fi17		‡Using Q^{41}/Q^{39}=1.2173	
$^{41}_{19}$K				+0.060*[c]‡ *5*	LX 71St12		‡Using Q^{41}/Q^{39}=1.2173	
$^{43}_{20}$Ca				<±0.23	LX 69Kl03	$^1P_1$		*a*=−15.3 *4*
								b<±12
$^{53}_{24}$Cr					DR 66Bu01	$^7P_4(3d^54p)$		*a*=11.60 *15*
						$^7P_3(3d^54p)$		*a*≤1.5 *20*
						$^7P_2(3d^54p)$		*a*=26.16 *10*
						$^7P_3(3d^44s4p)$		*a*=70.4 *26*
$^{55}_{25}$Mn				±0.40 *2*	LX 69Ha22	$z^6P_{7/2}$		*a*=429.059[f] *43*
								b=63.86[f] *90*
								c=0.030[f] *59*
						$z^6P_{5/2}$		*a*=467.410[f] *13*
								b=−73.46[f] *19*
								c=−0.029[f] *26*
						$z^6P_{3/2}$		*a*=571.85 *80*
								b=11.5 *56*
$^{55}_{25}$Mn					SE 71Da36	$^6S_{5/2}$		*a*=−72.420836[p] *15*
								b=−19031[p] *17*Hz
								c=−0.7[p] *10*Hz
								d<0.25; *e*<0.02Hz
$^{63}_{29}$Cu				negative	LX 66Bu14	$^2P_{3/2}$		*a*=195 *2*
								b=41 *8*, *b*/*a*<0
$^{63}_{29}$Cu					LX 66Ne05	$^2P_{3/2}$		*a*=+194.72 *15*
				−0.25		(using a($^2P_{1/2}$) and b)		*b*=−28.8 *6*
$^{63}_{29}$Cu					LX 67Bu10	$^4P_{3/2}$		*a*=+2140.0 *23*
								b=−37.9 *2*
$^{63}_{29}$Cu				−0.315‡ *12*	LX 68Bu16	$^2P_{3/2}$		*a*=195.23 *25*
				−0.235† *10*				*b*=28.75 *70*
								b/*a*<0
							‡Used $<r^{-3}>=1.29a_o^{-3}$	
							†From D-levels, with corrections	
$^{63}_{29}$Cu				−0.211*[cl] *4*	69St24			
$^{63}_{29}$Cu				−0.210*‡ *4*	LX 70Fi17		‡Using Q^{63}/Q^{65}=1.0805	
$^{65}_{29}$Cu					LX 66Bu14	$^2P_{3/2}$		*a*=210 *2*
								b=35 *8*, *b*/*a*<0
$^{65}_{29}$Cu					LX 66Ne05	$^2P_{3/2}$		*a*=+208.57 *15*
				−0.22		(using a($^2P_{1/2}$) and b)		*b*=−25.9 *6*
$^{65}_{29}$Cu					LX 67Bu10	$^4P_{3/2}$		*a*=+2292.3 *25*
								b=−35.0 *2*
$^{65}_{29}$Cu				−0.161[c] *3*	67St29	$^2D_{5/2}$		
			or	−0.196*[c] *4*	(67Fi02)	(atomic spectra)		
				−0.228[c] *5*	(LX 67Bu10)	$^2P_{3/2}$		
			or	−0.194*[c] *4*				
			ave	−0.195* *4*				
$^{65}_{29}$Cu				−0.194*[c] *4*	LX 70Fi17 (66Ne05)	$4^2P_{3/2}$		

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques – Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{63}_{30}$Zn	38m	3/2	−0.28156* *5*	+0.29[i] *3*	DR 69La05	$^3P_1$		a=−326.57[f] *4*
								b=−34.46[f] *3*
								Q^{63}/Q^{67}=1.8347 *13*
$^{65}_{30}$Zn	245d	5/2	+0.7692 *2*	−0.024 *2*	DR 64By01	$^3P_1$:$^7/_2$,$^5/_2$	1875.475 *6*	a=+535.163[f] *2*
						$^5/_2$,$^3/_2$	1334.123 *6*	b=+2.870[f] *5*
								Q^{65}/Q^{67}=−0.1528 *3*
$^{65}_{30}$Zn	245d				LX 64La08	$^3P_1$		b=+2.867[f]‡ *12*
								Q^{65}/Q^{67}=−0.1527 *8*
							‡Used a-value of 64By01	
$^{67}_{30}$Zn				+0.18 *2*	DR 57Bl10	$^3P_1$:$^7/_2$,$^5/_2$	2111.13 *12*	a=608.99 *5*
						$^5/_2$,$^3/_2$	1551.54 *10*	b=−19.37 *9*
$^{67}_{30}$Zn					DR 62Lu04	$^3P_1$		a=609.15[cf]
								b=−18.8[cf]
$^{67}_{30}$Zn					DR 64By01	$^3P_1$:$^7/_2$,$^5/_2$	2111.300 *3*	a=609.086[f] *2*
						$^5/_2$,$^3/_2$	1551.565 *4*	b=−18.782[f] *8*
$^{67}_{30}$Zn					LX 64La08	$^3P_1$		b=−18.770[f]‡ *12*
							‡Used a-value of 64By01	
$^{67}_{30}$Zn			±0.87524 *11*		OP 67Sp04	(^{67}Zn vapor; mineral oil)		$\nu^{67}/\nu(^1H)$=
								0.0625241 *6*
$^{67}_{30}$Zn			±0.87524 *11*		OP 67Sp11	(^{67}Zn+^{111}Cd cell)		$\nu^{67}/\nu(^{111}Cd)$=
								0.295228 *2*
$^{67}_{30}$Zn				+0.150[c] *15*	DR 69La05	$^3P_{2,1}$		
$^{85}_{37}$Rb				+0.295 *20*	DR 55Me07	$6^2P_{3/2}$:4,3	39.35 *15*	a=8.16 *6*
						3,2	20.67 *20*	b=8.40 *40*
						2,1	9.79 *20*	
$^{85}_{37}$Rb					DR 61Bu02	$6^2P_{3/2}$:4,3	39.275 *48*	a=8.178 *9*
						3,2	20.812 *61*	b=8.199 *40*
						2,1	9.824	
$^{85}_{37}$Rb				±0.298[bE] *1*	DR 65Sc08	$5^2P_{3/2}$		a=25.029 *16*
				or ±0.247*[bE]				b=26.032 *70*
				±0.283[bE] *8*		$6^2P_{3/2}$		a=8.25 *10*
								b=8.16 *20*
				or ±0.254*[E]		(from b and fine structure separation)		
$^{85}_{37}$Rb					LX 66Bu17	$6^2P_{3/2}$		a=8.163‡ *4*
								b=8.19‡ *3*
							‡Assumed g_J=1.334	
$^{85}_{37}$Rb			+1.3524 *2*		OP 67Ba47	$^2S_{1/2}$		g_I/g_J=
								−1.46648x10^{-4} *8*
$^{85}_{37}$Rb				+0.316 *7*	DR 68Bu06	$7^2P_{3/2}$:4,3	17.78 *4*	a=3.71 *1*
				or +0.267* *6*				b=3.68 *8*
$^{85}_{37}$Rb					DR 68Fe01	$7^2P_{1/2}$:3,2	52.95 *6*	a=17.65 *2*
$^{85}_{37}$Rb			±1.3524 *2*		OP 68Wh01			g_I/g_J=
								1.4664908x10^{-4}[g] *30*
								g^{85}/g^{87}=
								0.2950736 *7*
$^{85}_{37}$Rb				+0.316 *20*	DR 68Zu01	$8^2P_{3/2}$:4,3	9.55 *6*	a=1.99‡ *2*
				or +0.270* *17*				b=1.98‡ *12*
							‡Used known μ- and Q-ratios to determine a and b from $\Delta\nu$	
$^{85}_{37}$Rb				±0.330[cp]	DR 68Zu03	$5^2P_{3/2}$		
				±0.317[cp]	(65Sc08)	$6^2P_{3/2}$		
$^{85}_{37}$Rb				+0.260*‡ *2*	70Fi17		‡Using Q^{85}/Q^{87}=2.0669	
$^{85}_{37}$Rb					DR 71Ch61	$7^2S_{1/2}$:3,2	271 *15*	
$^{85}_{37}$Rb				+0.263*‡ *2*	71St12		‡Using Q^{85}/Q^{87}=2.0669	
$^{85}_{37}$Rb					DR 72Ch57	$5^2D_{3/2}$		a=8[p] *3*
$^{85}_{37}$Rb					DR 72Gu26	$7^2S_{1/2}$:3,2	278[p] *5*	

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques – Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{87}_{37}$Rb	47Gy			+0.143 *10*	DR 55Me07	$6^2P_{3/2}$:3,2	86.95	a=27.63‡ *10* b=4.06‡ *20*
							‡Used known ratios g^{87}/g^{85}=3.388 and b^{85}/b^{87}=2.0669	
$^{87}_{37}$Rb	47Gy				OP 58B99	$^2S_{1/2}$:2,1	6834.682608 *7*	
$^{87}_{37}$Rb	47Gy				DR 61Bu02	$6^2P_{3/2}$:3,2	87.122 *43*	a=27.707 *15*
						2,1	51.418 *31*	b=4.000 *39*
						1,0	23.696 *97*	
$^{87}_{37}$Rb	47Gy				OP 61Ca22	$^2S_{1/2}$:2,1	6834.682590 *70*	
$^{87}_{37}$Rb	47Gy				DR 63Bu13	$5^2P_{3/2}$:3,2	267.17 *15*	a=84.853 *30*
						2,1	157.09 *10*	b=12.611 *70*
						1,0	72.25 *20*	
$^{87}_{37}$Rb	47Gy			±0.144[bE] *1*	DR 65Sc08	$5^2P_{3/2}$		a=84.852 *30*
				or 0.120*[bE]				b=12.611 *70*
				±0.137[bE] *4*		$6^2P_{3/2}$		(a=27.96 *35*)
								b=3.95 *10*
				±0.123*[E]		(from b and fine structure separation)		
$^{87}_{37}$Rb	47Cy			+0.138[E] *1*	DR 65Zu01	$6^2P_{3/2}$:3,2	87.04 *3*	a=27.70 *2*
				+0.114*[E] *1*		2,1	51.46 *2*	b=3.94 *4*
						1,0	23.75 *6*	
$^{87}_{37}$Rb	47Gy				LX 66Bu17	$6^2P_{3/2}$		a=27.61‡ *4*
								b=3.91‡ *7*
							‡Assumed g_J=1.334	
$^{87}_{37}$Rb	47Gy		+2.7500 *5*		OP 67Ba47	$^2S_{1/2}$		g_I/g_J= -4.96997×10^{-4} *9*
$^{87}_{37}$Rb	47Gy			+0.147 *2*	DR 68Bu06	$7^2P_{3/2}$:3,2	39.43 *2*	a=12.57 *1*
				or +0.124* *2*		2,1	23.43 *3*	b=1.71 *3*
						1,0	10.87 *4*	
$^{87}_{37}$Rb	47Gy		±2.7499 *5*		OP 68Wh01			g_I/g_J= 4.9699147×10^{-4} *50*
$^{87}_{37}$Rb	47Gy			+0.153 *9*	DR 68Zu01	$8^2P_{3/2}$:3,2	21.20 *4*	a=6.75‡ *3*
				or +0.131* *8*				b=0.96‡ *6*
							‡Used known μ- and Q-ratios to determine a and b from $\Delta\nu$	
$^{87}_{37}$Rb	47Gy			±0.160[cp]	DR 68Zu03	$5^2P_{3/2}$		
				±0.153[cp]	(65Sc08)	$6^2P_{3/2}$		
$^{87}_{37}$Rb	47Gy				70Fi17			
				+0.126*[c] *1*	DR (65Sc08)	$5^2P_{3/2}$		
				+0.126*[c] *1*	DR (65Zu01)	$6^2P_{3/2}$		
				+0.124*[c] *2*	DR (68Bu06)	$7^2P_{3/2}$		
$^{87}_{37}$Rb	47Gy				DR 71Ch61	$7^2S_{1/2}$:2,1	565 *40*	
$^{87}_{37}$Rb	47Gy			+0.127*‡ *1*	71St12		‡Average value	
				±0.127*[c] *1*	DR (65Sc08)	$5^2P_{3/2}$		
				±0.127*[c] *1*	DR (65Zu01)	$6^2P_{3/2}$		
				±0.123*[c] *2*	DR (68Bu06)	$7^2P_{3/2}$		
				±0.129*[c] *8*	DR (68Zu01)	$8^2P_{3/2}$		
$^{87}_{37}$Rb	47Gy				DR 72Ch57	$5^2D_{3/2}$		a=23[p] *5*
$^{87}_{37}$Rb	47Gy				DR 72Gu26	$7^2S_{1/2}$:2,1	623[p] *7*	
$^{87}_{38}$Sr				+‡0.36 *3*	DR 63Zu04	5^3P_1:$^{11}/_2$,$^9/_2$ $^9/_2$,$^7/_2$	1463.149 *6*	a=−‡260.084 *2*
							130.264 *6*	b=−‡35.658 *6*
							‡Sign from optical spectroscopy data	
$^{89}_{39}$Y					LX 70Be59	$z^2F_{5/2}$	For g_J=0.854	a=23.8 *4*
						$z^2F_{7/2}$	For g_J=1.148	a=84.08 *1*

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{105}_{46}$Pd					LX 68Bu04	$^3P_1$		a=132 *6* b/a=−1.1 *5*
$^{107}_{47}$Ag					LX 66Bu18	$^2P_{3/2}$		a=28 *4*
$^{109}_{47}$Ag					LX 72Mo48	$5^2P_{3/2}$		a=36 *4*
$^{105}_{48}$Cd	5.5m	5/2	−0.7385[a] *2*	+0.43[l] *4*	DR 69La06	$^3P_1$		a=−1025.9[f] *2* b=−103.9[f] *3*
$^{107}_{48}$Cd	6.7h	5/2	−0.6155[a] *8*	+0.77[cl] *10*	DR 63By02	$^3P_1$		a=−854.2 *10* b=−166 *3*
$^{107}_{48}$Cd	6.7h		−0.61447[a] *15*	+0.68[cl] *7*	LX 63Th06 69La06	$^3P_1$		a=−853.543[f] *6* b=−163.279[f] *5*
$^{107}_{48}$Cd	6.7h		±0.61444 *15*		OP 66Mc17 68Mc20	(Cd vapor; mineral oil) (^{107}Cd+^{111}Cd cell)		$\nu/\nu(^1H)$= 0.0437924 *20* $\nu/\nu(^{111}Cd)$= 0.20678100 *22*
$^{109}_{48}$Cd	470d	5/2	−0.8276[a] *15*	+0.78 *10*	DR 63Mc11	$^3P_1$		a=−1148.6 *20* b=−167.3 *20*
$^{109}_{48}$Cd	470d				LX 63Th06	$^3P_1$		a=−1148.784[f] *7* b=−165.143[f] *5*
$^{109}_{48}$Cd	470d		±0.82701 *20*		OP 66Mc17 68Mc20	(Cd vapor; mineral oil) (^{109}Cd+^{111}Cd cell)		$\nu/\nu(^1H)$= 0.0589435 *20* $\nu/\nu(^{111}Cd)$= 0.27832106 *28*
$^{109}_{48}$Cd	470d		±0.82701 *20*		OP 68Le08	(^{111}Cd+^{109}Cd cell)		ν^{111}/ν^{109}= 3.5929795 *20*
$^{109}_{48}$Cd	470d			+0.69[c] *7*	69La06	$^3P_1$		
$^{111}_{48}$Cd					DR 62La24	$^3P_1$:$^3/_2$,$^1/_2$	6185.72 *2*	
$^{111}_{48}$Cd					DR 63La12	$^3P_1$		a=−4123.81 *1*
$^{111}_{48}$Cd					LX 64Lu04	$^1P_1$		a=±186 *4*
$^{111}_{48}$Cd			±0.59429 *14*		OP 66Le21	(^{111}Cd+^{199}Hg cell)		$\nu/\nu(^{199}Hg)$= 1.1879850 *5*
$^{111}_{48}$Cd			±0.59429 *14*		OP 66Mc16 68Mc20	(Cd vapor; mineral oil)		$\nu/\nu(^1H)$= 0.2117831 *6*
$^{111}_{48}$Cd					OP 69Le10	5^1P_1		a positive
$^{111m}_{48}$Cd	49m	11/2	−1.1040[a] *4*	−0.85[l] *9*	DR 69La06	$^3P_1$		a=−697.1[f] *2* b=+202.3[f] *5*
$^{113}_{48}$Cd	>3Jy				DR 62La24	$^3P_1$:$^3/_2$,$^1/_2$	6470.79 *2*	
$^{113}_{48}$Cd	>3Jy		±0.62167 *15*		OP 67Le22	(^{111}Cd+^{113}Cd cell)		ν^{113}/ν^{111}= 1.0460840 *2*
$^{113}_{48}$Cd	>3Jy		±0.62167 *15*		OP 66Mc16 68Mc20	(Cd vapor;mineral oil)		$\nu/\nu(^1H)$= 0.221543 *2* ν^{113}/ν^{111}= 1.04608417 *24*
$^{113}_{48}$Cd	14y	11/2	−1.0875[a] *3*	−0.71[l] *7*	DR 64By03 69La06	$^3P_1$:$^{13}/_2$,$^{11}/_2$ $^{11}/_2$,$^9/_2$	4310.572 *5* 3949.625 *7*	a=−686.0425[f] *8* b=+169.047[f] *9*
$^{113m}_{48}$Cd	14y		−1.0867 *3*		OP 69Ch07	(^{113}Cd+^{111}Cd cell)		ν^{113m}/ν^{111}= 0.16623263 *10*
$^{115}_{48}$Cd	2.3d	1/2	−0.6462 *3*		DR 64Mc06	$^3P_1$		a=−4484 *2*
$^{115}_{48}$Cd	2.3d		−0.64777 *15*		OP 69Ch07	(^{115}Cd+^{111}Cd cell)		ν^{115}/ν^{111}= 1.0900002 *12*
$^{115m}_{48}$Cd	43d	11/2	−1.0424[a] *10*	−0.55[l] *6*	DR 64Mc06 69La06	$^3P_1$		a=−657.6 *6* b=+131 *6*
$^{115m}_{48}$Cd	43d		−1.0400 *25*		OP 69Ch07	(^{115}Cd+^{111}Cd cell)		ν^{115m}/ν^{111}= 0.15908842 *6*

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{113}_{49}$In and $^{115}_{49}$In					LX 69Br09	$5^2D_{3/2}$		$a=\pm64.5$‡ *10* $b/a=-0.59$ *17*
						$6^2D_{3/2}$		$a=\pm72.1$‡ *3* $b/a=-0.47$ *5*
							‡Assumed $g_F=0.8$	
$^{113}_{49}$In and $^{115}_{49}$In					LX 70Zi06	$5^2D_{5/2}$	For $g_F=1.2$	$a=148$ *8* $b/a\leq0.3$ β‡$=1.9$ *4*
							‡Stark coefficient in MHz/(kV/cm)^2	
$^{117}_{50}$Sn					LX 67Br24	$^3P_1^\circ$		$a^{117}/a^{119}=0.9555$ *3*
$^{129}_{54}$Xe					EI 69Jo26	$5d[7/2]_4$		$a=-583.571^p$ *2*
$^{129}_{54}$Xe					LX 69Le02	$5d[5/2]_2^\circ$		$a=829.5$ *8*
$^{131}_{54}$Xe			±0.6913 *23*		‡ 67Ha33		‡"Electron–pumping." NMR observed by change in radiation when aligned nuclei bombarded by electrons	
$^{131}_{55}$Cs	10d			−0.572* *10*	LX 68Ac01	$6^2P_{3/2}$		$a=+96.54$ *30* $b=-91.6$ *16*
$^{131}_{55}$Cs	10d			−0.691 *9*	DR 69Sc15	$7^2P_{3/2}$:4,3	104.0 *2*	$a=+31.73$ *6*
				−0.57* *1*		3,2	108	$b=-28.63$ *35*
						2,1	86.4 *3*	
$^{131}_{55}$Cs	10d			−0.575*‡ *6*	71St12		‡Weighted average	
				−0.583*[c] *10*	LX (68Ac01)	$6^2P_{3/2}$		
				−0.570*[c] *8*	LX (68Ac01)	$7^2P_{3/2}$		
$^{132}_{55}$Cs	6.2d			+0.459* *10*	LX 68Ac01	$6^2P_{3/2}$		$a=+75.75$ *60* $b=+73.35$ *160*
$^{132}_{55}$Cs	6.2d		+2.22* *1*	+0.570 *15*	DR 69Sc15	$7^2P_{3/2}$: $^7/_2$, $^5/_2$	108.30 *30*	$a=+25.03$ *12*
				+0.47* *1*		$^5/_2$, $^3/_2$	47.75 *40*	$b=+23.60$ *60*
						$^3/_2$, $^1/_2$	17.00 *50*	
$^{132}_{55}$Cs	6.2d			+0.469*‡ *10*	71St12		‡Weighted average	
				+0.468*[c] *10*	LX (68Ac01)	$6^2P_{3/2}$		
				+0.474*[c] *30*	LX (68Ac01)	$7^2P_{3/2}$		
$^{133}_{55}$Cs				−0.003 *2*	DR 55A56	$7^2P_{3/2}$:5,4	82.85 *5*	$a=16.60$ *1*
						4,3	66.45 *5*	$b=-0.11$ *8*
						3,2	49.90 *5*	
$^{133}_{55}$Cs					DR 58Bu05	$7^2P_{1/2}$:4,3	400.8 *1*	
$^{133}_{55}$Cs				−0.0036 *13*	DR 59Bu93	$7^2P_{3/2}$:5,4	82.93 *3*	
						4,3	66.42 *5*	
						3,2	49.94 *3*	
$^{133}_{55}$Cs				−0.0024[b] *20*	DR 62Bu30	$8^2P_{3/2}$:5,4	38.093 *30*	$a=7.626$ *5*
						4,3	30.502 *130*	$b=-0.049$ *42*
						3,2	22.912 *30*	
$^{133}_{55}$Cs					DR 64Fa11	$7^2P_{3/2}$:3,2	49.81[b] *3*	
						$8^2P_{3/2}$:5,4	37.82 *5*	$a=+7.58$ *1*
						4,3	30.32	$b=-0.14$ *5*
						3,2	22.85 *3*	
$^{133}_{55}$Cs			±2.5780 *7*		OP 68Ha01			$g_I/g_J=$ 1.9917398x10^{-4} *26*
$^{133}_{55}$Cs				−0.0028*	LX 69Sv01	$6^2P_{3/2}$	For $g_F=1.345$	$a=50.72$ *3* $b=-0.38$ *18*
				−0.0032*		$7^2P_{3/2}$	For $g_F=1.3349$	$a=16.610$ *6* $b=-0.15$ *3*
				−0.0030*‡ *6*			‡Average	

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{133}_{55}Cs$					LX 69Vi03	$6^2P_{3/2}$	For g_F=1.3341 *3*	a=50.45 *8* b=−0.66 *72*
$^{133}_{55}Cs$					DR 71Ch61	$8^2S_{1/2}$:4,3	684 *50*	
$^{133}_{55}Cs$				−0.0030*[c] *11*	DR 71St12 (59Bu93)	$7^2P_{3/2}$		
$^{134}_{55}Cs$	2.1y			+0.436 *3*	DR 68He07	$7^2P_{3/2}$: $^{11}/_2$, $^9/_2$	105.10 *6*	a=+16.851 *16*
				+0.356* *2*		$^9/_2$, $^7/_2$	72.0 *15*	b=+18.07 *12*
						$^7/_2$, $^5/_2$	46.56 *13*	
$^{134}_{55}Cs$	2.1y			+0.427 *11*	DR 68Kn01	$8^2P_{3/2}$: $^{11}/_2$, $^9/_2$	47.84 *12*	(a=7.69)
				+0.355* *11*				b=8.06 *20*
$^{134}_{55}Cs$	2.1y			+0.455 *3*	DR 69Zu04	$6^2P_{3/2}$		
$^{134}_{55}Cs$	2.1y				70Fi17			
				+0.360*[c] *3*	DR (69Zu04)	$6^2P_{3/2}$		
				+0.356*[c] *2*	DR (68He07)	$7^2P_{3/2}$		
				+0.355*[c] *7*	DR (68Kn01)	$8^2P_{3/2}$		
$^{134}_{55}Cs$	2.1y			+0.364*‡ *2*	71St12		‡Weighted average	
				+0.367*[c] *3*	(70Fi17)	$6^2P_{3/2}$		
				+0.361*[c] *3*	DR (68He07)	$7^2P_{3/2}$		
				+0.359*[c] *7*	DR (68Kn01)	$8^2P_{3/2}$		
$^{135}_{55}Cs$	2My			+0.049 *2*	DR 59Bu93	$^2P_{3/2}$:5,4	89.42 *5*	(a=17.57‡ *1*) b=+2.19 *9*
							‡Calculated using a^{133}(55A56) and g−ratios from atomic beam measurements (57St11)	
$^{135}_{55}Cs$	2My			+0.0536*	LX 69Sv01	$6^2P_{3/2}$	For g_F=1.345	a=53.64 *4* b=7.41 *32*
				+0.0495*		$7^2P_{3/2}$	For g_F=1.3349	a=17.570 *6* b=2.35 *7*
				+0.052*‡ *5*			‡Average	
$^{135}_{55}Cs$	2My			+0.044*[1]‡ *2*	DR 71St12	$7^2P_{3/2}$	‡Based on Q^{*134}, weighted average, and b−values of 59Bu93, 68He07	
$^{137}_{55}Cs$	30y			+0.050 *2*	DR 59Bu93	$^2P_{3/2}$:5,4	92.99 *5*	(a=18.28‡ *1*) b=+2.23 *9*
							‡Calculated using a^{133}(55A56) and g−ratios from atomic beam measurements (57St11)	
$^{137}_{55}Cs$	30y			+0.0545*	LX 69Sv01	$6^2P_{3/2}$	For g_F=1.345	a=55.80 *4* b=7.54 *20*
				+0.0499*		$7^2P_{3/2}$	For g_F=1.3349	a=18.274 *6* b=2.37 *4*
				+0.052*‡ *5*			‡Average	
$^{137}_{55}Cs$	30y			+0.045*[1]‡ *2*	DR 71St12		‡Based on Q^{*134}, weighted average, and b−values of 59Bu93, 68He07	
$^{135}_{56}Ba$				+0.18 *2*	DR 63Zu05	$^3P_1$: $^5/_2$, $^3/_2$	2536.94 *6*	a=1028.31 *2*
						$^3/_2$, $^1/_2$	1603.39 *2*	b=−27.08 *2*
$^{135}_{56}Ba$			±0.83651 *26*		OP 66Ol02	$^1S_0$		
$^{135}_{56}Ba$					LX 68Op01	$^3P_1$		b/a=−0.02636 *13*
$^{135}_{56}Ba^*$					OP 70Vo08	$6^2S_{1/2}$		a=3591.6706 *3*
$^{137}_{56}Ba$				+0.28 *3*	DR 63Zu05	$^3P_1$: $^5/_2$, $^3/_2$	2824.46 *6*	a=1150.59 *2*
						$^3/_2$, $^1/_2$	1819.50 *2*	b=−41.61 *2*
$^{137}_{56}Ba$				±0.20	LX 64Lu09	$^1P_1$		a=−113.2 *10* (b=58.2‡)
							‡From atomic spectroscopy data	

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{137}_{56}$Ba			±0.93573 *28*		OP 66Ol02	$^1S_0$		ν^{137}/ν^{135}= 1.11862 *3*
$^{137}_{56}$Ba					LX 68Op01	$^3P_1$		b/a=−0.03621 *13*
$^{137}_{56}$Ba*					OP 70Vo08	$6^2S_{1/2}$		a=4018.8711 *4*
$^{139}_{57}$La					LX 70He26	$y^2D_{3/2}$	For g_F=0.802	a=143.18 *11*
								b=1.27 *37*
						$y^2D_{5/2}$	For g_F=1.186	a=63.41 *21*
								b=−13.3 *14*
$^{139}_{57}$La					LX 70He20	$z^2F_{5/2}$	For g_F=0.9054	a=410.8 *10*
								b=52.87 *39*
								b/a=+0.1287 *2*
						$z^2F_{7/2}$	For g_F=1.195	a=146.11 *25*
								b=50.7 *19*
								b/a=+0.347 *8*
$^{147}_{62}$Sm					LX 69Ha60	$^5F_1(4f^5 5d6s^2)$		a∼−297[p]
						$^7D_1(4f^6 6s6p)$		a∼+267[p]
$^{169}_{69}$Tm					LX 69Ha60	J=$^9/_2$		a=−333.9[p] *31*
						J=$^7/_2$		a=−360.7[p] *31*
$^{171}_{70}$Yb					LX 67Bu06	$^3P_1$		a^{171}/a^{173}= −3.6174 *2*
$^{171}_{70}$Yb			±0.49188 *20*		OP 67Ol01	$^1S_0$		
$^{171}_{70}$Yb					LX 69Ba48	$^3P_1(6s6p)$		a=3959.1 *14*
					DR			a^{171}/a^{173}=3.6166 *3*
$^{171}_{70}$Yb					LX 69Bu06	$^1P_1$		a/g_F=206.0 *16*
$^{171}_{70}$Yb					LX 70Bu11	$^3P_1(4f^{14}6s6p)$		a^{171}/a^{173}= 3.61650 *5*
						$^3P_1(4f^{13}5d6s^2)$		a^{171}/a^{173}=3.6329 *5*
$^{171}_{70}$Yb					DR 70Wa07	$^3P_1$:$^3/_2$,$^1/_2$	5936.739 *30*	a=3958.228 *60*
$^{173}_{70}$Yb			±0.67755 *27*		OP 67Ol01	$^1S_0$		μ^{173}/μ^{171}= 1.37748 *6*
$^{173}_{70}$Yb					LX 69Ba48	$^3P_1(6s6p)$		a=−1094.7 *6*
					DR			b=−826.9 *9*
$^{173}_{70}$Yb					LX 69Bu06	$^1P_1(6s6p)$		a/g_F=56.9 *5*
								b/g_F=575 *7*
$^{173}_{70}$Yb					LX 70Bu11	$^3P_1(6s6p)$		a=−1094.35 *3*
								b=−826.59 *20*
$^{173}_{70}$Yb					DR 70Wa07	$^3P_1$:$^7/_2$,$^5/_2$	4697.916 *30*	a=−1094.318 *35*
						$^5/_2$,$^3/_2$	1496.414 *75*	b=−825.904 *85*
$^{175}_{71}$Lu					LX 70Go15	$^2D_{3/2}$	For g_F=0.80	a=−1313.34 *50*
								b=−455.8 *12*
						$^2F_{5/2}$		a/g_F=+351.864 *56*
								b/g_F=+3444.2 *19*
$^{181m}_{73}$Ta	11ns		±3.30‡ *12*		LX 70Li16		Hf crystal	ω=152 5MHz for H=24.2kG
							‡Observed by time differential perturbed angular correlations	
$^{197}_{79}$Au				±1.04[b] ±0.57‡	LX 69Go10	$6^2P_{3/2}$		a=14.0 *5*
								b=327.6 *6*
								b/a=+23.4 *8*
							‡From b and fine structure	

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{183}_{80}$Hg	8.8s	1/2	+0.518[j]‡ *9*		OP 72Bo09 72Ot03	$^3P_1$		a=15300 *700* ‡Also measured by NMR/βAO on ground state
$^{185}_{80}$Hg	50s	1/2	+0.504[j]‡ *4*		OP 72Bo09 72Ot03	$^3P_1$		a=14900 *400* ‡Also measured by NMR/βAO on ground state
$^{187}_{80}$Hg	2.4m	3/2	−0.586[jp] *6*	−0.3[lp] *11*	OP 72Ot03 71Bo31			
$^{193}_{80}$Hg	6h	3/2	−0.627[k] *2*		LX 65Re18	$^3P_1$		a=−6133 *15*
$^{193}_{80}$Hg	6h		±0.62364[p] *34*		OP 70Mo40	6^1S_0		
$^{193}_{80}$Hg	6h			−0.77[lp]	OP 71Fu18	$^3P_1$		(a=−6133 *15*) b=+477 *182*
$^{193m}_{80}$Hg	11h		±1.063[k] *1*		LX 65Sm01	$^3P_1$		a=−2399.69 *6* b=−725 *90*
$^{193m}_{80}$Hg	11h		±1.0517[p] *6*		OP 70Mo40	6^1S_0		
$^{193m}_{80}$Hg	11h		−1.0518[p] *5*		OP 71Re23			ν/ν^{199}= 0.1609411[p] *5*
$^{195}_{80}$Hg	9.5h		±0.5381 *3*		OP 64Wa01			μ^{195}/μ^{199}= 1.070356 *66*
$^{195}_{80}$Hg	9.5h		±0.5389[k] *3*		LX 65Sm01	$^3P_1$		a=15813.46 *23* a^{195}/a^{199}= 1.071927 *15*
$^{195m}_{80}$Hg	40h	13/2	±1.049[k] *1*		LX 65Sm01	$^3P_1$		a=−2368.04 *8* b=−782.45 *86*
$^{195m}_{80}$Hg	40h		±1.0380[p] *5*		OP 70Mo40	6^1S_0		
$^{195m}_{80}$Hg	40h		−1.0381[p] *5*		OP 71Re23			ν/ν^{199}= 0.1588454 *4*
$^{197}_{80}$Hg	65h	1/2	±0.525[k] *1*		DR 59M81	$^3P_1$		a=15405 *30*
$^{197}_{80}$Hg	65h		±0.5243[k] *3*		LX 61Hi16	$^3P_1$		a=15387.1 *53*
$^{197}_{80}$Hg	65h		±0.5241 *2*		OP 62Wa07			μ^{197}/μ^{199}= 1.042479 *15*
$^{197}_{80}$Hg	65h		±0.5245[k] *3*		DR 63St15	$^3P_1$:$^3/_2$,$^1/_2$	23086.37 *10*	a=15392.66[f] *15*
$^{197m}_{80}$Hg	24h		−1.032[k] *8*		DR 61Br17	$^3P_1$:$^{15}/_2$,$^{13}/_2$ $^{13}/_2$,$^{11}/_2$	(18248‡ *11*) 14234.86 *9*	a=−2328.89 *84* b=−902.9 *54* ‡Calculated from data of Hirsch
$^{197m}_{80}$Hg	24h		−1.0316[k] *10*	±1.61 *13*	DR 61Hi16	$^3P_1$:$^{15}/_2$,$^{13}/_2$ $^{13}/_2$,$^{11}/_2$	18246 *14* 14236 *20*	a=−2328.8 *17* b=−901 *13*
$^{197m}_{80}$Hg	24h		±1.0211[p] *6*		OP 70Mo40			
$^{197m}_{80}$Hg	24h		−1.0212[p] *5*		OP 71Re23			ν/ν^{199}= 0.1562657 *3*
$^{199}_{80}$Hg					DR 59P33	6^3F_4:$^9/_2$,$^7/_2$	5800 *100*	
$^{199}_{80}$Hg			+0.50270 *24*		OP 61Ca21	$^1S_0$		$\mu^{199}/\mu(^1H)$= +0.1782706 *3*
$^{199}_{80}$Hg					LX 61Hi16	$^3P_1$		a=14750.7 *50*
$^{199}_{80}$Hg					DR 63St15	$^3P_1$:$^3/_2$,$^1/_2$	22128.56 *10*	a=14754.04[f] *14*
$^{199m}_{80}$Hg	43m	13/2	−1.00832[p] *5*		OP 71Re23			ν/ν^{199}= 0.1542921 *5*
$^{199m}_{80}$Hg	43m				LX 71Re24	6^3P_1		a=−2298.7[p]‡ *4* ‡Assumed b=−900 *300*
$^{199m}_{80}$Hg	43m			+2.0[jp] *13*	OP 72Ot03			
$^{201}_{80}$Hg				±0.58 *18*	DR 58S40	$^3P_1$		a=5441 *15* b=−35 *2*
$^{201}_{80}$Hg					DR 59P33	6^3F_4:$^{11}/_2$,$^9/_2$ $^9/_2$,$^7/_2$ $^7/_2$,$^5/_2$	2860 *50* 2340 *50* 1820 *50*	

Table H: Nuclear Moments by Optical Double Resonance and Pumping Techniques—Con.

Nucleus	$T_{1/2}$	I	μ	Q	Method Refer.	Atomic State F,F'	$\Delta\nu(F,F')$	Interaction Constants
$^{201}_{80}$Hg			−0.55671 *27*		OP 61Ca21	$^1S_0$		$\mu^{201}/\mu(^1H)$= −0.1974198 *9*
$^{201}_{80}$Hg					DR 61Ko5	$^3P_1$: $^5/_2$, $^3/_2$ $^3/_2$, $^1/_2$	13986.557 *8* 7551.613 *13*	a=−5454.569 *3* b=−280.107 *5*
$^{201}_{80}$Hg			−0.55670 *27*		DR 63Le18			μ^{201}/μ^{199}= −1.1074164 *5*
$^{203}_{80}$Hg	47d		±0.8436 *4*		OP 70Ki05	6^1S_0		ν^{201}/ν= 1.09984 *18*
$^{203}_{80}$Hg	47d		+0.850* *9*	+0.40[1] *4*	LX 70Re14	$^3P_1$		a=4991.35 *3* b=−249.2 *3*
$^{205}_{80}$Hg	5.5m	1/2	+0.5968[ip] *5*		OP 72Ot03			
$^{203}_{81}$Tl and $^{205}_{81}$Tl					LX 69Zi02	$6^2D_{3/2}$	For g_J = 0.8 ‡Stark coefficient in MHz/(kV/cm)^2	a=42 *2* β‡=0.12 *1* a/β>0
$^{203}_{81}$Tl and $^{205}_{81}$Tl					LX 70Zi07	$7^2D_{3/2}$	For g_J=0.8 ‡Stark coefficient in MHz/(kV/cm)^2	a=55 *1* β‡=0.20 *4* a/β>0
$^{207}_{82}$Pb					LX 66Sa09	$^3P_1$		a=8811 *17*
$^{207}_{82}$Pb			±0.5783 *7*		OP 69Gi03	$^3P_0$		ν/ν_p=0.20502 *22*
$^{207}_{82}$Pb			±0.57810‡ *29*		OP 69Gi04	$^3P_0$		$\nu/\nu(^{199}Hg)$= 1.14960 *4*
					72Gi20			‡Using $\mu^{199}_{unc.}$=+0.497856 *5*, 61Ca21 Large discrepancy with NMR-value may be due to large interaction of $^3P_1$-state with $^3P_0$-state

* Polarization or Sternheimer correction included

[a] Calculated from the $\Delta\nu$- or a-ratio for two isotopes

[b] Calculated from b/a

[c] Recalculation of earlier data

[d] No diamagnetic correction added. Unsure if authors already corrected for it

[£] Enriched sample used

[f] Corrected for second order perturbations of neighboring levels

[g] Extrapolated to zero intensity

[h] Extrapolated to zero power

[i] Extrapolated to zero pressure

[j] Resonance observed by depolarization of polarized nuclei

[k] Calculated using a^{199}=14754.0 *1* [63St15] and the uncorrected $\mu(^{199}Hg)$=+0.497856 *5* from Cagnac [61Ca21]

[l] Calculated from the b-ratio for two isotopes

[m] Metastable or excited state

[p] Preliminary value from meeting abstract, thesis, private communication, etc.

Table J: Nuclear Moments by Nuclear Orientation, Perturbed Angular Correlation and Nuclear Specific Heat Measurements

Introduction

Nuclear moment values obtained by nuclear orientation, perturbed angluar correlation and nuclear specific heat measurements are collected in this table. The last systematic literature search for the data included was done in early 1972. A brief review of the techniques follows.

Nuclear Orientation:

If a sample of nuclei is unoriented, the spatial distribution of radiation emitted by the sample is isotropic. If the nuclei can be oriented in some manner, the radiation is frequently no longer isotropic. The actual distribution depends on the type of radiation (α, β, or γ's), the degree of orientation of the nuclei, the spins of the initial and final states as well as the angular momentum, L, carried off by the radiation. The term "oriented" is used to indicate that the $2I+1$ nuclear magnetic substates, m_Z, are unequally populated. If the pairs of substates with the same m_Z but opposite signs, $+m_Z$ and $-m_Z$, have equal populations, the nuclei are said to be aligned. If they have unequal populations, the nuclei are said to be polarized.

The angular distribution of the radiation emitted by an ensemble of nuclei, with spin I_o, can be written in terms of Legendre polynomials as:

$$W(\theta) = \sum_{k=0}^{k_{max}} B_k F_k P_k(\cos\theta) \qquad (1)$$

where k_{max} is the smaller of $2I_o$ and $2L$. θ is the angle between some fixed axis, z, and the direction of propagation of the radiation. The B_k are orientation parameters which depend on the relative populations of the substates of I_o. The F_k are angular correlation functions which depend on the spins I_o, I_f and on L of the transition. For radiation other than γ's, "particle parameters", b_k, must be included in the expansion. For α's and unpolarized γ's, in general, only even k occur. Odd k can be present for β-decay and polarized γ's.

To be oriented at low temperature, the nuclei must have a lifetime long enough so that they can be incorporated in a suitable material. Most γ-emitting states, with the exception of a few isomers, have very short lifetimes. However, many radioactive nuclei which decay by α- or β-emission or K-capture have long lifetimes and the angular distribution of the γ or γ's following the decay can be measured. The degree of orientation of the γ-emitting state can be calculated from that of the oriented nucleus if the spins of the preceding states and the angular momenta carried off by and mixtures of all preceding radiations are known. Such calculations assume that the intermediate state half-lives are short so that there are no perturbations acting to change the populations of the states. If this is true, the angular distribution in (1) can be replaced by:

$$W(\theta) = \sum_{k=0}^{k_{max}} B_k(I_o,T)\Big[\prod_a U_k^{(a)}(I_a,L_a,I_{a+1})\Big] \times F_k(I_n,L_n,I_f)\, P_k(\cos\theta) \qquad (2)$$

where each $U_k^{(a)}$ is a function of the nuclear spins and angular momentum for the a^{th} unobserved transition preceding the observed one. k_{max} is the smaller of $2I_o$, $2I_a$, $2I_n$, $2L_a$, $2L_n$. If any of the spins I_o through I_n is 0 or 1/2, the angular distribution becomes isotropic.

For an assembly of atoms at thermal equilibrium, the population of any level, m, is proportional to the $\exp[-E_m/kT]$. If the differences in the energies of the levels are small with respect to kT, the populations will be approximately equal. However, if the separation between levels can be made the order of kT, either by increasing the interaction energy and/or decreasing T, the nuclei can be oriented. For a discussion of several methods for producing oriented nuclei at low temperatures, see [65Da10] or [65De31].

Originally paramagnetic salts, incorporating the nucleus under investigation, were cooled to very low temperatures by adiabatic demagnetization. The nuclei were oriented by the hyperfine interaction of external or internal fields with the nuclear or electronic moments. The "brute force" method of orientation making use of the direct interaction of the nuclear magnetic moment was originally suggested by Gorter [34Go01] as a means of possibly further lowering temperatures. More recently, orientation experiments have been done on nuclei imbedded as dilute impurities in ferromagnetic metals and antiferromagnetic crystals, taking advantage of the very large fields present at the impurity sites. These materials are usually cooled by thermal contact with paramagnetic salts at very low temperatures.

The material chosen for cooling must fit certain requirements. It must have a large specific heat so that it will not warm up rapidly after being cooled. It must be able to be cooled to a very low temperature and it must be possible to determine its temperature. A large number of the earlier orientation experiments were done on nuclei in the following classes of salts since many had been thoroughly investigated and their properties well known; see [61Hu20]:

Tutton salts: $M''M_2'(XO_4)_2 \cdot 6H_2O$

Rare-earth ethyl sulphates: $M'''(C_2H_5SO_4)_3 \cdot 9H_2O$

Double nitrates: $M_2'''M_3'(NO_3)_{12}\cdot 24H_2O$

Fluosilicates: $M''SiF_6\cdot 6H_2O$

Two of these, cerium magnesium nitrate, CMN, and neodymium ethyl sulphate, NES, have been used for very many moment determinations. Around 1965, it was observed by the Berkeley group [65Fr19], [66Bl17] that the temperature dependence of γ–anisotropies of CMN and NES showed sharp discontinuities below ~0.003°K. They felt these could only be satisfactorily explained by assuming that the earlier temperature scales for these materials were based on properties that were not sensitive enough to the temperature below ~0.003°K. It appeared that the temperatures actually reached were much lower than those given by the magnetic temperature relationship. For this reason, very low temperature measurements done with these salts prior to 1965 are suspect.

In order to determine nuclear moments, a material, whose low temperature properties are known, is chosen for the nuclear environment. It is cooled, the nuclei oriented, and the γ–intensity or the γ–anisotropy, ϵ,

$$\epsilon = [W(90°) - W(0°)]/W(90°) \qquad (3)$$

is measured as a function of the temperature. The resulting curve is then fit by adjusting the values of the interaction constants on which the orientation parameters, B_k, depend. The anisotropy or intensity also depends upon the values chosen for the spins of all nuclear levels involved and on the angular momenta of the transitions through the U_k– and F_k– terms in (2). In order to determine the degree of orientation of the nuclei, the temperature at the nucleus must be known. Frequently a reference nucleus, such as ^{60}Co or ^{54}Mn with well-known orientation parameters, can be incorporated into the sample to act as a thermometer. The distribution of the reference nuclei should be similar to that of the nuclei under consideration to minimize differences due to local warming.

The advantages of measuring nuclear moments by nuclear orientation stem from the fact that one is counting a single transition, rather than coincidences, so that sufficient data can be obtained in reasonable times with very dilute samples. However, the nucleus must have a lifetime of the order of hours and a sufficiently large μ or Q in order to be oriented. Temperatures below ~0.01°K are necessary.

The accuracy of such measurements is not very great. The magnetic moment can be determined to about 10%. A more recent development combines NMR techniques with low temperature orientation and leads to moments which can be determined to about 0.1%. In these experiments the NMR frequency is observed by the destruction of the orientation at resonance. A short review of this technique can be found in [68Sh25].

Measurements of the γ–anisotropy do not yield the sign of the magnetic moment, but the sign can be determined from a measurement of the γ–ray circular polarization or β–asymmetry since these depend on the polarization of the nucleus and involve the odd k terms in (1) as well as the even ones.

The major difficulties encountered in orientation experiments have to do with:

1) the knowledge of the temperature at the nuclei. There can be heat leaks, local warm–up due to radiation, and difficulties in measuring the temperatures accurately;

2) the presence of perturbations acting on the nuclei during the finite lifetimes of the intermediate levels. These cause changes in the relative populations of the levels.

For more complete discussions of nuclear orientation and the measurement of nuclear moments using oriented nuclei, see [57Bl04], [65Da10] or [65De31]. *Nuclear Orientation* edited by M. E. Rose [63Ro33] is a handy collection of early journal papers and some review articles on this subject. Discussions of more recent techniques and problems can be found in the proceedings of several recent conferences on hyperfine interactions, for example, see [71St46].

Nuclear Specific Heat:

A few moments have been determined from measurements of the specific heat at very low temperatures. The specific heat, C_P, of a system can be expressed as a sum:

$$C_P = C_L + C_E + C_M + C_N \qquad (4)$$

C_L is the lattice contribution to the specific heat. For temperatures well below the Debye temperature, i.e. $T<\theta/50$, it is given by: $C_L=AT^3$, where A is a constant. C_E, the electronic specific heat, the contribution due to the conduction electrons, is given by $C_E=\gamma T$, a relation which holds up to about 1000°K. C_M, the magnetic specific heat which is due to the exchange interaction of the local electronic spins of neighboring ions, does not contribute to the total specific heat at very low temperatures of the order of 1°K. The nuclear specific heat, C_N, depends on the energies of the $2I+1$ levels of the different orientations of the nucleus with respect to the effective fields. From statistical mechanics it can be shown that:

$$C_N = [R/(kT)^2](\sum_{ij} [H_i^2 - H_iH_j] \exp[-(H_i + H_j)/kT]) \times (\sum_{ij} \exp[-(H_i + H_j)/kT])^{-1} \quad (5)$$

where H_i, H_j are the energies of levels i, j. In terms of effective magnetic and quadrupole interaction constants, A' and P', the energy can be written as:

$$H_m = A'm + P'[m^2 - I(I + 1)/3] \quad (6)$$

for $m = -I, -I+1, \ldots +I$.

To carry out such experiments, samples of ferromagnetic or antiferromagnetic metals or alloys are thermally isolated as well as possible after being cooled to temperatures below 1°K. The samples are then heated electrically and the temperature measured. If the specific heat can be measured over a range of about 0.4 to 4°K, it may be possible to obtain C_N and the interaction constants from the temperature dependence of the specific heat. Above about 1°K, C_N can be neglected and C_L and C_E separated by plotting C_p/T vs T^2. The contributions of C_L and C_E can be subtracted from the data below 1°K to determine C_N, which dominates in this region. These measurements require samples of great purity and very reliable thermometry. Since gram quantities are needed and only average properties for the natural isotopic abundances of the elements are measured, this method has not been used for moment measurements except for the few cases of the monoisotopic rare earths.

A review of the determination of interaction constants from nuclear specific heat measurements can be found in [67Lo12].

Perturbed Angular Correlation:

In the absence of perturbing electric or magnetic fields, the angular correlation of two successive radiations can be expressed in terms of the Legendre polynomials, as:

$$W(\theta) = \sum_{k=0}^{k_{max}} A_k(1)\, A_k(2)\, P_k(\cos\theta) \quad (7)$$

where θ is the angle between them and the A_k (j) are coefficients which depend on the angular momentum, L_j, carried off by the jth transition, on the spins of the nuclear levels involved, I_i, I_n(see figure 1) and on the kind of radiation, α, β, γ, or e^-[53Bi10]. k_{max} is the minimum of $2I$, $2L_1$, $2L_2$. In a simplified description, the observation of the first radiation choses a particular direction in space or quantization axis. The relative populations of the sublevels of the intermediate state depend on the type of radiation

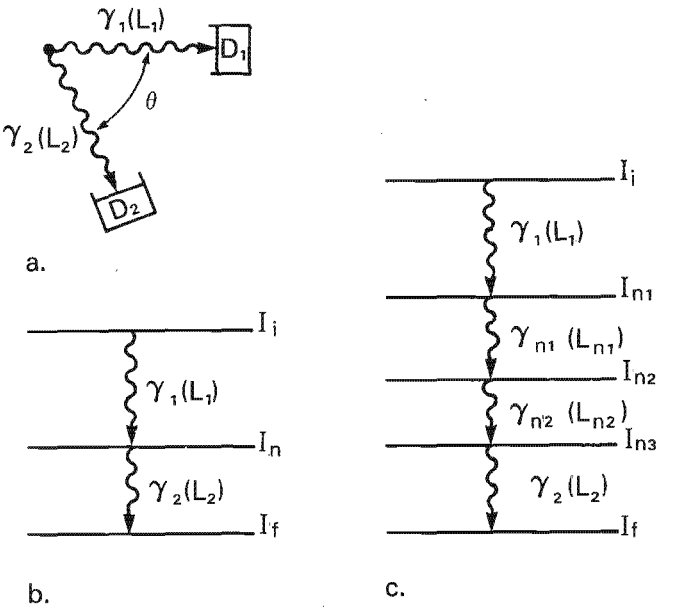

FIGURE 1a. Scheme for the detection of the correlation of γ_1 and γ_2. D_1 and D_2 are the detectors for γ_1 and γ_2, respectively.
b. Decay scheme for the emission of two successive γ's.
c. Decay scheme for the emission of γ's in a multiple cascade.

The L_j represent the angular momenta carried off in each transition: the I_j, the spins of the nuclear levels.

and the spins of the levels, I_i, I_n. The angular distribution of the second radiation with respect to the first is then a function of the angular momentum carried off, L_2, the spin of the level, I_n, and the population distribution in the intermediate state, which remains unchanged if, during the lifetime, τ, of the intermediate state, there have been no perturbing interactions. For the observation of the correlation of γ_1 and γ_2 in a multiple cascade (see figure 1c), a more general form of (7) can be written:

$$W(\theta) = \sum_{k=0}^{k_{max}} A_{kk} P_k(\cos\theta) \quad \text{or} \quad = 1 + \sum_{N=2}^{k_{max}} b_N \cos N\theta \quad (8)$$

where the A_{kk} are products of functions of 1) the level spins, the angular momentum and the mixing ratio for each of the observed radiations and 2) the level spins for the intervening unobserved radiations in the cascade. k_{max} is the smallest of $2L_1$, $2L_2$ and the $2I$ in the cascade. The b_N are simple algebraic functions of the A_{kk} in this alternate way of expressing the correlation.

The possibility of perturbing the angular correlation by magnetic fields was first pointed out by Hamilton [40Ha20]. The effect of hyperfine structure and of applied magnetic fields on the angular correlation was originally calculated by Goertzel [46Go05] and

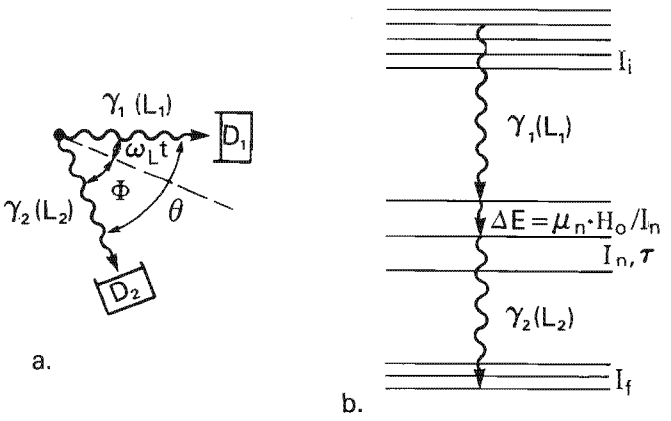

FIGURE 2a. Scheme for the observation of the correlation of two γ's in a transverse magnetic field. During the time t, between the emission of γ_1 and γ_2, the nucleus precesses through the angle $\omega_L t$. Therefore, at any given angle θ, the unperturbed correlation of $\theta-\omega_L t$ is observed. D_1 and D_2 are the detectors for γ_1 and γ_2, respectively.

b. Decay scheme for the emission of two γ's perturbed by the application of an external field, H_0, which causes a transition between the substates of the intermediate state during its lifetime, τ.

looked for by Brady and Deutsch [50Br27], but the primitive counting techniques available at that time made it impossible to observe any perturbation. In a semiclassical description, the interactions of the nuclear moments with perturbing magnetic or electric fields cause the nuclei to precess during the lifetime of the intermediate state. This results in a change in the angular distribution of the second radiation with respect to the first. A schematic representation of this is shown in figure 2. The nucleus decays to a particular sublevel of the intermediate state by the emission of the first radiation. The magnetic or electric interaction with the perturbing fields causes a transition between the sublevels of the intermediate state which is then followed by the emission of the second radiation. In the presence of perturbing fields, the angular correlation can be expressed in terms of the unperturbed correlation coefficients and the spherical harmonics for each radiation:

$$W(k_1,k_2,t) = \sum_{k_1 k_2 \mu_1 \mu_2} A_{k1}(1)\, A_{k2}(2)\, G(k_1 k_2 \mu_1 \mu_2 t) \times Y^{\mu_1}_{k1}(\Omega_1)\, Y^{*\mu_2}_{k2}(\Omega_2) \quad (9)$$

For the exact form of the attenuation factors, $G(k_1k_2\mu_1\mu_2t)$, for many kinds of static and time-dependent perturbations, including mixed electric and magnetic interactions, see [65Fr20] or [64St29], which are essentially equivalent papers, [64Al32], or [53Ab15]. A few specific examples, for frequently encountered situations, are given below.

In the absence of any other perturbations, the application of a static magnetic field causes, in general, both an attenuation of the angular correlation as well as a rotation of the observed pattern. For the special case in which the external field, H, is perpendicular to the direction of emission of the observed γ's, the perturbed angular correlation, PAC, has a particularly simple form:

$$W_\perp(\theta,t,H) = \sum_{k=0}^{k_{max}} A_{kk} P_k[\cos(\theta-\omega_L t)]$$

or (10)

$$= 1 + \sum_{N=2}^{k_{max}} b_N \cos N(\theta-\omega_L t),$$

where $\omega_L = 2\pi g \mu_N H/h$ is the Larmor precessional frequency, the A_{kk} or b_N are the unperturbed correlation functions and t is the time between the observation of the two gammas. It is assumed that the detectors can distinguish between the gammas. If the direction of the magnetic field at the nucleus is known, the sign of the magnetic moment can be determined from the direction of rotation of the correlation. If additional perturbations are present, these must be taken into account. In order to reduce the effect of any time-dependent quadrupole interactions, dilute solutions or liquid metals are frequently employed. In such sources, if the correlation time, τ_c, is small compared to the observation time or lifetime and if $\omega_L\tau_c << 1$, the effect of such perturbations is to multiply each term in (10) by an attenuation factor, $G_k = \exp(-\lambda_k t)$, where λ_k is the relaxation constant for the interaction.

For static quadrupole interactions, the attenuation factors of equation (9) cannot be expanded in terms of a single parameter 'k' as was possible in the magnetic case. However, for an axially symmetric field, they can be expressed in terms of ω_o, the smallest non-vanishing quadrupole frequency, where $\omega_o = 3\omega_Q$ or $6\omega_Q$, for I integer or half-integer*, respectively, with $\omega_Q = 2\pi(eqQ/4hI) \times (2I-1)^{-1}$. Then

$$G(k_1, k_2, \mu_1, \mu_2, t) = \sum_{n=0}^{n_{max}} g_n(k_1, k_2, \mu) \cos n\omega_o t \quad (11)$$

with $n = |m^2-m'^2|$ for integer I and $(1/2)|m^2-m'^2|$* for half-integer I. For a non-vanishing quadrupole perturbation, k_{max} must be greater than or equal to 4.

For randomly-oriented static fields, for example, for powdered crystalline sources, the angular correlation can be written as:

$$W(\theta) = 1 + \sum_k G_{kk} A_{kk} P_k(\cos\theta) \quad (12)$$

*Note these corrections to the corresponding expressions given in [65Fr20] or [64St29].

The form of the correlation does not change; however, the coefficients of the $P_k(\cos\theta)$ are reduced. Since there are always some nuclei in the sample aligned along the direction of observation of one of the counters, there is a lower limit to the attenuation factors. For axially-symmetric fields, this lower limit or "hard-core" value is $G_{kk} = 1/(2k + 1)$. If the perturbing fields are randomly-fluctuating, the correlation can be destroyed.

The many kinds of PAC experiments for the measurement of magnetic moments can be divided into two major classifications: (1) the time-integrated methods, with observation times longer than the lifetime of the intermediate state, which yield values of $\omega_L\tau$; and (2) the differential methods which determine ω_L directly. Because of the great variety of these experiments, only a brief discussion of a few representative techniques will be given. For more detailed information on the many modifications and variations, the reader is referred to the review articles by Frauenfelder [65Fr20], or Grodzins [68Gr31].

From equation (10), it can be seen that a measurement of the correlation as a function of delay time for a constant value of H, or as a function of H at a constant delay time yields ω_L, and therefore g, directly from the period of oscillation, T, of the correlation. A more sensitive measure of the period can be obtained by observing the correlation at some fixed angle for field up ($W_\perp\uparrow$) and down ($W_\perp\downarrow$) and plotting the ratio, $R = W_\perp\uparrow / W_\perp\downarrow$, as a function of t or H, respectively. If the resolution time, τ_0, is small, $\tau_0 << \tau$ and $\tau_0 << T$, g may be obtained from the period of oscillation of R through the relation:

$$T = h/2g\mu_N H \tag{13}$$

R is independent of the decay of the source and the period of R is not greatly affected by small time-dependent perturbations.

If $k_{max} = 4$, the ratio,

$$r = 2(W_\perp\uparrow - W_\perp\downarrow)/(W_\perp\uparrow + W_\perp\downarrow) \tag{14}$$

at $\theta = 3\pi/4$, is also an oscillating function of the delay time of the form: $A(\sin 2\omega_L t)/(B - C\cos 4\omega_L t)$ with period also given by (13). A, B, and C represent functions of the A_{kk}. The presence of small time-dependent perturbations does not much alter the period of r from which g is calculated, although it does cause the amplitudes of the oscillations to decrease with an increase in delay time.

Differential techniques have been used to determine moments of states with lifetimes of the order of 10^{-3} to 10^{-9} seconds.

For time-integrated measurements, IPAC, the expression for the correlation is obtained by averaging equation (9) over the observation time (zero delay time and infinite resolving time). Equation (10) then becomes:

$$W_\perp(\theta,H) = 1 + \sum_{N=2}^{k_{max}} (b_N/[1 + (N\omega_L\tau)^2]^{1/2}) \times \cos N(\theta + \Delta\theta) \tag{15}$$

where $\Delta\theta = (1/N)\tan^{-1}(N\omega_L\tau)$. In this case, both an attenuation and a rotation of the correlation are observed. For small $\omega_L\tau$, $\Delta\theta \sim \omega_L\tau$. In the presence of time-dependent quadrupole perturbations, the precession angle, $N\omega_L\tau$, and the correlation coefficients are both reduced by an attenuation factor, which, for $\omega_L\tau << 1$, is $(G_k)_{ave} = 1/(1 + \lambda_k\tau)$.

In the early experiments, the entire correlation was obtained with and without an external field and the rotation, from which g can be calculated, was measured. As in the case of DPAC, more sensitive measurements for small rotations, $\omega_L\tau << 1$, can be made by measuring the coincidences at a constant angle for field up and field down. The ratio,

$$r(\infty) = 2[W_\perp(\uparrow) - W_\perp(\downarrow)]/[W_\perp(\uparrow) + W_\perp(\downarrow)], \tag{16}$$

is approximately $4b_2(G_2)_{ave}\omega_L\tau$ for $k_{max} = 2$ and $\theta = 3\pi/4$ or $7\pi/4$. The product $b_2(G_2)_{ave}$ can be determined from the zero field correlation for the particular source used. A measurement of r then yields $\omega_L\tau$. Another useful ratio for the determination of g, again for $\omega_L\tau << 1$, is:

$$y(\infty) = [W_\perp(\pi/4) - W_\perp(3\pi/4)]/[W_\perp(\pi) - W_\perp(\pi/2)] \tag{17}$$

which is approximately $2(G_2)_{ave}\,\omega_L\tau$ if $b_4 << b_2$. The slope of y vs H yields g if $(G_2)_{ave}$ is known.

If the detectors, in $\gamma\gamma$ measurements, cannot distinguish between the two gammas, only an attenuation is observed and equation (15) becomes:

$$W_\perp(\theta,H) = 1 + \sum_N (b_N/[1 + (N\omega_L\tau)^2])\cos N\theta; \tag{18}$$

that is, the unperturbed correlation is attenuated by the factor $[1 + (N\omega_L\tau)^2]^{-1}$.

All integral methods yield the product $\omega_L\tau$; therefore, the value obtained for the magnetic moment depends upon knowledge of the lifetime of the intermediate state. The values of μ appearing in the accompanying table have been corrected for newer values of the lifetimes. However, the uncertainty in the lifetime has not been taken into account since most of the measurements are not accurate enough to warrant such treatment.

Integral measurements have been made for states with lifetimes of the order of 10^{-7} to about 10^{-12} seconds. The upper limit is set by the number of accidental coincidences which are accepted; the lower, by the magnetic fields available.

Since other unknown perturbations may contribute to the attenuation of the correlation, attenuation measurements are much less reliable for the determination of moments than those of the rotation of the correlation. Further, the sign cannot be ascertained from the attenuation factors.

In order to extend PAC measurements to a wider range of states than are accessible with normal radioactive decay products, nuclear reactions and scattering experiments with pulsed beams have been used. The reaction orients the nucleus by preferentially populating sublevels of the excited state and the perturbed angular distribution, PAD, of the gamma-decay can be measured by integral or differential methods, using pulse repetition times greater than the lifetime of the state. Such techniques have been used for measurements on states with lifetimes of the order of milliseconds to nanoseconds.

The recent stroboscopic measurements [70Ch05] make use of a pulsed beam with a repetition time smaller than the lifetime of the intermediate state, $T_0 << \tau$. For such an experiment, the counting rate at a time t after the pulse burst is given by the sum of intensities of the contributions of all previous bursts. For the observation of the gamma in a transverse field, neglecting other perturbations, the intensity can be written as:

$$I(\gamma) = \sum_{a=0}^{\infty} \exp[-(t + aT_0)/\tau] \sum_{k\ \text{even}} [1 + A_k(1)A_k(2)\, P_k(\cos[\theta - \omega_L(t+aT_0)])] \tag{19}$$

$$\cong e^{-t/\tau} \sum_{k\ \text{even}} \frac{b_k[\cos k(\theta-\omega_L t) - \exp[-T_0/\tau] \cos k(\theta-\omega_L(t-T_0))]}{[1 - 2\exp[-T_0/\tau] \cos k\omega_L T_0 - \exp[-2T_0/\tau]]}$$

Here T_0 is the repetition time of the beam pulses; t, the delay time or observation time of the gamma after the pulse-burst; and the A_k are the correlation functions for the reaction product and the gamma. The contributions of different bursts will add constructively if the condition:

$$k\omega_{L_0} T_0 = 2n\pi \text{ for some } n = 1, 2, \ldots \tag{20}$$

is satisfied. Thus, for a given T_0, the counting rate will show resonances at values of $H_0 = nh/kg\mu_N T_0$. For $k_{max}=2$ and values of $H=H_0$, the maximum or minimum of the correlation may be observed by choosing θ_0 and t_0 to satisfy the relation:

$k(\theta_0 - \omega_{L_0} t_0) = 2m\pi$ or $(2m-1)\pi$, respectively,

for $m = 0, 1, 2, \ldots$

The stroboscopic method has been used for states with lifetimes from milliseconds to about 0.1 microseconds.

To measure the moments of very short-lived states by PAD, nuclei have been implanted by Coulomb excitation (IMPAC) or imbedded in ferromagnetic and paramagnetic materials to make use of the very large internal fields known to exist at impurity sites. One of the major difficulties in these experiments is knowledge of the magnetic fields perturbing the nucleus. The past history of the source and its treatment can cause wide variations in the fields present. The recoil of the nucleus can displace it from its regular position in the lattice. If the lifetimes are very short, of the order of picoseconds, the transient fields acting on the nucleus as it is slowing down become important. Some estimate of these effects can be made using states with "known" moments. For the particular case of the magnetic moments of the Pt and Os excited states, measured using Ir-Fe alloys, great variations have been observed which cannot be explained, suggesting that the Ir-Fe alloys are unsuitable for moment measurements [71Ki13].

Perturbed angular correlation has been a useful technique for the measurement of moments of a very large number of states which are not accessible by standard resonance or spectroscopic methods, that is, those states with lifetimes between about 10^{-3} and 10^{-12} seconds. However, there are several problems associated with this kind of experiment. For a non-isotropic angular correlation, the states involved must have spins greater than or equal to 1. This means that, in studying magnetic moments, the quadrupole interaction cannot easily be eliminated as is possible in many spectroscopic or resonance experiments where atomic states with $J = 1/2$ or 0 are used. However, by proper choice of sources, it is often possible to reduce the quadrupole interactions. Since PAC experiments involve the decay of radioactive nuclei, the atom can be left in highly excited states. This is especially true following K-capture or alpha-decay. If the nuclear lifetime is very short, the environment may not have reached equilibrium

before the emission of the second radiation and the perturbations acting on the nucleus are not completely known.

In PAC experiments, as with all determinations of μ, the magnetic field at the nucleus must be known. For many of the measurements, the values of μ are determined only to about 5–10% and therefore the diamagnetic and Knight-shift corrections, which are less than 1–2% even for the heaviest atoms, are not important. However, for transition elements, the rare-earths, and the transuranic elements, paramagnetic corrections must be made for the large fields caused by the unfilled inner electron-shells. A table of correction factors, β, for rare-earth ions for temperatures of 50° to 2000°K can be found in [64Gu06].

In an actual angular correlation experiment the time-resolution, counter-efficiencies, geometry, accidental coincidences and the effects of other coincidences which may have been present, must all be taken into account in the evaluation of the moments. A discussion of the treatment of the raw data appears in Frauenfelder and Steffen's paper [65Fr20], p1188.

General discussions of perturbed angular correlations can be found in the many papers already cited. There are also several reviews on particular methods in Hyperfine Interactions [67Fr15]. Discussions of some of the newer techniques and problems can be found in the proceedings of several of the recent international conferences, for example, those at Asilomar, 1967 [68Ma56]; Delft, 1970 [71Va39]; Rehovot, 1970 [71Go39]; and Osaka, 1972 [72Pr21].

Explanation of Table J

Nucleus	Chemical symbol with Z- and A-number
Level	Energy, in keV, of the level for which information is given Ground state levels are indicated by gs.
$T_{1/2}$	Half-life of the level The value quoted is taken from Table of Nuclear Half-lives [68Ma49], Nuclear Data Sheets (through Volume B5), Table of Isotopes [67LeHo], or it is the value used in the referenced article.
I	Nuclear spin, in units of $h/2\pi$, used to obtain μ from the deduced g-value Values enclosed in ( )'s have been determined by resonance or spectroscopic techniques. Values enclosed in [ ]'s have been inferred from decay characteristics
μ	Nuclear magnetic dipole moment, in nuclear magnetons The values of μ obtained by Integral Perturbed Angular Correlations or Attenuated Angular Correlations, which are derived from the measurement of $\omega\tau$, have been corrected to the value of $T_{1/2}$ quoted unless otherwise indicated by an "a". In general, values of μ determined by these techniques are not accurate enough to warrant the application of a diamagnetic correction. Those marked by "d" have had a diamagnetic correction included.
Q	Nuclear electric quadrupole moment, in barns, as given by the experimenter Those values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment.
Refer.	Reference key number

Method

Codes used to designate the specific techniques are:

AAC	attenuation of the angular correlation
BAO, BAP	β–asymmetry from oriented, polarized nuclei
CDPAC	constant delay perturbed angular correlation
DAAC	time differential attenuated angular correlation
DPAC, DPAD	time differential perturbed angular correlation, distribution
GAO, GAP	γ–anisotropy from oriented, polarized nuclei
IMPAC	perturbed angular correlation following implantation
IPAC, IPAD	integral perturbed angular correlation, distribution
NMR	nuclear magnetic resonance
NRF	nuclear resonance fluorescence
PAC, PAD	perturbed angular correlation, distribution
SpHt	nuclear specific heat
Strob	stroboscopic perturbed angular correlation
SE	spin exchange
αAO	α–anisotropy from oriented nuclei

Measured Quantity

Measured quantities from which the moments are derived

Units quoted are as given or as determined from graphs or data presented. There has been a confusion in the units quoted for precessional frequencies in many papers (an interchange of Hz and rad./s). We have tried to correct these, but we include a footnote to the author's quoted unit.

Environment and Comments

Nature of materials used; magnetic fields (external or internal); assumptions made; comments

If there are a series of values for a respective series of conditions, the values and conditions are set off by similar punctuation.

The notation (185γ)(89γ) represents coincidences between the 185keV γ and the 89keV γ.

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{8}_{3}$Li	gs	0.85s	(2)	±1.6532[d] *8*		59Co68	BAP-NMR	ν=3.413 *1* MHz	^{7}LiF(polarized n,γ) H_o=5418 *1* G
$^{8}_{3}$Li	gs	0.85s	(2)	positive		62Co08	BAP-NMR	‡Compared Zeeman level transition rates for two senses of circularly polarized rf fields.	^{7}LiF(polarized n,γ)
$^{8}_{3}$Li	gs	0.85s	(2)	±1.6532[d] *8*		67Gu14	BAP-NMR	ν=2.0570 *7* MHz	^{7}LiF(polarized n,γ) H_o=3.2649 *4*kG
$^{8}_{3}$Li	gs	0.85s	(2)	±1.65362[p] *22*, ±1.65288[p] *20*, ±1.65270[p] *30*		71Ha67	BAP-NMR		^{7}Li(d,p) recoils in Au,Pt,Pd foils
$^{8}_{3}$Li	gs	0.85s	2	±1.653		71Ot04	BAP-SE		
$^{8}_{5}$B	gs	770ms	[2]	±1.03551[dp] *25*		72Mi19	BAP-NMR		^{6}Li(^{3}He,n) recoils in Pt foil.
$^{10}_{5}$B	720	690ps	[1]	+0.63 *12*		72Av01	IPAC		^{9}Be on Au(p,); H_o=17.6kG
$^{12}_{5}$B	gs	20.4ms	(1)	+1.003 *1*		67Su03 68Su05	BAP-NMR	ν_o/ν_p‡= 1.79641 *32*, 1.79637 *39*; 1.79510 *25*, 1.79526 *29*; 1.79639 *22* ‡Includes correction of 25.6 ppm for proton resonance in H_2O	^{11}B(d,p) recoils in Cu;Pt;Au foils. H_o measured by proton resonance. μ (uncorrected for σ + K) =1.00337 *15*; 1.00270 *11*; 1.00337 *12*
$^{12}_{5}$B	gs	20.4ms	(1)	±0.976 *31*		68Pf03 70Wi17	DPAD		^{11}B(d,p)polarized ^{12}B recoils in Au, Pd; H_o= 8.24 to 15.95G
$^{12}_{5}$B	gs	20.4ms	1		±0.017‡*2*	70Su04 71Mi06	BAP-NMR	eqQ=154 *16* kHz; 49 *5*kHz Q^{12}/Q^{11}=± 0.42 *4* ‡Used Q^{11}=+0.04065 *26* (70Ne21)	TiB_2; ZrB_2
$^{12}_{5}$B	gs	20.4ms	(1)	+1.00285‡$^{+15}_{-14}$		70Wi17	BAP-NMR	μ=1.00336 *8*; 1.00324 *6*; 1.00253 *5*; 1.00261 *6* ‡Includes Knight shift estimated from spin relaxation times.	^{11}B(d,p) recoils in Au;Cu; Pd;Pt;values uncorrected for Knight shift; H_o measured by proton resonance.
					+0.030 *8*		BAP-NMR	eqQ=59 *15*kHz	^{11}B(d,p)recoils in Be foils; compared with values for Be; used $\gamma_\infty(B^{3+})$=−0.145
$^{12}_{5}$B	gs	20.4ms	(1)		≈0.0346[p]	71Wi28	BAP-NMR	eqQ=54.9 *6*kHz	^{12}B implanted in Be single crystal.
$^{13}_{5}$B	gs	19ms	[3/2]	±3.17712‡ *51*		71Wi09	BAP-NMR	ν/ν_p=0.379104 *25* ‡Includes estimate of Knight shift from ^{12}B	^{11}B(t,p) recoils in Au, Pt, Pd foils.
$^{13}_{5}$B	gs	19ms	[3/2]		±0.08	72Ha68	BAP-NMR	Q^{12}/Q^{13}=0.358[p] *8* eqQ^{13}=130 *2*kHz eqQ^{12}=46.5 *5*kHz	^{11}B(d,p) and (t,p) recoils in Mg crystal
$^{12}_{7}$N	gs	12ms	(1)	+0.4571 *1*		68Su05 67Su09	BAP-NMR	ν/ν_p‡=0.081817 *23*; 0.081850 *23*, 0.081869 *23*; 0.081836 *13* ‡Includes correction of 25.6 ppm for proton resonance in H_20	^{10}B(^{3}He,n) recoils in Al; Cu; Pt; H_o measured by proton resonance; μ (uncorrected for σ and K)= 0.45699 *13*; 0.45723 *10*; 0.45709 *7*
$^{12}_{7}$N	gs	12ms	1‡			71Mi06	BAP-NMR	‡From observed quadrupole spectra	^{10}B(^{3}He,n) recoils in Nb, Ta

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{14}_{7}N$	5830	12.4ps	[3]	$1.5 \leq \lvert\mu\rvert \leq 2.55^{p}$		72Be60	PAC		$^{12}C(^{3}He,p)$ recoils in He gas or vacuum; used $H_{in,calc}$=57.3MG
$^{18}_{8}O$	1980	3.3ps	[2]	$0.40<\lvert\mu\rvert<0.72$		72Go06	AAC		$^{12}C(^{18}O^{7+},O')$; H_{calc} =85.5MG at oxygen nucleus
$^{17}_{9}F$	gs	66s	[5/2]	$\pm 4.7224^{d}$ *12*		66Su01	BAP-NMR	ν/ν_{p}=0.33797, 0.33804	O(d,n)recoils in CaF_2; $H_o \approx 5$kG
$^{18}_{9}F$	1125	153ns	[5]	+2.840 *65*		67Po09	DPAD	ω=16.6 *3*Mr/s for all cascades	(SiO on Cu)(^{3}He,p); H_o= 6.1 *6*kG
$^{18}_{9}F$	1125	153ns	[5]	+2.860 *30*		67Sc09	DPAD		(CaO on Au)(^{3}He,p); H_o= 15.71kG
$^{19}_{9}F$	197	89ms	[5/2]	+3.69 *4*		61Fr07	DPAD		LiF; CaF_2; NaF(p,p')
$^{19}_{9}F$	197	89ns	[5/2]		±0.11 *2*	64Su01	DPAD	ν_o=12.4 *6*MHz	ClF(p,p')
$^{19}_{9}F$	197	89ns	[5/2]	+3.59 *2*		67Br14	DPAD		(CaF_2 on Cu)(p,p'); (α,α'); H_o=10465G measured by proton resonance
$^{19}_{9}F$	197	89ns	[5/2]	±3.605 *8*		69Bl18	DPAD	ω_p/ω=3.874 *8*	Thick CaF_2 target (p,p'); H_o=2.5 to 18.8kG
$^{20}_{9}F$	gs	11s	[2]	$+2.094^{d}$ *2*		63Ts01	BAP-NMR		CaF_2 crystal(polarized n,); $H_o$measured by proton resonance
$^{20}_{9}F$	gs	11s	[2]	$\pm 2.0935^{d}$ *9*		67Gu14	BAP-NMR	ν=2.1820 *7*MHz	CaF_2 crystal (polarized n,) H_o=2.7358 *4*kG
$^{20}_{9}F$	gs	11.2s	[2]		±0.064 *20*	73Ac03	BAP-NMR	eqQ=±5.77 *2*MHz Q/Q^{19}(197keV)= ±0.108 *4*	MgF_2 crystal(polarized n,); H_o=4.35kG
$^{19}_{10}Ne$	238	17.7ns	[5/2]	−0.740 *8*		69Bl02	DPAD	$\omega/\omega(^{19}F-197)$= −0.2054 *15*	CaF_2(pulsed p,n); $H_o \approx 34$kG
$^{20}_{11}Na$	gs	408ms	2	$\pm 0.3694^{p}$ *10*		71Ot04 70Bo47	BAP-SE		^{20}Ne(d,2n)
$^{22}_{11}Na$	583	243ns	[1]	+0.535 *10*		66Su07	DPAD	ω=15.65 *25*Mr/s	^{210}Po in 30N HF; H_o=6111 *30*G
$^{22}_{11}Na$	583	243ns	[1]	+0.555 *17*		67Sc09	DPAD		(CaF_2 on Cu)(α,n)
$^{29}_{15}P$	gs	4.2s	[1/2]	$\pm 1.2349^{d}$ *3*		71Su13	BAP-NMR	μ=1.23374 *9*; 1.23356 *3*	(Si on Cu)(d,n) recoils in red P; Si
$^{37}_{18}Ar$	1610	4.6ns	[7/2]	−1.33 *5*		71Ra22	DPAD		$K^{37}Cl$(pulsed p,n); H_o=16.6 to 47kG calibrated using ^{19}F(197 level)
$^{36}_{19}K$	gs	245ms	2	$\pm 0.547^{p}$ *2*		72Sc35	BAP-SE		(^{87}Rb + ^{36}Ar)(p,n)
$^{37}_{19}K$	1380	10.5ns	[7/2]	+5.2 *3*		71Ra22	DPAD		(Ca on Au)(p,α); H_o=8.2kG calibrated using ^{19}F(197 level)
$^{41}_{19}K$	1290	7.3ns	[7/2]	+4.41 *5*		69Bl07	DPAD		(^{41}K on Ta)(p,p'); H_o=34kG; used $g_{ex}(^{19}F-197)$=1.442 *3*

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{40}_{20}$Ca	3740	41ps	[3]	+0.45[p]‡ *24*		70Be71 72He19	IMPAC	$\omega\tau$=4.0 *17* mr	(Ca on Fe)(p,p'); H_o=1 kG, H_{hf}=−92 *6*kG; neglected transient fields
								‡H_{hf} at Ca in doubt	(71Be69)
$^{40}_{20}$Ca	4490	272ps	[5]	+1.55[p]‡ *25*		70Be71 72He19	IMPAC	$\omega\tau$=54 *9* mr	(Ca on Fe)(p,p'); H_o=1kG, H_{hf}=−92 *6*kG,neglected transients fields
								‡H_{hf} at Ca in doubt	(71Be69)
$^{42}_{20}$Ca	3190	5.5ns	[6]	−2.52 *18*		70Ma39	IPAD		(KI on Pt)(α,p); H_o=10.3kG
$^{42}_{20}$Ca	3190	5.5ns	[6]	-3.00^{+12}_{-18}		71No06	DPAD	ω=−58.0 *25*Mr/s‡ $=-74.8^{+30}_{-40}$ Mr/s‡	Ca metal(pulsed α,2p); H_o=24.20 *15*, 31.5 *3*kG; assumed K negligible
								‡Unit given as MHz	
$^{41}_{21}$Sc	gs	0.59s	[7/2]	±5.43[dp] *2*		72Su05	BAP-NMR		^{40}Ca(d,n)recoils in Pt foil at 4.2°K; expect K<0.26%
$^{43}_{21}$Sc	3123	450ns	[19/2]	+3.144‡ *19*		71Na10	DPAD Strob		Ca metal(pulsed α,p); H_o= 5.96 *2*, 3.64 *1*; ~7.5kG
								‡Assumed K=(0.25 *20*)%	
$^{44}_{21}$Sc	69	153ns	[1]	+0.35 *2*		62Be19	DPAC		TiOF solution;H_o=2648; 5563G
$^{44}_{21}$Sc	69	153ns	[1]	+0.342 *6*		67Ri06	DPAC	ω=12.35Mr/s	^{44}Ti in HCl; H_o=7550G
$^{44}_{21}$Sc	69	153ns	[1]		±0.18[p]‡ *3*	69Be77	PAC		$BaTiO_3$
								‡Antishielding correction made	
$^{47}_{21}$Sc	767	274ns	[3/2]	±0.35 *5*		68Fo02	DPAC	ω=6.9 *10* Mr/s	(^{44}Ca on Cu)(α,p); H_o= 6.10 *6*kG
$^{48}_{23}$V	gs	16d	(4)	±1.63 *10*		66Ca04	GAP	μH=±1.34 *8*nm−kG	Fe−V; H_{int}=−82kG; T measured by ^{54}Mn in Cu
$^{48}_{23}$V	306	7.09ns	[2]	+0.376 *34*		67Au02	IPAC	$G_2\omega\tau$=0.331 *13*r, $G_2\omega\tau$=0.407 *23*	liquid source, H_o=36.4kG; ^{48}Cr in Cu metal, H_o=46.6kG; G_2=0.91 *7*; 0.95 *6*
$^{48}_{23}$V	306	7.09ns	[2]	±0.44[p] *19* ±0.51[p] *23*		69Pa12	IPAC		dilute $BaCrO_4$ in HNO_3; H_o=14.2kG
$^{51}_{23}$V	320	173ps	[5/2]	+4.2 *7*		63Kr02	NRF		(V metal powder)(γ,γ) using gaseous $^{51}CrCl_2O_2$ γ−source; H_o=24.7kG; assumed K=+0.6% (H_{int} uncertain ~10%−65Ma27)
$^{51}_{23}$V	320	173ps	[5/2]	+3.85 *32*		68Ke09	IPAD	$\omega\tau$=−0.163 *14*r, $\omega\tau$=−0.161 *21*, $\omega\tau$=−0.159 *20*	4.5%V−Fe alloy, 1%V−Fe alloy, 2%V−Fe alloy CEx with p; H_{int}=87.3 *18*kG
$^{51}_{24}$Cr	749	7.5ns	[3/2]	±1.1[bf] *7*		69Ku18	DPAD		^{50}Cr(d,p)
$^{52}_{25}$Mn	gs	5.7d	(6)	positive‡		57Hu80	GAP		$Ce_2Mg_3(NO_3)_{12}$•*24*
								‡Measured circular polarization of γ	
$^{52}_{25}$Mn	gs	5.7d	6?	±2.98 *15*		61Je04	GAO		$La_2Mg_3(NO_3)_{12}$•*24*
$^{52}_{25}$Mn	gs	5.7d	(6)	+3.059 *2* or +3.0764 *6*	+0.53 *11*	70Ni11	GAO-NMR	g^{52}/g^{55}= 0.36961 *7* Q^{52}/Q^{55}=+1.5 *2*	$(Ce,La)_2Mg_3(NO_3)12$•*24* at 0.1°K;used μ^{55}_{cor}=+3.449 *2* or 3.4680 *3* and Q^{55}=+0.35 *5*
$^{54}_{25}$Mn	gs	312d	(3)	±2.5 *2* positive‡		60Ba42	GAP	g^{52}/g^{54}=0.60	$(Zn,Ni)SiF_6$•*6*; CMN; used μ^{52}=3.05
								‡Measured circular polarization of 840γ	
$^{54}_{25}$Mn	gs	312d	3	±3.28 *6*		61Je04	GAO		$La_2Mg_3(NO_3)_{12}$•*24*

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{54}_{25}$Mn	gs	312d	(3)	±3.284[d] *5* or ±3.302[d] *5*		67Te01	GAP-NMR	ν=189.9 *3*MHz	^{54}Mn in Fe; 0.013°K; H_o=675G; H_{hf}=−229.00kG; recalculated using μ^{55}_{cor}=3.449 *2* or 3.4680 *3*
$^{54}_{25}$Mn	gs	312d	(3)	+3.278 *2* or +3.2959 *4*	+0.35 *8*	70Ni11	GAO-NMR	g^{54}/g^{55}=+0.79199 *6* Q^{54}/Q^{55}=+0.99 *10*	$(Ce,La)_2Mg_3(NO_3)_{12}$•*24* at 0.1°K, used μ^{55}=+3.449 *2* or 3.4680 *3* and Q^{55}=+0.35 *5*
$^{56}_{25}$Mn	gs	2.58h	(3)	±3.3 *3* positive‡		60Ba06	GAP	g^{52}/g^{56}=0.47 *5*	CMN; used μ^{52}=3.05 ‡Measured circular polarization of 845γ
$^{54}_{26}$Fe	1408	1.0ps	[2]	+2.86‡ *56*		72Hu08 74Hu01	IMPAC	$\Delta\theta$=−18.9 *48*mr, $\Delta\theta$=−12.3 *22*mr	CEx with ^{16}O, recoils in Fe, $Fe_{0.8}$−$Co_{0.2}$; H_{hf}=−330, −364kG for Fe, alloy respectively ‡Analyzed $\Delta\theta$ vs E_{recoil} with transient field theory. Assumed 12% radiation damage correction to H_{hf}.
$^{54}_{26}$Fe	2950	1.22ns	[6]	±8.22 *18*		71He21	DPAD	ω=2230 *50* Mr/s	^{54}Fe(p,p′); H_o=2.5kG; H_{int}=−339kG
$^{56}_{26}$Fe	847	6.9ps	[2]	+1.12 *32*		61Me11	NRF	$\omega\tau$=±0.485°	Fe(γ,γ)using gaseous $^{56}CoCl_2$ γ-source; H_{int}=3.17kG
$^{56}_{26}$Fe	847	6.9ps	[2]	+1.23‡ *34*		63Ap01	IPAC	$\omega\tau$=7.9‡ *37*mr	^{56}Co diffused into Fe; H_{int}=−330 *10*kG ‡Corrected for other γ's coincident with 845γ and for influence of field on position of peaks
$^{56}_{26}$Fe	847	6.93ps†	[2]	+1.20‡ *20*		72Hu08 74Hu01	IMPAC		Fe(p,p′)recoils in Fe ‡$\Delta\theta$ vs E_{recoil} fit with transient field theory †Value used in analysis
$^{57}_{26}$Fe	136	8.8ns	[5/2]	±0.915 *45*		64Ko16	DPAD		(^{57}Fe on Cu)(p,p′); H_{int}=−333kG
$^{57}_{26}$Fe	136	8.8ns	[5/2]	+0.85 *12*		69Sp05	IPAD	$\omega\tau$=0.230 *36*r	Stainless steel (14MeV O^{3+},O′); H_o=11.0kG
$^{57}_{26}$Fe	367	7ps	[3/2]	$\lvert\mu\rvert$<0.6 or H_{int}≠330kG		69Sp05	IMPAC		(^{57}Fe on Fe)(30MeV O^{4+},O′); H_{hf}=330kG assumed
$^{57}_{26}$Fe	367	7ps	[3/2]	$\lvert\mu\rvert$<0.9		74Hu01	IMPAC	$\Delta\theta$=6 9mr	^{57}Fe recoils in $Fe_{.8}Co_{.2}$ H_{hf}(Static)=−364kG; Φ_t/g=−14.5mr expected from transient field theory including radiation damage correction to H_{hf}
$^{57}_{26}$Fe	707	3ps	[5/2]	$\lvert\mu\rvert$<1.0		74Hu01	IMPAC	$\Delta\theta$=4.0 *55*mr	^{57}Fe recoils in $Fe_{.8}Co_{.2}$;H_{hf}(Static)=−364kG;Φ_t/g=−13.6mr expected from transient field theory including radiation damage corrections to H_{hf}
$^{58}_{26}$Fe	811	6.4ps	[2]	+1.08 *34*		69Si13	IPAC	$\omega\tau$=7.73 *175* mr	^{58}Co in Fe; H_o≈5kG, H_{hf}=323.4kG at room T
$^{59}_{26}$Fe	gs	45d	(3/2)	±1.1 *2*		70Ts04	GAO	A^{59}/k=6.2 *11*m°K	$Nd_2Zn_3(NO_3)_{12}$•*24* crystal; $Ce_2Zn_3(NO_3)_{12}$•*24* crystal; used A/k(^{57}Fe)=1.57 *4*m°K
$^{55}_{27}$Co	gs	18h	[7/2]	±5.3 or 4.5		60Ba20	GAP	g^{58}/g^{55}=1.33 or 1.55 *10*	$Ce_2Mg_3(NO_3)_{12}$•*24*;used I^{58}=2, μ^{58}=4.03
$^{55}_{27}$Co	gs	18h	[7/2]	±4.3 *3*		61Ch12	GAO		(Ni,Zn)SiF_6•6 crystal; ^{60}Co used as thermometer

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{57}_{27}$Co	gs	270d	(7/2)	+4.722[d] *17*	+0.49 *9*	72Ni01	GAO-NMR	A=+243.46 *48*MHz B=+317.7 *5*Mhz P=+0.28 *4*MHz	$(Ce,La)_2(Mg,Co)_3(NO_3)_{12}$•24; for ^{59}Co used A=+79.096 *4*, B=+103.91 *4*, P=+0.0720 *4* in units of (hcx10^{-4}cm^{-1}) from ENDOR and μ^{59}_{cor}=4.616 *9*, Q^{59}=+0.38
$^{57}_{27}$Co	1378	19.4ps	[3/2]	+2.8 *9*		67Be17	IPAC		Fe(α,); H_{int} =−290.6 *9*kG
$^{57}_{27}$Co	1378	19.4ps	[3/2]	+3.0 *6*		70Va10	IMPAC	$\omega\tau$=70mr	^{54}Fe(α,n); H_{int}=−290.6 *9*kG
$^{58}_{27}$Co	gs	71.3d	[2]	±3.5 *3*		52Da19	GAO		(Co,Cu,Zn)$Rb_2(SO_4)_2$•*6*
$^{58}_{27}$Co	gs	71.3d	[2]	+4.035 *8*	+0.21 *3*	72Ni01	GAP-NMR	A=+362.73 *4*MHz B=+476.75 *20*MHz P=+0.41 *2*MHz	See ^{57}Co (72Ni01) above
$^{58}_{27}$Co	54	10.2μs	[4]	+4.184 *8*		70Be33	Strob DPAD	B_o=627.4 *10* G for T_o=1μs	^{57}Fe(pulsed d,n); target at T=930°C ($T>T_C$)
$^{59}_{27}$Co	1292	564ps	[3/2]	+1.99 *35*		67Ag03	IPAC		dilute $FeCl_3$; dilute $FeCl_2$; $K_3Fe(CN)_6$; H_o=18.2kG, β=1.5
$^{59}_{27}$Co	1292	564ps	[3/2]	+1.64 *14*		71Ar07	IPAC AAC	g=+1.11 *10* g=±1.04 *16*	^{59}Co−Fe;H_o=13kG,H_{int}=−276kG; ^{59}Co−Cu, ^{59}Co−Ni, ^{59}Co−Fe
$^{60}_{27}$Co	gs	5.26y	(5)	±3.5 *5*		54Bl07	GAO	βT=0.0112°K	(Co,Cu,Zn)$Rb_2(SO_4)_2$•*6*; used βT^{59}=0.021°K; μ^{59}=4.62
$^{60}_{27}$Co	gs	5.26y	(5)	±4.3 *2*		55Po17	GAO		(Co,Cu,Zn)$(NH_4)_2(SO_4)_2$•*6* crystal
$^{60}_{27}$Co	gs	5.26y	(5)	positive		55Wh42	GAP		$Ce_2Mg_3(NO_3)_{12}$•*24*; measured circular polarization of γ
$^{60}_{27}$Co	gs	5.26y	(5)	+3.790 *8*	+0.42 *5*	72Ni01	GAP-NMR	A=+136.22 *7*MHz B=+179.08 *8*MHz P=+0.113 *5*MHz	See ^{57}Co (72Ni01) above
$^{63}_{28}$Ni	87.2	1.72μs	[5/2]	+0.752 *2*		70Bl06 71Bl15	DPAC		^{62}Ni(pulsed d,p); H_o=18.33kG
$^{62}_{29}$Cu	41	4.80ns	[2]	±1.21 *6*		71Bl15	DPAC		^{62}Ni(pulsed p,n); H_o=28.0kG at 870°,970°K;H_o=5.55,11.1kG at 290°K,H_{int}=−41.8, −36.4kG
$^{62}_{29}$Cu	41	4.80ns	[2]	±1.34 *12*		71Bo64	IPAC DPAC	$\omega\tau$=−0.56$^{+56}_{-28}$r ω=−44 *8*Mr/s	Ni(α,2n); aqueous ZnCl; H_o= 13.20 *15*kG
$^{62}_{29}$Cu	390	11.5ns	[3]	±1.89[p]		69Su13	PAC		aligned ^{60}Ni(pulsed α,np), H_{hf}=−47.2kG
$^{64}_{29}$Cu	1590	20.4ns	[6]	+1.02[p] *6*		71Su09	PAC		aligned ^{62}Ni(pulsed α,np)
$^{64}_{29}$Cu	1590	20.4ns	[6]	+1.06[p] *3*		72Bl14	DPAD		
$^{66}_{29}$Cu	1154	596ns	[6]	+1.038[p] *3*		72Bl14	DPAD		
$^{67}_{30}$Zn	185	1.01ns	[3/2]	+0.38 *12*		68Li02	IPAC	$\omega\tau$=3.1°‡	Cu foils(α,2n); H_o=31.2kG ‡Corrected for strong annihilation background
$^{67}_{30}$Zn	185	1.01ns	[3/2]	±0.51 *6*		69Bo41	IPAC		GaCl; H_o=18.3kG
$^{67}_{30}$Zn	185	1.01ns	[3/2]	+0.35 *12*		71Re01	DPAC IPAC		
$^{67}_{30}$Zn	605	340ns	[9/2]	−1.093[p] *20*		72Be61	DPAD		
$^{67}_{32}$Ge	734	70ns	[9/2]	−0.945[p] *30*		72Be61	DPAD		
$^{67}_{32}$Ge	734	70ns	[9/2]			72Ha69	DPAD	Q/Q^{69}(398keV)= 1.22[p] *2*	Zn(pulsed α,); Ga(pulsed p,); $T<T_{melt}$
$^{69}_{32}$Ge	398	2.8μs	[9/2]	−1.0008[d] *32*		70Ch05	Strob	$B_{o\ corr}$= 2.951 *10*kG for T_o=1μs	liquid ^{69}Ga(pulsed p,n); used K_{Ge}=4.49 4x10^{-3}, σ_{Ge}=2.8x10^{-3}

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{70}_{32}$Ge	1040	1.3ps	[2]	+1.18‡ *58*		69He11	IMPAC	$\Delta\theta$=−11.2 *15*mr	(^{70}Ge on Fe)(^{16}O,O′); H_o~1kG; H_{int}=+70 *3*kG
								‡Includes estimate of transient field	
$^{70}_{32}$Ge	1040	1.3ps	[2]	+1.76[c]‡ *42*		74Hu01 (69He11)	IMPAC	‡Included effect of decays-in-flight	H_{hf}=+70 *3*kG
$^{71}_{32}$Ge	175	79ns	[5/2]	+1.015 *10*		68Mo12	DPAD		$AuGa_2$(pulsed p,n), H_o=15.98kG; (Ga on Au)(pulsed p,n), H_o=26.04kC
$^{71}_{32}$Ge	175	79ns	[5/2]			72Ha69	DPAD	Q/Q^{69}(398keV)= 0.219[p] *4*	Zn(pulsed α,); Ga(pulsed p,); $T<T_{melt}$
$^{71}_{32}$Ge	198	20.2ms	[9/2]	−1.022 *23* −1.0396[d] *23*		70Be29	DPAD Strob	B_o=355.8 *8*G for T_o=64μs	liquid ^{71}Ga(pulsed p,n); H_o=98.7, 72.4G for DPAD
$^{71}_{32}$Ge	198	20.2ms	[9/2]		±0.28[p] *10*	72Ri13	‡	‡Measured relaxation time as f(T) by GAO	liquid Ga(pulsed p,n)
$^{72}_{32}$Ge	835	3.14ps	[2]	+1.00 *50*		69He11	IMPAC	$\Delta\theta$=−9.9 *17*mr	(^{72}Ge on Fe)(^{16}O,O′); H_{int}=+70 *3*kG
$^{72}_{32}$Ge	835	3.14ps	[2]	+1.16[c]‡ *28*		74Hu01 (69He11)	IMPAC	‡Included effect of decays-in-flight	H_{hf}=+70 *3*kG
$^{74}_{32}$Ge	596	12ps	[2]	+0.92 *46*		69He11	IMPAC	$\Delta\theta$=−11.3 *13*mr	(^{74}Ge on Fe)(^{16}O,O′); H_{int}=+70 *3*kG
$^{74}_{32}$Ge	596	12ps	[2]	+0.94[c]‡*20*		74Hu01 (69He11)	IMPAC	‡Included effect of decays-in-flight	H_{hf}=+70 *3*kG
$^{76}_{32}$Ge	563	17.6ps	[2]	+0.74 *36*		69He11	IMPAC	$\Delta\theta$=−9.9 *15*mr	(^{76}Ge on Fe)(^{16}O,O′); H_{int}=+70 *3*kG
$^{76}_{32}$Ge	563	17.5ps	[2]	+0.72[c]‡ *16*		74Hu01 (69He11)	IMPAC	‡Included effect of decays-in-flight	H_{hf}=+70 *3*kG
$^{72}_{33}$As	215	80ns	[3]	+1.575[p] *18*		72Be62	DPAD		^{72}Ge(p,n)
$^{73}_{33}$As	66.9	5.0ns	[5/2]	+1.62 *10*		63Bo26	DPAC	ν=116 *6*MHz	
$^{73}_{33}$As	427	5.8μs	[9/2]	+5.157‡ *32*		69Qu03	PAD-NMR	$\|g\|(1+K)$= 1.1495 *57*	liquid ^{71}Ga metal(α,2n); H_1, ν_1=8.5G, 858kHz; 12.4, 854; 17.0, 856; 14.6, 925
								‡Assumed K=+0.32%	
$^{73}_{33}$As	427	5.8μs	[9/2]	±5.234 *13*		70Be23	Strob		solid ^{72}Ge(d,n)
$^{74}_{33}$As	274	26.8ns	[3]	+2.428[d] *30*		71Ch10	DPAD	$\omega/\omega(^{19}$F−197keV)= +0.555 *4*	^{74}Ge metal(pulsed p,n); H_o=21kG; Knight shift negligible
$^{75}_{33}$As	265	11.9ps	[3/2]	±1.11 *33*		71Be89	IPAC	$\omega\tau$=9.0 *24*mr	Se in Fe; H_{eff}=150 *17*kG
$^{75}_{33}$As	265	11.9ps	[3/2]	+0.93[p] *24*		72Ch36	IPAC	$\omega\tau$=16.2 *4*mr	implantation in Fe foil by mass-separator; H_{hf}=319 *33*kG measured using 280keV level
$^{75}_{33}$As	280	0.28ns	[5/2]	+0.90 *28*		60Ma03	IPAC	$G_2\omega\tau$=−17.2 *34*mr	^{74}Se(pile n,) dissolved in HNO_3; H_o=13kG; β=1, G_2~1
$^{75}_{33}$As	280	0.28ns	[5/2]	+0.83[p] *18*		66Ag01	IPAC	$\omega\tau$=13.6 *22*mr	material not given; H_o=20kG
$^{75}_{33}$As	280	0.28ns	[5/2]	±2.4[p] *3*		70Az01	IPAC		^{75}Se in HNO_3; H_o=10kG; used β=1, G_2=1
$^{75}_{33}$As	280	0.28ns	[5/2]	±0.91 *12*		71Be89	IPAC	$\omega\tau/H$= 0.698 *75*r/MG	H_2SeO_3 in dilute HCl, H_o=20kG
								$\omega\tau$=104.7 *35*mr	Se in Fe, find H_{eff}=150 *17*kG and H_{hf}=145 *18*kG
$^{76}_{33}$As	45	2.60μs	[1]	+0.558 *1*		71Be90	Strob	B_o=1175 *2*G for T_o=1μs	metallic ^{76}Ge(p,n)
$^{77}_{33}$As	473	116μs	[9/2]	±5.508[p] *9*		70Be78	Strob		liquid ^{76}Ge metal(d,n)

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{76}_{34}$Se	559	11.1ps	[2]	+0.80 *24*		67Mu10	IPAC	$\omega\tau$=20 *3*mr	pure metal; Fe–As(pile n,); H_{int}=+650 *150*kG
$^{76}_{34}$Se	559	11.1ps	[2]	+0.80 *22*		69He11	IMPAC	$\Delta\theta$=–27.1 *15*mr	(^{76}Se on Fe)(^{16}O,O′); H_o≈1kG H_{int}=+650 *150*kG
$^{77}_{34}$Se	249	9.4ns	[5/2]	+1.20 *15*		64En01	DPAC	ω=75 *8*Mr/s	K^{77}Br; H_o=33kG
$^{77}_{34}$Se	440	24ps	[5/2]	+1.02 *28*		70Ro32	IMPAC	$\Delta\theta$=–53.0 *88*mr	recoils in Fe; H_{int}= +650 *150*kG; $H_i\tau_i$=+4.5 *23*MG–ps
$^{78}_{34}$Se	614	8.6ps	[2]	+0.82 *22*		69He11	IMPAC	$\Delta\theta$=–24.0 *16*mr	(^{78}Se on Fe)(^{16}O,O′); H_{int}=+650 *150*kG
$^{80}_{34}$Se	666	8.05ps	[2]	+0.84 *24*		69He11	IMPAC	$\Delta\theta$=–23.9 *11*mr	(^{80}Se on Fe)(^{16}O,O′); H_{int}= +650 *150*kG
$^{82}_{34}$Se	655	11.3ps	[2]	+0.86 *24*		69He11	IMPAC	$\Delta\theta$=–29.5 *8*mr	(^{82}Se on Fe)(^{16}O,O′); H_{int}=+650 *150*kG
$^{78}_{35}$Br	181	100μs	[4]	±4.100‡ *12*		71Br31	PAD–NMR		molten Se–Tl(pulsed p,n); H_o=6.5G ‡Uncorrected for Knight shift or diamagnetism
$^{78}_{35}$Br	181	100μs	[4]	+4.08‡ *8*		71In04	DPAD		Molten Se–Tl(390°C) (pulsed p,); H_o=51.5 *5*, 63.8 *1*, 96.3 *9*G τ_{relax}=40 *30*μs ‡Uncorrected for Knight shift or diamagnetism
$^{81}_{35}$Br	540	35μs	[9/2]	±5.84‡ *7*		71Br31	PAD–NMR		molten Se–Tl (pulsed d,n); H_o=10.4G ‡Uncorrected for Knight shift or diamagnetism
$^{81}_{35}$Br	540	35μs	[9/2]	±5.674‡ *45*		71Ch28	Strob	ω_o=391.70kr/s for n=2; H_o=64.87G	Se–Tl at 450°C(pulsed 10MeV d,); τ_{relax}=24 *11*μs ‡Uncorrected for Knight shift or diamagnetism
$^{82}_{35}$Br	gs	36h	(5)	positive		71Hi12	BAP		^{82}Br and ^{57}Co implanted in Fe; T~30m°K
$^{79}_{36}$Kr	148	77.7ns	[5/2]	+1.122 *10*		68Bl04	DPAD		aqueous(K^{19}F+K^{79}Br)(pulsed p,n); H_o~25kG; used $g(^{19}F_{ex})$=1.445 *3*
$^{83}_{36}$Kr	9.3	143ns	[7/2]	–1.82†[P] *25*	≈1[P]	67Mi17	DPAC	$2\omega_{spin}$= 29.6†Mr/s‡	RbCl at 23°C; H_o=1.7kG; polycrystalline $Rb_2Mg(SO_4)_2$·*6* ‡Unit given as MHz †Values as reported in paper
$^{86}_{38}$Sr	?	460ns	[8]	–1.93[P] *12*		72Ha66	DPAD	ω=8.46 *50*Mr/s	^{88}Sr(p,n); H_o=7.27kG
$^{86}_{39}$Y	243	28.5ns	[2]	–1.06 *6*		68Tr11	DPAC		As(^{16}O,5n)Zr, chem; Zr in 1M HF solution; H_o~41kG; β=1 assumed
$^{90}_{40}$Zr	3590	130ns	[8]	±10.84 *14*		70Na13 71Na16	Strob	ω=78.55 *79*Mr/s‡	Sr metal(α,2n); H_o=12.00 *4*kG; K=0.87% assumed ‡Unit given as MHz
$^{91}_{40}$Zr	>2265	29.0ns	[15/2]	±5.32[P] *8*		72Ba82	DPAD		^{88}Sr(α,n)

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{91}_{41}$Nb	2378	10.0ns	[17/2]	±10.62[P] *34*		72Ba82	DPAD		^{89}Y(α,2n)
$^{95}_{41}$Nb	gs	35d	[9/2]	±6.3 *6* $\mu H<0$		67Ca07	GAP		dilute Nb–Fe; Nb–Co alloys; H_{int}(in Fe)=255kG from NMR measured circular polarization of 768γ
$^{92}_{42}$Mo	2761	190ns	[8]	±11.2 *6*		70Co28 71Co08	DPAC	ω=25.5 *12*Mr/s	^{90}Zr foil(α,2n); H_o=3.8 *1*kG
$^{92}_{42}$Mo	2761	190ns	[8]	±11.27 *13*		70Na13 71Na16	Strob	ω(1)= 70.37 *63*Mr/s‡ ω(2)= 71.05 *64*Mr/s‡ ‡Unit given as MHz	(^{90}Zr metal on Zr)(α,2n); H_o=10.39 *2*kG; (1)=773γ, (2)=1511γ
$^{94}_{42}$Mo	2953	97.7ns	[8]	±10.54[P] *16*		72Fa16	DPAD		^{92}Zr(α,2n); H_o=15.85kG
$^{95}_{42}$Mo	204	760ps	[3/2]	−0.55 *6*		66An02	IPAC	$\omega\tau$=−44 *3*mr $\omega\tau$=−37.5 *80*mr	solid Mo(d,) liquid $HTcO_4$+H_2MoO_4 in HNO_3; H_o=22.5 *3*kG
$^{95}_{42}$Mo	204	760ps	[3/2]	−0.39 *3*		70Bo28	IPAC	$\omega\tau$=+28.0 *17*mr (average for 2 cascades)	Nb foil(α,2n); H_o=20.6 *4*kG assumed
$^{98}_{42}$Mo	787	3.5ps	[2]	+0.68 *36*		69He11	IMPAC	$\Delta\theta$=−12.1 *30*mr	(^{98}Mo on Fe)(O,O′); H_o~1kG; H_{int}=−256 *5*kG
$^{100}_{42}$Mo	536	10ps	[2]	+0.68 *36*		69He11	IMPAC	$\Delta\theta$=−8.0 *10*mr	^{100}Mo on Fe(O,O′); H_{int}=−256 *5*kG
$^{96}_{43}$Tc	gs	4.3d	[6]	±4.60 *14*		71Fo24	GAP–NMR	ν=173.23 *5*MHz, 171.45 *5*, 168.88 *8*	Tc–Fe; H_o=1.317,4.39,8.78kG; Obtain g from slope of ν vs H_o and H_{int}=−298 *10*kG from intercept
$^{99}_{43}$Tc	141	192ps	[7/2]	±3.8 *12*		68Za04	IPAC	$\omega\tau$=30 *10*mr	solid MoO_3; H_o=20 *1*kG
$^{99}_{43}$Tc	141	192ps	[7/2]	+4.7 *12*		69In07	IPAC	$\omega\tau$=+0.58 *10*r	Mo–Fe(pile n,); assumed H_{int}=−320 *65*kG
$^{99}_{43}$Tc	181	3.59ns	[5/2]	±3.6 *5* positive		58Ra16	AAC IPAC		Mo wire disolved in HNO_3; H_o=10kG
$^{99}_{43}$Tc	181	3.59ns	[5/2]	+3.6 *4*		59Bo43	IPAC	G_2=0.81 *5*	fission Mo in $(NH_4)_2MoO_4$; H_o=15.55kG (H_{int} uncertain ~10%,65Ma27)
$^{99}_{43}$Tc	181	3.59ns	[5/2]	+3.6 *3*		65An02	IPAC		$(NH_4)_2MoO_4$; H_o=16.00 *25*kG
$^{99}_{43}$Tc	181	3.59ns	[5/2]	+3.6 *6*		71Wi08	DPAC		Tc–Cu; H_o=29.80 *15*kG
$^{98}_{44}$Ru	654	5.9ps	[2]	+0.60 *34*		69He11	IMPAC	$\omega\tau$=−5.0 *40*mr	(^{98}Ru on Fe)(^{16}O,O′); H_{int}=−505 *15*kG
$^{98}_{44}$Ru	654	5.9ps	[2]	+0.78[c]‡ *60*		74Hu01 (69He11)	IMPAC	‡Used H_{hf} (IMPAC) = −359 *44*kG, based on g_{ave}(2+)=0.40 *3*, and Φ_t=−10.7 *24*mr; included effect of decays-in-flight	
$^{99}_{44}$Ru	gs	–	(5/2)	−0.623‡ *21*		65Ma27	DPAC	‡Using $\mu(90)/\mu(gs)$=+0.455 *16* from Mössbauer experiments (66Ki02) and $g(90)$=−0.189 *4*; Ru in Cu	
$^{99}_{44}$Ru	90	20.7ns	(3/2)	−0.392 *40*		64Bo28	DPAC	ω= 38.7 *11*x10^6s^{-1}‡ ‡Unit as given	liquid $RhCl_3$ in 3N HCl; (H_{int}uncertain ~10%,65Ma27)
$^{99}_{44}$Ru	90	20.7ns	(3/2)	−0.284 *6*		65Ma27	DPAC	g=−0.181 *2* g=−0.189 *2*	liquid source; H_o=41.6 *4*kG Ru in Cu; H_o=41.5 *4*kG, β≈0.958
				negative			IPAC	g=±0.184 *10*	Ru in Ni; H_{int}=−180 10kG

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{100}_{44}$Ru	540	11.9ps	[2]	+1.02 *13*		66Au06	IPAC	$\omega\tau$=−17.8 *12*mr	^{100}Ru in Fe; H_o=10kG, H_{int}=−442 *31*kG
$^{100}_{44}$Ru	540	11.9ps	[2]			69He11	IMPAC	$\Delta\theta$=3.3 *32*mr	(^{100}Ru on Fe)(^{16}O,O′); H_o≈1kG; H_{int}=−505 *15*kG
$^{100}_{44}$Ru	540	11.9ps	[2]	+0.94[c]‡ *30*		74Hu01 (69He11)	IMPAC	‡See ^{98}Ru(654), 74Hu01	
$^{101}_{44}$Ru	127	550ps	[3/2]	−0.310 *26*		66Au06	IPAC	$\omega\tau$=+336 *13*mr	^{101}Ru in Fe; H_o=10kG, H_{int}=−442 *31*kG
								$\omega\tau$=+130 *4*mr	^{101}Ru in Ni; H_{int}=−178 *8*kG
$^{102}_{44}$Ru	475	17.6ps	[2]	+0.80 *18*		66Au06	IPAC	$\omega\tau$=−20.9 *42*mr	^{102}Ru in Fe; H_o=10kG, H_{int}=−442 *31*kG
$^{102}_{44}$Ru	475	17.6ps	[2]	±0.76[ap] *50*		68Fr17	PAC	$\omega\tau$=−22 *14*mr	Ru diffused in Fe; H_{int}= 500 2kG
$^{102}_{44}$Ru	475	17.6ps	[2]			69He11	IMPAC	$\Delta\theta$=2.8 *44*mr	(^{102}Ru on Fe)(^{16}O,O′); H_{int}=−505 *15*kG
$^{102}_{44}$Ru	475	17.6ps	[2]	+0.741 *62*		72Jo06	IPAC	$\omega\tau$=−21.7 *12*mr	Rh in Fe at liquid He temp; H_o=22kG; H_{hf}=−503 *9*kG
$^{102}_{44}$Ru	475	17.6ps	[2]	+0.62[c]‡ *24*		74Hu01 (69He11)	IMPAC	‡See ^{98}Ru(654), 74Hu01	
$^{104}_{44}$Ru	358	58ps	[2]	+0.58 *8*		69He11	IMPAC	$\Delta\theta$=47.8 *44*mr	(^{104}Ru on Fe)(^{16}O,O′) H_{int}=−505 *15*kG
$^{104}_{44}$Ru	358	58ps	[2]	+0.82[c]‡ *10*		74Hu01 (69He11)	IMPAC	‡Used H_{hf} (IMPAC) =−359 *44*kG, based on g_{ave}(2+)=0.40 *3*, and Φ_i=−10.7 *24*mr; included effect of decays-in-flight	
$^{100}_{45}$Rh	74.8	215ns	[2]	+4.26 *6*		65Ma34	DPAC		metallic Rh; H_o=2.22kG; assumed K=+0.43%
$^{100}_{45}$Rh	74.8	215ns	[2]	+4.321[d] *8*		66Ma54	DPAC	2ν=16.49 *5*, 25.10 *5*MHz	metallic Rh; H_o=4996 *10*G, 7636 *7*G; assumed K=+0.43%
$^{100}_{45}$Rh	74.8	215ns	[2]	±4.298[d] *30*		71Re06	DPAD		^{103}Rh metal(p,4n);G'=0.79 *1*; H_o measured by proton resonance with Hall probe; assumed K=0.43%
$^{103}_{45}$Rh	93	1.13ns	[9/2]	±6.21 *90*		71BaA1	IPAC		dilute $RuCl_4$;H_o=18.5kG, β=1; Ru source in Cu
$^{103}_{45}$Rh	298	6.3ps‡	[3/2]	+0.03 *39*		70Ro32	IMPAC	$\Delta\theta$=+3.6 *50*mr	recoils in Fe; H_{int}= −543 *11*kG, $H_i\tau_i$=7.4 *15*MG−ps assumed
								‡Value of $T_{1/2}$ used in analysis	
$^{103}_{45}$Rh	298	6.3ps‡	[3/2]	±1.72 *46* or ±2.12 *63*		71Bh05	IMPAC	$\Delta\theta$=+29 *7*mr	5%Rh-Fe alloy; H_{int}=−540kG; assumed no transient fields or assumed $H_i\tau_i$=1.24MG−ps
								‡Value of $T_{1/2}$ used in analysis	
$^{103}_{45}$Rh	298	7.6ps‡	[3/2]	±0.90[p] *30*		71Sp14	AAC	$g(3/2)/g(5/2)$= 1.3 *3*	Rh(^{35}Cl,Cl′)recoils in gas
								‡Value of $T_{1/2}$ used in analysis	
$^{103}_{45}$Rh	298	6.3ps	[3/2]	±0.70[ap] *21*		72Mi20	PAC		recoils in gas
$^{103}_{45}$Rh	360	59ps	[5/2]	+1.38 *25*‡		70Ro32	IMPAC	$\Delta\theta$=+102.7 *70*mr	recoils in Fe;H_{int}=−543 *11*kG $H_i\tau_i$=7.4 *15*MG−ps assumed
								‡Uncertainty increased to ~ 20%	
$^{103}_{45}$Rh	360	59ps	[5/2]	±1.2 *2*		71Bh05	IMPAC	$\Delta\theta$=+108 *14*mr	5%Rh-Fe alloy; H_{int}=−540kG, assumed no transient field or $H_i\tau_i$=1.24MG−ps
$^{103}_{45}$Rh	360	76ps‡	[5/2]	±1.12[p]25		71Sp14	AAC		Rh(^{35}Cl,Cl′) recoils in gas
								‡Value of $T_{1/2}$ used in analysis	
$^{103}_{45}$Rh	360	59ps	[5/2]	±0.95[ap] *32*		72Mi20	PAC		recoils in gas

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{104}_{46}$Pd	556	9.7ps	[2]			69Hel1	IMPAC	$\Delta\theta$=−0.8 *14*mr	(^{104}Pd on Fe)(^{16}O,O′);H_o≈1kG H_{int}=−595 *12*kG
$^{104}_{46}$Pd	556	9.7ps	[2]	+0.76‡ *14*		74Hu01	IMPAC	$\Delta\theta$=1.3 *12*mr	CEx with ^{16}O, recoils in disordered $Fe_{.8}Co_{.2}$; H_{hf}(IMPAC)=−409 *31*kG, Φ_t= −9.3 *14*mr
				+0.62[c]‡ *16*		(69Hel1)		‡Calculated assuming $g_{ave}(2+)$=0.36, H_{hf}(IMPAC)=−409kG	
$^{106}_{46}$Pd	512	12.7ps	[2]	+0.85 *11*		65Kol2 66Je02	IPAC	$\omega\tau$=2.06 *20*mr	$RuCl_3$ in 3N HCl; H_o=55.62kG
$^{106}_{46}$Pd	512	12.7ps	[2]	+0.75 *8*		66Au06	IPAC	$\omega\tau$=−17.6 *3*mr	^{106}Pd in Fe; H_{int}=−540 *40*kG
								$\omega\tau$=−11.6 *7*mr	^{106}Pd in Co; H_{int}=−361 *50*kG
								$\omega\tau$=−50 *9*mr	^{106}Pd in Ni; H_{int}=−162 *35*kG
$^{106}_{46}$Pd	512	12.7ps	[2]	±0.70 *6*		67Mu09	IPAC		Ru in Fe; H_{int}=580 *20*kG
									Ru in Co; H_{int}=397 *15*kG
$^{106}_{46}$Pd	512	12.7ps	[2]	±0.690 *53*		68Bo15	IPAC	$\omega\tau$=17.3 *2*mr	^{106}Ru in Fe; H_{int}=−573 *20*kG
$^{106}_{46}$Pd	512	12.7ps	[2]	±0.75 *7*		68Jo17	IPAC	$\omega\tau$=1.73 *11*mr	Ru in Cu or stainless steel; H_o=51.1kG
				±0.70 *9*				$\omega\tau$=1.42 *16*mr	$RuCl_3$ in 3N HCl; H_o=51.1kG,assumed β=1
$^{106}_{46}$Pd	512	12.7ps	[2]	+0.58 *34*		69Hel1	IMPAC	$\Delta\theta$=4.5 *26*mr	(^{106}Pd on Fe)(^{16}O,O′); H_{int}=−595 *12*kG
$^{106}_{46}$Pd	512	12.7ps	[2]	±0.73 *6*		70Si20	IPAC	$\omega\tau$=18.1 *8*mr	^{106}Ru−Fe;H_o=6.5kG;H_{int}=571kG
$^{106}_{46}$Pd	512	12.7ps	[2]	+0.754 *54*		72Jo06	IPAC	$\omega\tau/B$=33.7 *10*mr/MG $(\omega\tau/B)_{ave}$= 31.74 *56*mr/MG	Pd−Co at $T<0.25T_C$; H_o>20kG; also measured in Pd−Fe, −Ni, −steel
$^{106}_{46}$Pd	512	12.7ps	[2]	+0.64 *12*, +0.74‡ *14*		74Hu01	IMPAC	$\Delta\theta$=20 *15*mr, $\Delta\theta$=3.5 *14*mr	CEx with ^{16}O, recoils in disordered $Fe_{.8}Co_{.2}$, in Fe; H_{hf}(IMPAC)=−409 *36*kG and Φ_t=−9.3 *14*mr for both. ‡Average value (this work and that of 69Hel1, recalculated) for recoils in Fe
$^{106}_{46}$Pd	1128	2.5ps	[2]	+0.71 *13*		68Bo15	IPAC	$\omega\tau$=3.63 *47*mr	^{106}Ru in Fe; H_{int}=−573 *20*kG at room T
$^{106}_{46}$Pd	1128	2.5ps	[2]	±0.77 *23*		70Si20	IPAC	$\omega\tau$=3.8 *10*mr	^{106}Ru−Fe;H_o=6.5kG;H_{int}=571kG
$^{108}_{46}$Pd	434	23.8ps	[2]	+0.60 *8*		69Hel1	IMPAC	$\Delta\theta$=17.5 *16*mr	(^{108}Pd on Fe)(^{16}O,O′); H_{int}=−595 *12*kG
$^{108}_{46}$Pd	434	23.8ps	[2]	+0.74 *8*		74Hu01	IMPAC	$\Delta\theta$=15.6 *12*mr	CEx with ^{16}O, recoils in disordered $Fe_{.8}Co_{.2}$; H_{hf}(IMPAC)=−409 *31*kG Φ_t=−9.3 *14*mr
				+0.80[c]‡ *12*		(69Hel1)			‡H_{hf} + Φ_t for Fe same as for alloy
$^{110}_{46}$Pd	374	45.8ps	[2]	+0.50 *6*		69Hel1	IMPAC	$\Delta\theta$=35.0 *23*mr	(^{110}Pd on Fe)(^{16}O,O′); H_{int}=−595 *12*kG
$^{110}_{46}$Pd	374	45.8ps	[2]	+0.72 *8*		74Hu01	IMPAC	$\Delta\theta$=36.9 *18*mr	CEx with ^{16}O, recoils in disordered $Fe_{.8}Co_{.2}$;H_{hf} (IMPAC)=−409 *31*kG; Φ_t=−9.3 *14*mr
				+0.68[c]‡ *8*		(69Hel1)			‡H_{hf} and Φ_t for Fe same as for alloy
$^{107}_{47}$Ag	325	5.9ps	[3/2]	+1.17 *72*		70Ro32	IMPAC	$\Delta\theta$=−10.4 *20*mr	recoils in Fe;H_{int}=−282 *20*kG $H_{\mathcal{T}}\tau_1$=7.4 *15*MG−ps assumed
$^{107}_{47}$Ag	325	5.9ps	[3/2]	±0.75[p] *22*		71Sp14	AAC	$g(3/2)/g(5/2)$= ±1.25 *30*	CEx recoils in He gas $H_{\mathcal{T}}\tau_1$=7.4 *15*MG−ps assumed

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{107}_{47}$Ag	325	5.9ps	[3/2]	±0.61[ap] *21*		72Mi20	PAC		recoils in gas
$^{107}_{47}$Ag	423	34ps	[5/2]	+1.65 *70*		70Ro32	IMPAC	$\Delta\theta$=+22.7 *20*mr	recoils in Fe;H_{int}=−282 *20*kG
$^{107}_{47}$Ag	423	34ps	[5/2]	±0.88[p] *22*		71Sp14	AAC		CEx recoils in He gas
$^{107}_{47}$Ag	423	34ps	[5/2]	±0.87[ap] *32*		72Mi20	PAC		recoils in gas
$^{109}_{47}$Ag	309	5.2ps	[3/2]	+1.72 *70*		70Ro32	IMPAC	$\Delta\theta$=−8.9 *24*mr	recoils in Fe;H_{int}=−282 *20*kG $H_i\tau_i$=7.4 *15*MG−ps assumed
$^{109}_{47}$Ag	309	5.2ps	[3/2]	±1.29[p] *30*		71Sp14	AAC	$g(3/2)/g(5/2)$= ±1.4 *4*	CEx recoils in He gas
$^{109}_{47}$Ag	309	5.2ps	[3/2]	±0.67[ap] *22*		72Mi20	PAC		recoils in gas
$^{109}_{47}$Ag	414	33ps	[5/2]	+1.21 *56*		70Ro32	IMPAC	$\Delta\theta$=+16.5 *25*mr	recoils in Fe;H_{int}=−282 *20*kG $H_i\tau_i$=7.4 *15*MG−ps assumed
$^{109}_{47}$Ag	414	33ps	[5/2]	±1.06[p] *27*		71Sp14	AAC		CEx recoils in He gas
$^{109}_{47}$Ag	414	33ps	[5/2]	±0.67[p] *22*		72Mi20	PAC		recoils in gas
$^{110}_{47}$Ag	gs	24.4s	(1)	±2.7210[d] *8*		69Ac02	BAP-NMR	$\gamma/2\pi$= 2.0645 *4*kHz/G	AgF,AgCl,AgBr,Ag_2O, and Ag_2O_2(polarized n,);T~8°K; $2H_i$=0.6G
$^{110}_{47}$Ag	116	253d	(6)	+2.9 *13*		65We02	GAP	μH=±1.00 *7* nm−MG μH=±0.31 *4*nm−MG μH negative from β asymmetry	Ag in Fe; H_{int}=−350 *100*kG Ag in Ni; H_{int}=−108 *30*kG; used GAO in ^{60}Co to measure temperature
$^{109}_{48}$Cd	469	8.9μs	[11/2]	−1.091[p] *2*		71Bl16	Strob		^{109}Ag(pulsed p,n); T= 1000 *10*°C
$^{110}_{48}$Cd	656	5.0ps	[2]	±0.54[p] *22*		68Ke17	IPAC		Cd in Fe; H_{int}=−348kG; $AgNO_3$ melted into Fe; $AgNO_3$ diffused into Fe
$^{110}_{48}$Cd	656	5.0ps	[2]	+0.78 *30*		69He11	IMPAC	$\Delta\theta$=−10.7 *38*mr	(^{110}Cd on Fe)(^{16}O,O'); H_{int}= −348 *10*kG
$^{110}_{48}$Cd	656	5.0ps	[2]	+0.64 *13*		72Jo06	IPAC	$\omega\tau$=3.2 *6*mr	Ag−Gd at 77°K; H_o=22kG, H_{hf}=−310 *7*kG
$^{110}_{48}$Cd	656	5.0ps	[2]	+1.00[c]‡ *44*		74Hu01 (69He11)	IMPAC	‡Assumed $g_{ave}(2+)$=0.36;H_{hf}(IMPAC)=−238 *131*kG; included effect of decays−in−flight	
$^{111}_{48}$Cd	247	84ns	[5/2]	−0.70[a]		52Ae01	PAC		
$^{111}_{48}$Cd	247	84ns	[5/2]	−0.72 *5*		54Al49	AAC		$InCl_3$ in H_2O
$^{111}_{48}$Cd	247	84ns	[5/2]	−0.783 *23*		56St63	CDPAC		dilute $InCl_3$ solution
$^{111}_{48}$Cd	247	84ns	[5/2]		+0.9	62Be12	PAC	$\omega_0\tau$=−1.5 *5* ‡Unit not given	In crystal;measured circular polarization of 247γ
$^{111}_{48}$Cd	247	84ns	[5/2]	−0.794[d] *6*		63Bo09	DPAC		Cd in HCl; H_o=10337 *50*G
$^{111}_{48}$Cd	247	84ns	[5/2]	−0.794[d] *18*		63Ma10	DPAC		In in HNO_3, H_o=32.6kG
				−0.781[d] *38*		63Sa19	DPAC	ω=47.35 Mr/s	In in HNO_3; H_o=31.81kG
$^{112}_{48}$Cd	617	6.2ps	[2]	+0.60 *12*		69He11	IMPAC	$\Delta\theta$=−7.3 *9*mr	(^{112}Cd on Fe)(^{16}O,O'); H_{int}=−348 *10*kG
$^{112}_{48}$Cd	617	6.2ps	[2]	+0.72[c]‡ *22*		74Hu01 (69He11)	IMPAC	‡See ^{110}Cd(656), 74Hu01	
$^{114}_{48}$Cd	558	9.0ps	[2]	+0.89 *12*		67Bh03	IPAC	$\omega\tau$=+9.69 *106*mr	Cd in Fe; H_{int}=348 *10*kG
$^{114}_{48}$Cd	558	9.0ps	[2]	+0.64 *26*		69He11	IMPAC	$\Delta\theta$=−5.2 *25*mr	(^{114}Cd on Fe)(^{16}O,O'); H_{int}= −348 *10*kG
$^{114}_{48}$Cd	558	9.0ps	[2]	+0.62[c]‡ *38*		74Hu01 (69He11)	IMPAC	‡See ^{110}Cd(656), 74Hu01	
$^{116}_{48}$Cd	513	13.7ps	[2]	+1.42 *76*		69He11	IMPAC	$\Delta\theta$=−4.0 *19*mr	(^{116}Cd on Fe)(^{16}O,O'); H_{int}= −348 *10*kG
$^{116}_{48}$Cd	513	13.7ps	[2]	+0.80[c]‡ *62*		74Hu01 (69He11)	IMPAC	‡See ^{110}Cd(656), 74Hu01	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{114}_{49}$In	gs	72s	[1]	$\leq\pm1.7$‡ *4*		62Ko16	BAP		In–Fe alloy; $H_{int}\geq$250kG; H_{int} negative
								‡Assumed allowed β–decay	
$^{116}_{49}$In	gs	14s	[1]	±1.12	~±0.03	66Ra17	BAP		^{115}In (polarized n,γ); measured relaxation times in InF_3,In_2O_3,InP, and In–metal
$^{116}_{49}$In	gs	14s	[1]	±2.7860[d] *12*	±0.09‡ *2*	71Wi12	BAP–NMR	$\gamma/2\pi$=2.1132 *8*kHz/G	InP(polarized th n,)at 77°K
								‡From temperature dependence of τ_{relax}; used Q^{115}=+0.83b	
$^{117}_{49}$In	660	60ns	[3/2]	+0.95 *8*		67Pa16	DPAC		^{116}CdO(pile n,); H_o=8.6kG
$^{117}_{49}$In	660	60ns	[3/2]		±0.64* *4*	72Ra27	DPAC	ν_Q=32.1 *5*MHz	$In_{0.99}Cd_{0.01}$ at 4.2°K and 295°K; used ν_Q^{115}=43.2 *1*MHz and Q^{115}=0.861* *15*b
$^{114}_{50}$Sn	3210	700ns	[9] or	g=−0.081[dp] *3*		72Bo44	DPAD		molten ^{112}Cd(α,2n); used
or	3090		[7]						$K\sim-0.8\%$
$^{115}_{50}$Sn	619	3.3μs	[7/2]	$<\pm0.98$‡		71Br03	PAD–NMR		liquid In metal(pulsed p,n)
								‡Searched for resonance in range $0.15<\|g\|<0.8$	
$^{115}_{50}$Sn	726	159μs	[11/2]	±1.361 *4*		71Br03	PAD–NMR	ν,B_0=100.03‡,530G; 274.52‡,1450G; 274.52‡,1460G	liquid In metal(pulsed p,n) H_o=14; 35; 47G, τ_{relax}= 0.75 *18*ms
								‡kHz	
$^{115}_{50}$Sn	726	159μs	[11/2]	−1.32 *11*		71Iv04	DPAC		liquid ^{113}Cd(pulsed α,2n); liquid ^{114}Cd(pulsed α,3n); H_o=6.48G
$^{115}_{50}$Sn	726	159μs	[11/2]	±1.40 *8*		72Me15	DPAD	ν=7.81 *37*kHz	In(pulsed p,); H_o=0 during pulse, H_o=40 *1*G between pulses
$^{115}_{50}$Sn	726	159μs	[11/2]		±0.8[p] *3*	72Ri13	‡		liquid In(pulsed p,n)
								‡Measured relaxation times as f(T) by GAO	
$^{116}_{50}$Sn	2369	350ns	[5]	−0.325 *25*		66RG02	DPAC		Sb dissolved in HCl; H_o= 30.2kG
				−0.30 *4* or −0.4 *2*			IPAC	$G_2\omega\tau$=312 *43*mr	H_o=2.09kG; G_2=1 or 0.7 *3*
$^{118}_{50}$Sn	2320	21.7ns	[5]	−0.340 *14*		62Bo16	IPAC	$\omega\tau$=417 *38*mr	^{118}Sb in 3N HCl; H_o=40.95kG
$^{118}_{50}$Sn	2320	21.7ns	[5]	−0.300 *25*		64De19	DPAC IPAC		Sb diffused into Fe foils; H_{int}=78.5 *30*kG, determined by Möss. on ^{119}Sb
$^{120}_{50}$Sn	2300	5.5ns	[5]	−0.37 *5*		62Bo16	IPAC	$\omega\tau$=150 *20*mr	^{120}Sb in 3N HCl, H_o=53.2kG
$^{120}_{50}$Sn	2300	5.5ns	[5]	−0.280 *25*		64De19	DPAC IPAC		Sb diffused into Fe foils; H_{int}=78.5 *30*kG, determined by Möss. on ^{119}Sb
$^{120}_{50}$Sn	2300	5.5ns	[5]		±0.021‡*8*	70Wo02	DPAC	ν_Q=1.15 *4*MHz ν_Q=0.68 *7*MHz	$KSbC_4H_4O_7$·*1/2* $(SbO)_2SO_4$
								Q/Q^{119}(23.8keV))=±2.86 *15*, using interaction constants obtained by Mossbauer for ^{119}Sb in the same compounds	
								‡Using Q^{119}(23.8keV)=0.06 *2*	
$^{117}_{51}$Sb	3130	340μs	[21/2?]	+1.21 *16*		71Iv04	DPAD		liquid ^{115}In(pulsed α,2n); H_o=30 to 100G
$^{117}_{51}$Sb	3130	340μs	[21/2?]	±1.22 *3*		72Me15	DPAD	ν=3.54 *3*kHz	In(pulsed α,2n); H_o=0 during pulse, H_o=40 *1*G between pulses

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{122}_{51}$Sb	gs	2.73d	(2)	±1.9 *2*		71Kr15	GAP		Sb–Fe(pile n,)
$^{122}_{51}$Sb	61	1.8μs	[3]	+2.979^{dp} *12*		72He26	Strob	ν=2.5MHz	molten ^{122}Sn(p,n)
$^{124}_{51}$Sb	gs	60d	(3)	±1.26 *7*		68Kn02	GAP	μH=240 *29*, 270 *19*, 305 *24*nm–kG	^{124}Sb in Fe, 3 different sources; H_{int}=218 *5*kG; T measured by ^{60}Co and ^{124}Te γ–anisotropy
$^{124}_{51}$Sb	gs	60d	(3)	±1.42 *10*		70Si17	GAP		^{124}Sb + ^{54}Mn in Fe foil; H_{hf}=230kG; T=8m°K; T measured by ^{54}Mn γ–anisotropy
$^{125}_{51}$Sb	gs	2.7y	(7/2)	±3.55^{p} *30*		64He08	GAP		^{125}Sb + ^{54}Mn in Fe foil; H_{int}≈200kG, T=0.024°K
$^{125}_{51}$Sb	gs	2.7y	(7/2)			68An05	GAP	μH=572 *3*nm–kG	^{125}Sb + ^{60}Co diffused in Fe; H_{int}(at Co)=286.3kG assumed
$^{125}_{51}$Sb	gs	2.7y	7/2‡	±2.62 *6*		68Ba70	GAP–NMR	$\gamma/2\pi$= 0.570 *14*kHz/G	^{125}Sb in Fe at 0.015°K; obtained g from slope of ν vs H_o; H_{hf}=+231 *6*kG ‡From μ(68St16) and g(68Ba70)
$^{125}_{51}$Sb	gs	2.7y	(7/2)	±2.59 *3*		68St16	GAP		Sb–Fe alloy; H_{int}=+230kG; ^{60}Co used for thermometry
$^{126}_{51}$Sb	gs	12.5d	[8]	±1.28 *7*		72Kr15	GAP	Δ/T=±0.094 *5*	Sb–Fe; ^{125}Sb used for thermometry; T=14.5m°K; H_{int}=231kG
$^{127}_{51}$Sb	gs	3.9d	[7/2]	±2.59 *12*		72Kr15	GAP	Δ/T=±0.431 *20*	Sb–Fe; ^{125}Sb used for thermometry; T=14.5m°K; H_{int}=231kG
$^{128}_{51}$Sb	gs	8.6h	[8]	±1.31 *19*		72Kr15	GAP	Δ/T=±0.087 *13*	Sb–Fe; ^{125}Sb used for thermometry; T=16m°K; H_{int}=231kG
$^{120}_{52}$Te	560	9.3ps	[2]	+0.42 *12*		69He11	IMPAC	$\Delta\theta$=–15.6 *36*mr	(^{120}Te on Fe)(^{16}O,O′); H_{int}= +620 *20*kG from Möss.
$^{120}_{52}$Te	560	9.3ps	[2]	+0.58^{c}‡*16*		74Hu01 (69He11)	IMPAC	‡Assumed $g_{ave}(2+)$=0.30; H_{hf}(IMPAC)= +342 *163*kG, Φ_i=10.8mr; included effect of decays–in–flight	
$^{122}_{52}$Te	564	7.6ps	[2]	+0.91 *12*		66Au05	IPAC	$\omega\tau$=15.4 *15*mr	Te in Fe; H_o=10kG; H_{int} =+620 *20*kG from Möss.
$^{122}_{52}$Te	564	7.6ps	[2]	+0.79 *12*		66Jo06	IPAC	$\omega\tau$=–13.2 *13*mr	Sb diffused into Fe; H_o=10kG; H_{int}=637 *21*kG
$^{122}_{52}$Te	564	7.6ps	[2]	+0.62 *6*		67Bh06	IPAC	$\omega\tau$=10.5 *10*, 9.9 *12*, 7.0 *14*mr	three different Sb–Fe sources; assumed H_{int}= +620 *20*kG
$^{122}_{52}$Te	564	7.6ps	[2]	+0.70 *14*		67Mu10	IPAC	$\omega\tau$=11.5 *20*mr	Sb–Fe(pile n,); H_{int}=600 *25*kG
$^{122}_{52}$Te	564	7.6ps	[2]	+0.48 *12*		69He11	IMPAC	$\Delta\theta$=–15.8 *12*mr	(^{122}Te on Fe)(^{16}O,O′); H_{int}= +620 *20*kG from Möss.
$^{122}_{52}$Te	564	7.6ps	[2]	+0.64^{c}‡ *10*		74Hu01 (69He11)	IMPAC	‡See ^{120}Te(560), 74Hu01	
$^{123}_{52}$Te	159	190ps	[3/2]	±0.72 *12*		70Ro31	AAC	$\omega\tau$=±0.42 *6*r G_2=±0.774 *42*	^{123}Te implanted in Fe; H_{int}= 620 *20*kG from NMR for dilute Te in Fe
$^{123}_{52}$Te	248	117d	[11/2]	–1.00^{p} *5*		72Va25	GAP		Te implanted in Fe by mass separator; T<20m°K
$^{123}_{52}$Te	440	?	?	g=+0.22^{p}‡ *3*		70Bo48	IMPAC	$\omega\tau$=–38.5 *33*mr	(^{123}Te in Fe)(^{16}O,O′); H_{hf}= 620 *20*kG; $H\tau_i$=7.1 *16*MG–ps ‡Estimated τ from ^{125}Te data
$^{123}_{52}$Te	506	?	?	g=+0.032^{p}‡*7*		70Bo48	IMPAC	$\omega\tau$=–4.4 *23*mr	(^{123}Te in Fe)(^{16}O,O′); H_{hf}= 620 *20*kG ‡Estimated τ from ^{125}Te data

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{124}_{52}$Te	603	6.6ps	[2]	+0.39 *8*		67Bh06		$\omega\tau$=−6.6‡ *24* or −5.4‡ *13*mr	^{123}Sb–Fe(pile n,); H_{int}= 620 *20*kG assumed
								‡For (1690γ)(603γ) or (722γ)(603γ)	
$^{124}_{52}$Te	603	6.6ps	[2]	+0.70 *16*		67Mu06	IPAC	$\omega\tau$=9.7 *13*mr	Sb in Fe;H_{int}=+610 *25*kG from Möss., includes temperature correction
$^{124}_{52}$Te	603	6.6ps	[2]	+0.53 *44*		68Bo41	IPAC	$\omega\tau$=7.5 *44*mr	(Sb in Fe)(pile n,); H_{int}= 627 *20*kG
$^{124}_{52}$Te	603	6.6ps	[2]	+0.42 *10*		69He11	IMPAC	$\Delta\theta$=−12.9 *9*mr	(^{124}Te on Fe)(^{16}O,O′); H_{int}= +620 *20*kG from Möss.
$^{124}_{52}$Te	603	6.6ps	[2]	+0.54[c]‡ *8*		74Hu01 (69He11)	IMPAC	‡See ^{120}Te(560); 74Hu01	
$^{125}_{52}$Te	145	58d	[11/2]	±0.93 *5*		72Si21	GAP		^{125}Te implanted in Fe by mass separator; H_{int}= 657 *20*kG; T<20m°K
$^{125}_{52}$Te	321	695ps	[9/2]	−0.909 *72*		69Kn03	IPAC	$\omega\tau$=81 *33*mr	liquid $^{125}SbCl_3$; H_o=19.1 *1*kG
								$\omega\tau$=200 *15*mr	^{125}Sb dissolved in Ni; H_o= 20.0 *1*kG, H_{int}=205 *10*kG
$^{125}_{52}$Te	321	695ps	[9/2]	−0.918‡ *32*		70Cr07	IPAC	For (321γ)(177γ): $\omega\tau$=47.7 *33*,179$^{+44}_{-29}$, 830$^{+240}_{-570}$mr	dilute solutions of ^{125}Sb in Cu, Ni, Fe; H_{int}=51.5, 236, 679kG
								For (204γ)(177γ): $\omega\tau$=54.2 *48*, 47.8 *48*mr;	$[SbCl_4]^-$, $[SbCl_6]^-$ in HCl; H_o=51.5kG;
								$\omega\tau$=52.8 *25*, 234 *17*mr	^{125}Sb in Cu, Ni; H_{int}=51.5, 236kG
								‡From weighted average of $\omega\tau/H$=0.976 *30*r/MG	
$^{125}_{52}$Te	321	695ps	[9/2]	−0.66 *9*		71Ro17	IPAC	$\omega\tau_{ave}$=132 *17*mr, for two cascades	fission ^{125}Sb in Ni; H_{int}= 186 *10*kG assumed
$^{125}_{52}$Te	443	21ps	[3/2]	+0.52[p] *16*		70Ro35 71Ro37	IMPAC	$\omega\tau$=−43.0 *54*mr	(Te in Fe)(^{16}O,O′); H_{hf}= 620 *20*kG; $H_{\tau_f}\tau_f$=7.1 *16*MG–ps
$^{125}_{52}$Te	463	13ps	[5/2]	+0.58 *27*		70Cr07	IPAC	$\omega\tau$=14 *6*mr	^{125}Sb in Fe; H_o=51.5kG, H_{int}=679kG
$^{125}_{52}$Te	463	13ps	[5/2]	+0.30[p] *12*		70Ro35 71Ro37	IMPAC	$\omega\tau$=−10.8 *33*mr	(Te in Fe)(^{16}O,O′); H_{hf}= 620 *20*kG; $H_{\tau_f}\tau_f$=7.1 *16*MG–ps
$^{125}_{52}$Te	463	13ps	[5/2]	+0.79 *30*		71Ro17	IPAC	$\omega\tau_{ave}$=18.7 *69*mr	fission ^{125}Sb in Fe; H_{int}=
								$\omega\tau$(1)=21 *14*mr,	620 *20*kG; (1)=(209γ)(428γ),
								$\omega\tau$(2)=15 *8*mr	(2)=(172γ)(428γ)
$^{125}_{52}$Te	525	?	[7/2?]	negative		71Ro17	IPAC	$\omega\tau$=+107 *24*mr	fission ^{125}Sb in Fe
$^{126}_{52}$Te	667	4.42ps	[2]	+0.50 *14*		69He11	IMPAC	$\Delta\theta$=−13.1 *25*mr	(^{126}Te on Fe)(^{16}O,O′); H_{int}= 620 *20*kG
$^{126}_{52}$Te	667	4.42ps	[2]	+0.62[c]‡ *16*		74Hu01 (69He11)	IMPAC	‡See ^{120}Te(560), 74Hu01	
$^{127}_{52}$Te	gs	9.4h	[3/2]	±0.66[p] *5*		72Si31	GAO		
$^{127}_{52}$Te	89	109d	[11/2]	−0.91[p] *5*		72Va25	GAP		Te implanted in Fe by mass separator; T<20m°K
$^{128}_{52}$Te	743	3.18ps	[2]	+0.42 *12*		69He11	IMPAC	$\Delta\theta$=−10.1 *20*mr	(^{128}Te in Fe)(^{16}O,O′); H_{int}= 620 *20*kG
$^{128}_{52}$Te	743	3.18ps	[2]	+0.54[c]‡ *14*		74Hu01 (69He11)	IMPAC	‡See ^{120}Te(560), 74Hu01	
$^{129}_{52}$Te	gs	69m	[3/2]	±0.67[p] *5*		72Si31	GAO		
$^{129}_{52}$Te	106	34d	[11/2]	−1.15[p] *5*		72Va25	GAP		Te implanted in Fe by mass separator; T<20m°K
$^{130}_{52}$Te	840	2.0ps	[2]	+0.50 *14*		69He11	IMPAC	$\Delta\theta$=−10.6 *22*mr	(^{130}Te in Fe)(^{16}O,O′); H_{int}= 620 *20*kG
$^{130}_{52}$Te	840	2.0ps	[2]	+0.64[c]‡ *18*		74Hu01 (69He11)	IMPAC	‡See ^{120}Te(560), 74Hu01	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{125}_{53}$I	188	35ns	[3/2]	±2.8[ap] *12*		72Le32	PAC		gaseous I at normal pressure
$^{127}_{53}$I	58	1.92ns	[7/2]	±1.70[p] *33*		65Ta14	IPAC		H_0=12.8kG
$^{127}_{53}$I	58	1.92ns	[7/2]	±2.02 *15*		67Sv01	IPAC	$\omega\tau$=216 *15*mr	^{126}Te in HNO_3 and in HCL; H_0=28.1kG
$^{127}_{53}$I	58	1.92ns	[7/2]	±2.78[p] *23*		69Be78	IPAC		H_0=100kG
$^{127}_{53}$I	203	330ps	[3/2]	⩾±1.07		67Sv01	IPAC	$\omega\tau$=88 *15*mr	^{127}Xe in Al foil; H_0=51.2kG
$^{131}_{53}$I	150	0.95ms	[5/2]	+2.77‡ *50*		67Ta07	IPAC	$\omega\tau$=97 *12*mr	^{131}Te in HCl; H_0=13.2kG
								‡Assumed time-dependent perturbations small	
$^{131}_{53}$I	1797	5.9ns	[9/2, 11/2?]	−0.72 *23*, −0.88 *28*		67Ta07	IPAC	$G_2\omega\tau$=73 *16*mr g=−0.16 *5*	^{131}Te in HCl; H_0=12.8kG; G_2=0.9 *1*
$^{132}_{53}$I	49.7	0.95ns	[3]	+2.22 *30*		69Si06	IPAC	$\omega\tau$=94.4 *123*mr	^{132}Te metal in HCl; H_0= 19.5kG, assumed G_2=1
$^{132}_{54}$Xe	668	7ps	[2]	+0.92[p] *42*		69Si09	IPAC	$\omega\tau$=22.3 *71*mr	^{132}Te diffused in Fe; H_{hf}= 1040 *20*kG
$^{131}_{55}$Cs	133	9.3ns	[5/2]	+2.48 *15*		64Br20	DPAC	ω=138 *8*Mr/s‡	$BaCO_3$ powder; H_0=29.1 *3*kG
								‡Unit given as MHz	
$^{131}_{55}$Cs	133	9.3ns	[5/2]	±2.30[p] *20*		69Be79	IPAC		G_2=0.88 *8*
$^{131}_{55}$Cs	133	9.3ns	[5/2]	+1.97 *12*		69Fe02	DPAC IPAC		$Ba(NO_3)_2$ in dilute HNO_3; H_0=9.3, 18kG
$^{131}_{55}$Cs	133	9.3ns	[5/2]	±1.85[p] *7*		72Ao01	DPAC		$^{130}Ba(NO_3)_2$(th n,), dis- solved in HCl; H_0=15.9kG
$^{133}_{55}$Cs	81	6.31ns	[5/2]	+3.1 *3*		59Bo56	IPAC		$BaCl_2$ aqueous solution; H_0= 22.4kG
$^{133}_{55}$Cs	81	6.31ns	[5/2]	+3.25[d] *15*		64Ag02	CDPAC		$BaCl_2$; delay time=22.9ns
$^{133}_{55}$Cs	81	6.31ns	[5/2]	+3.7 *8* ±3.5 *5*		66He12	IPAC AAC		H_0~10kG
$^{133}_{55}$Cs	81	6.31ns	[5/2]	±3.55 *40*		68Re05	DPAC		H_0=24.2kG
$^{133}_{55}$Cs	160	190ps	[5/2]	+1.65 *50*		59Bo56	IPAC	$\omega\tau$=+21 6mr	$BaCl_2$ aqueous solution; H_0= 24.2kG
$^{133}_{55}$Cs	160	190ps	[5/2]	+1.42 *32*		65Ag01	IPAC	$\omega\tau$=11.3 *36*mr, $\omega\tau$=17.8 *34*mr	dilute $BaCl_2$ in H_2O; H_0= 15.16, 21.17kG
$^{134}_{55}$Cs	11.2	47.0ns	[5]	+3.32 *6*		71Dr10	DPAC		CsCl(pile n,) dissolved in H_2O; H_0=9.9, 11.0kG
$^{134}_{56}$Ba	605	5ps	[2]	~0.006		70Be50	PAC	$\omega\tau$=0.05 3‡	^{134}CsCl aqueous solution, H_0=41.4kG
or	1400	⩽30ps	[4]	⩾0.002					
								‡Unit not given, appears to be 10^{-1}mr	
$^{137}_{56}$Ba	662	2.55m	[11/2]		negative ~0.05	65Lu02	GAO	$\|Q\|=\|Q(^{137}Cs)\|$	Co-Cs Tutton salt, Cu-Cs Tutton salt
$^{133}_{57}$La	535	49ns	[11/2‡]	±7.7		69Ge06, 70Ge14	DPAC		liquid sources Ce^{2+} or Ce^{3+}, La^{2+}; H_0=4kG
								‡Author's original value, I=3/2	
$^{140}_{57}$La	gs	40.2h	(3)		+0.092 *13* +0.115 *16* +0.104‡ *10*	66Bl05	GAO	P= +0.110 *16*x10^{-4}/cm −1.42 *12*x10^{-5}/cm	CMN at $1/T$~500 NES at $1/T$~88
								‡Average, based on Q^{139}=+0.22	
$^{137}_{58}$Ce	gs	9.0h	(3/2)	±0.74‡ *12*		63Ha07	GAO		NES, 1.2 to 4.2°K
								‡Using $<r^{-3}>$=4.44 au	
$^{137}_{58}$Ce	255	34.4h	(11/2)	±0.69 *3*		66Bl17	GAO		NES,CMN; used $<r^{-3}>$=4.44 au and new temperature scale

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{139}_{58}Ce$	gs	140d	(3/2)	±0.95[p] *20*		61Kn02	GAO		*NES*; G_2~1
$^{139}_{58}Ce$	gs	140d	(3/2)	±0.92‡ *16*		62Gr17	GAO		*NES*, *CMN*
								‡Using $<r^{-3}>$=4.44 au	
$^{139}_{58}Ce$	gs	140d	(3/2)	±0.78‡ *16*		63Ha07	GAO		*NES*, *CMN*
								‡Using $<r^{-3}>$=4.44 au	
$^{140}_{58}Ce$	2083	3.41ns	[4]	±4.60‡ *32*		63Ka03	DPAC		$La(NO_3)_3$ in HNO_3; H_o= 20.07 *10*kG
								‡Average for two different cascades	
$^{140}_{58}Ce$	2083	3.41ns	[4]	+4.44 *16*		63Ko07	DPAC	ω=210 *5*Mr/s	liquid $La(NO_3)_3$ in 3N HNO_3; H_o=39.5kG
				±4.40 *20*			IPAC	ω=63.4 *27*Mr/s,	$La(NO_3)_3$ in 3N HNO_3; $LaCl_3$+ $FeCl_3$ in 2N HNO_3; H_o=12.1kG
$^{140}_{58}Ce$	2083	3.41ns	[4]	±3.80 *40*		64Sc16	DPAC		$La(OH)_3$ in $Ce(HSO_4)_4$; H_o= 16.5, 20, 24.5kG; β=1
$^{140}_{58}Ce$	2083	3.41ns	[4]	+4.06 *15*		65Le16	DPAC		La_2O_3 in 3M HNO_2 aqueous solution; H_o=29.7, 42.1kG; β=1
$^{140}_{58}Ce$	2083	3.41ns	[4]		±0.404* *80*	73Kl17	DPAC	ν_Q=1.17 *15*MHz	$La_2Mg_3(NO_3)_{12}$•*24*; used $Q(^{139}La)$=+0.230 *10*b
$^{141}_{58}Ce$	gs	33d	(7/2)	±1.0[c]‡ *1*		62Gr17	GAO		Ce in *NES*
						55Ca48		‡Using $<r^{-3}>$=4.44 au	
$^{141}_{58}Ce$	gs	33d	(7/2)	±1.10‡ *16*		63Ha07	GAO		Ce in *NES* and *CMN*
								‡Using $<r^{-3}>$=4.44 au	
$^{143}_{58}Ce$	gs	34h	(3/2)	~±1‡		63Ha07,	GAO		^{143}Ce in *NES* and *CMN*
						72Sh01		‡Using $<r^{-3}>$=4.44 au. Analysis based on I=7/2; value not greatly affected by I	
$^{142}_{59}Pr$	gs	19.2h	(2)	±0.19 or ±0.14‡		58Da12 62Li06	GAO	‡For ΔI_β= 1 or 0	Pr in CMN
$^{142}_{59}Pr$	gs	19.2h	(2)	±0.22 *3* or ±0.14‡ *1*		58Gr92 62Li06	GAO	A=0.0027 *3* or 0.0042‡ *5*cm^{-1}	^{142}Pr in CMN
								‡For ΔI_β=1 or 0	
$^{142}_{59}Pr$	gs	19.2h	(2)	negative[p]		70Hi14	BAO	μB_{eff}~+0.8a-ergs	^{142}Pr in Te
$^{143}_{59}Pr$	57	4.17ns	[5/2]	+3.25 *12*		64Ko15	DPAC		metallic and liquid sources; H_o≤58kG
$^{143}_{59}Pr$	57	4.17ns	[5/2]	+2.58 *20*		66Zm01	IPAC	$\omega\tau$=0.377 *26*r $g\beta$=+2.06 *16*; $g\beta$=1.13 *11*	$^{143}Ce_2(SO_4)_3$ or $^{143}Ce(SO_4)_2$ in H_2SO_4; H_o=6.3kG, β=2.00; CeO_2 at 1400°K; H_o=5.3 2kG, β=1.1
$^{143}_{59}Pr$	57	4.17ns	[5/2]	±2.68[a] *28*		68Ta12	IPAC	$G_2\omega\tau$=0.223 *33*, 0.39 *11*r $G_2\omega\tau$=145 *20*, 284 *64*, 404 *96*mr	cubic CeO_2; H_o=5.6, 8.5kG; G_2=0.98, β=2.0 dilute $CeCl_3$; H_o=2.8, 5.6, 8.5kG; G_2=0.80 *4*, β=1.42
$^{144}_{60}Nd$	695	3.4ps	[2]	+0.26 *4*		72Ku10	IMPAC	$\Delta\theta$=-11 2mr, corrected for beam-bending $g/g_{2^+}^{150}$=0.40 *10*	CEx with $^{16}O^{5+}$ on ^{144}Nd, recoils in Fe; H_o=1.4kG, H_{int}= 2.4 *3*MG; $H\tau_i$=10.8 *89*MG-ps at 300°K
$^{144}_{60}Nd$	1314	90ps	[4]	+0.18 *19*		67Jo11	IPAC		$PmCl_3$ in H_2O; H_o=51.8 5kG; used β=2.25

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{146}_{60}$Nd	454	21ps	[2]	±0.51‡ *5*		68Be42	IMPAC	$g/g_{2+}(^{152}Sm)$= 0.735 *77*	CEx with O, recoils in He, Ar; H_{eff}~25.5 *25*MG
								‡Used g/g_{2+}^{148}=1.2 *1*[67Be08]; $g_{2+}(^{152}Sm)$=0.35	
$^{146}_{60}$Nd	454	‡	[2]	+0.44 *6*		72Ku10	IMPAC	$\Delta\theta$=−83mr corrected for beam−bending g/g_{2+}^{150}=0.69 *14*	CEx with $^{16}O^{5+}$ on ^{146}Nd, recoils in Fe; H_0=1.4kG, H_{int}= 2.4 *3*MG, $H\tau_1$=10.8 *89*MG−ps at 300°K
								‡$T_{1/2}$=19.4ps used in analysis	
$^{148}_{60}$Nd	300	116ps	[2]	+0.48 *10*		67Be08	IMPAC	$\omega\tau$=6.9 *12*mr	$Nd^{3+}(^{16}O,O')$ recoils in Cu; H_0=16.6kG, β(320°K)=2.17 *17*
								$\omega\tau$=0.36 *3*, 0.24 *2*, 0.021 *2*r	Nd recoils in Fe, Co, Ni
$^{148}_{60}$Nd	300	116ps	[2]	±0.43‡ *3*		68Be42	AAC	$g/g_{2+}(^{152}Sm)$ = 0.61 *4*	CEx with O, recoils in gas
								‡Used $g_{2+}(^{152}Sm)$=0.35	
$^{148}_{60}$Nd	300	116ps	[2]	±0.412 *32*		70Be36	AAC	$\omega^2\tau_c$=0.079 *12*r^2/ns g/g_{2+}^{150}=0.638 *52*	CEx recoils in He;
$^{148}_{60}$Nd	300	‡	[2]	+0.50 *8*		72Ku10	IMPAC	$\Delta\theta$=−0.38 *4*r corrected for beam−bending g/g_{2+}^{150}=0.80 *18*	CEx with $^{16}O^{5+}$ on ^{148}Nd, recoils in Fe; H_0=1.4kG, H_{int}= 2.4 *3*MG, $H\tau_1$=10.8 *89*MG−ps at 300°K
								‡$T_{1/2}$=85.2ps used in analysis	
$^{150}_{60}$Nd	132	1.52ns	[2]	+0.48 *8*		58Go72	IPAD	$\omega\tau$=94.5 *5*mr	CEx with ^{1}H on aqueous solution of $Nd(NO_3)_3$ in HNO_3; H_0=16.0 *3*kG, β=2.3 *3*
$^{150}_{60}$Nd	132	1.52ns	[2]	+0.620 *42*		67Ku07	DPAC		CEx with ^{1}H on solid Nd metal, 930°C; H_0=25kG, β=1.32
$^{150}_{60}$Nd	132	1.52ns	[2]	±0.694 *24*		68Be42	AAC	$g/g_{2+}(^{152}Sm)$= 0.99 *5*	CEx with O, recoils in He, Ar, Kr
				±0.644 *18*		70Be36		$\omega^2\tau_c$=0.194 *11*r^2/ns	recoils in He
								$\omega^2\tau_c$=0.103 *16*r^2/ns	recoils in Ar
$^{150}_{60}$Nd	132	1.52ns	[2]	+0.68 *10*		68Be51 70Be36	IPAC		CEx recoils in Ar; H_0= 17.4 *6*kG
$^{150}_{60}$Nd	397	55.9ps	[4]	+1.28 *20*		72Ku10	IMPAC	$\Delta\theta$=−0.31 *3*r corrected for beam−bending g/g_{2+}^{150}=1.00	CEx with $^{16}O^{5+}$ on ^{150}Nd, recoils in Fe; H_0=1.4kG, H_{int}= 2.4 *3*MG, $H\tau_1$=10.8 *89*MG−ps at 300°K
$^{143}_{61}$Pm	gs	265d	[5/2or 7/2]	±3.75 *50* or ±3.9 *5*		63Gr10	GAO	A=±0.029 *3*cm^{-1} P''=0.0022 *3*cm^{-1}or A=±0.022 *2*cm^{-1} P''=0.00125 *20*cm^{-1}	Pm^{3+} in NES CMN
$^{144}_{61}$Pm	gs	360d	[5 or 6]	±1.68 *14* or ±1.75 *14*		61Sh02	GAO	A/k=±0.0091°K or A/k=±0.0079°K	Pm^{3+} in NES; used $<r^{-3}>$= 36.8x10^{24}cm^{-3}
$^{144}_{61}$Pm	gs	360d	[5 or 6]			63Gr10	GAO	A=±0.0065 *5*cm^{-1} P''=0.00011 *1*cm^{-1}or A=±0.0056 *5*cm^{-1} P''=7.3 *4*x10^{-5}cm^{-1}	NES CMN
$^{147}_{61}$Pm	91	2.55ns	[5/2]	+3.42 *50*		60Bo17	IPAC	$\omega\tau$=+0.79 *11*r	aqueous solution of $NdCl_3$; H_0=15kG, β=2.2
$^{147}_{61}$Pm	91	2.55ns	[5/2]	~+3		60Ma03		$G_2\omega\tau$=−0.38 *9*r where 0.5<G_2<1.0	Nd_2O_3 in alcohol; H_0=13kG
$^{148}_{61}$Pm	gs	5.4d	(1)	±1.82 *19*		63Gr10	GAO	A=±0.035 *4*cm^{-1} P''=+0.0033 *7*cm^{-1}	NES CMN
$^{148}_{61}$Pm	137	43d	[6]	±1.80 *18*		63Gr10	GAO	A=±0.0058 *3*cm^{-1}	NES

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{149}_{61}$Pm	gs	53h	(7/2)	±3.3 *5*		63Gr10, (60Ch15)	GAO	P''=0.00088 *20*cm^{-1}	CMN
$^{149}_{61}$Pm	114	2.58ns	[5/2]	±2.34 *30*		66Sv01	IPAC AAC	$\omega\tau$=0.377‡ *66*r, $\omega\tau$=1.81‡ *16*r	$NdCl_3$ in H_2O; H_o=13.90 *40*, 51.6 *5*kG; used G_2=0.81 *3*, β=1.92 ‡Corrected for Compton events of (542γ)(114γ) of ~8%
$^{149}_{61}$Pm	114	2.58ns	[5/2]	±2.51 *33*		69Ta08	IPAC	$G_2\omega\tau$=394 *106*mr, 223 *36*mr; 354 *146*mr	$^{149}Nd_2O_3$ in dilute HCl; H_o= 12.8,8.5kG for (424γ)(114γ); H_o=12.8kG for (542γ)(114γ); used G_2=0.80 *3*, β=1.92
$^{149}_{61}$Pm	114	2.58ns	[5/2]	±2.08^p *15*		70Be67, 69Be25	IPAC		^{148}Nd(th n,),dissolved in aqua regia; used G_2=0.81
$^{149}_{61}$Pm	114	2.58ns	[5/2]	±1.95 *20*		70Se11	IPAC	$G_2\omega\tau$=0.37 *3*‡ or $G_2\omega\tau$=0.39 *14*‡ ‡Unit not given	Nd_2O_3 in HCl; (542γ)(114γ) or (424γ)(114γ); used β=1.93 and G_2=0.878 *31*
$^{149}_{61}$Pm	188	3.24ns	[3/2]	+1.08^p *15*		70Be67	IPAC		^{148}Nd(th n,),dissolved in aqua regia, used G_2=0.77
$^{149}_{61}$Pm	188	3.24ns	[3/2]	±2.2 *6*		70Se11	IPAC	$G_2\omega\tau$=0.74 *16*‡ ‡Unit not given	Nd_2O_3 in HCl; used β=1.93 and G_2=0.62 *12* calculated from data on 114 and 270keV levels; time-dependent interactions assumed
$^{149}_{61}$Pm	211	80ps	[5/2]	+2.18^p *35*		70Be67	IPAC		^{148}Nd(th n,),dissolved in aqua regia; used G_2=1
$^{149}_{61}$Pm	270	2.59ps	[7/2]	+2.21^p *11*		70Be67, 69Be25	IPAC		^{148}Nd(th n,), dissolved in aqua regia; used G_2=0.84
$^{149}_{61}$Pm	270	2.59ps	[7/2]	±3.64 *20*		70Se11	IPAC AAC	$G_2\omega\tau$=0.42 *6*‡ or $G_2\omega\tau$=0.46 *2*‡ ‡Unit not given	Nd_2O_3 in HCl; (268γ)(156γ) or (268γ)(270γ); used β=1.93 and G_2=0.781 *18*
$^{145}_{62}$Sm	gs	340d	[7/2]	±0.92 *6*		69Ka21	GAO	μ/μ^{147}=1.12 *11*, 1.15 *12*	NES, CMN
$^{147}_{62}$Sm	121	780ps	[5/2]	−0.30 *18*		68Bo47	IPAC		aqueous $EuCl_3$; H_o=18.3 *3*kG; used β=1.16
$^{147}_{62}$Sm	121	780ps	[5/2]	−0.26^p *15*		70Be67	IPAC		Sm(p,); G_2=1
$^{147}_{62}$Sm	198	1.31ns	[3/2]	−0.28 *10*		68Bo47	IPAC		aqueous $EuCl_3$; H_o=18.3 *3*kG; used β=1.16
$^{147}_{62}$Sm	198	1.31ns	[3/2]	−0.28^p *6*		70Be67	IPAC		Sm(p,); G_2=1
$^{148}_{62}$Sm	551	7.35ps	[2]	+0.34 *9*		72Ku10	IMPAC	$\Delta\theta$=−30 2mr $g/g_{2^+}^{154}$=0.752 *88*	CEx with $^{16}O^{5+}$ on ^{148}Sm, recoils in Fe; H_o=1.4kG, H_{int}= +2.3 *2*MG, Hr_t=10.8 *89*MG-ps at 300°K
$^{150}_{62}$Sm	334	48ps	[2]	±0.636 *34*		70Be36 (68Be42)	AAC	$\omega^2\tau_c$=0.177 *19*r^2/ns $g/g_{2^+}^{152}$=0.936 *60*	CEx recoils in He gas
$^{150}_{62}$Sm	334	48ps	[2]	+0.55 *6*		72Ku10	IMPAC	$\Delta\theta$=−22.6 *11*mr $g/g_{2^+}^{154}$=0.903 *98*	CEx with $^{16}O^{5+}$on ^{150}Sm; see ^{148}Sm(551), 72Ku01
$^{151}_{62}$Sm	105	480ps	[5/2]	+0.52^p *18*		71Be23	IPAC		^{150}Nd(pile n,); used β=1.16 at 320°K; G=1
$^{151}_{62}$Sm	168	760ps	[3/2]	+0.57^p *12* +0.58^p *12*		71Be23	IPAC		^{150}Nd(pile n,); used β=1.16 at 320°K; G=1
$^{152}_{62}$Sm	122	1.4ns	[2]	±0.62 *12*		58Go72	IPAD	$\omega\tau$=56.8 *40*mr	CEx with ^{1}H on aqueous solution of $Sm(NO_3)_3$ in HNO_3; H_o=16.0 *3*kG, β=1.16
$^{152}_{62}$Sm	122	1.4ns	[2]	+0.72 *32*		58Su55	PAC		CEx with ^{1}H on Sm_2O_3 on Cu foil; H_o=22kG, G_2~0.6

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{152}_{62}$Sm	122	1.4ns	[2]	±0.23 *15* ±0.64‡ *11*		60De16	IPAC	$\omega\tau$=0.063 *7*r	Eu_2O_3 in HNO_3; G_2=1, H_o=19.0 *2*kG; β=3.0
								$\Delta\theta/H$=−2.12 *18*mr/kG or −1.00 *29*mr/kG	Eu_2O_3, H_o=22kG; G_2(300°K)=0.68 *8* or G_2(1200°K)=0.55 *7*
								‡Using β=1.16 for liquid source and 300°K data	
$^{152}_{62}$Sm	122	1.4ns	[2]	±0.56 *14*		60Ma38	IPAC	$G_2\omega\tau$=37 *9*mr	Eu_2O_3 in nitric acid; H_o=12kG G_2=1.00 *13*, β=1.15
$^{152}_{62}$Sm	122	1.4ns	[2]	+0.700 *60*		62Ba38	IPAC		$EuCl_3$ in HCl, 300°K, β=1.15; anhydrous $EuCl_3$, ~1200°K, β=1.04; H_o=23, 26kG
$^{152}_{62}$Sm	122	1.4ns	[2]	+0.554 *56*		67Wo06	DPAD		^{152}Sm powder(p,p′); β(330°K)=1.135
$^{152}_{62}$Sm	122	1.42ns	[2]	±0.678 *24* ±0.692 *26*		70Be36 (68Be51, 68Be42)	AAC	$\omega^2\tau_c$=0.202 *14*, 0.094 *7*r^2/ns	CEx recoils in He, Ar
$^{152}_{62}$Sm	122	1.42ns	[2]	±0.60 *7*		71Do17	IPAC		dilute aqueous $^{152}Eu_2Cl_3$; H_o=21.8 *1*kG, β=1.15; observed three distinct cascades
$^{152}_{62}$Sm	366	57ps	[4]	+1.22 *15*		72Ku10	IMPAC	$\Delta\theta$=−0.313 *10*mr $g/g_{2^+}^{154}$=1.00	CEx with $^{16}O^{5+}$ on ^{152}Sm; see ^{148}Sm(551), 72Ku01
$^{154}_{62}$Sm	82	3.02ns	[2]	+0.53 *12*		58Go72	IPAC	$\omega\tau$=110 *8*mr	see ^{152}Sm(122), 58Go72
$^{154}_{62}$Sm	82	3.02ns	[2]	+0.576 *58*		67Wo06	DPAD		^{154}Sm metal powder(p,p′); β(330°K)=1.135
$^{154}_{62}$Sm	82	3.02ns	[2]	±0.634 *56* ±0.620 *64*		70Be36 (68Be42)	AAC	$\omega^2\tau_c$=0.079 *14*r^2/ns $g/g_{2^+}^{152}$=0.917 *28*	CEx recoils in Ar
$^{154}_{62}$Sm	267	165ps	[4]			67Bo32	IMPAC	$\omega\tau$=−0.45^p *5*r $g/g_{4^+}^{152}$=0.68^p *12*, using $T_{1/2}^{152}$(4+)=57.3ps	CEx with ^{16}O on ^{154}Sm, ^{152}Sm
$^{154}_{62}$Sm	267	165ps	[4]	+1.35 *14*		72Ku10	IMPAC	$\Delta\theta$=−889 *44*mr $g/g_{2^+}^{154}$=1.07 *12*	CEx with $^{16}O^{5+}$ on ^{154}Sm; see ^{148}Sm(551), 72Ku01
$^{154}_{62}$Sm	549	23.5ps	[6]	+1.90 *28*		72Ku10	IMPAC	$\Delta\theta$=−141 *10*mr $g/g_{2^+}^{154}$=1.12 *13*	CEx with $^{16}O^{5+}$ on ^{154}Sm; see ^{148}Sm(551), 72Ku01
$^{147}_{63}$Eu	625	765ns	[11/2]	+6.00 *33*		70Kl07	DPAC	ω=2.73 *16*Mr/s	$GdCl_3$ in HCl; H_o=1kG, β(300°K)=0.52
$^{149}_{63}$Eu	497	2.43μs	[11/2]	+6.05 *16*		70Kl07	DPAC	ω=2.75 *7*Mr/s	$GdCl_3$ in HCl; H_o=1kG, β(300°K)=0.52
$^{153}_{63}$Eu	103	3.8ns	[3/2]	+1.05^p *26*		71Be23	IPAC		^{152}Sm(pile n,); used G_2=0.85 *5*, β(320°K)=0.55
$^{154}_{63}$Eu	gs	16y	(3)		±1.88 *21*	62Ju06, 66Bl05	GAO	Q/Q_{gs}^{152}=+0.62‡ *7*	^{154}Eu in NES; used Q^{152}/Q^{151}=±2.75 *17* and Q^{151}=1.1 *1*
								‡Using P^{154} as corrected in [66Bl05]	
$^{155}_{63}$Eu	105	400ps	[5/2]	+2.47^p *27*		71Be23	IPAC		^{154}Sm(pile n,); used G=1 and β(320°K)=0.55
$^{152}_{64}$Gd	344	29ps	[2]			67Pr16	IPAC	$\omega\tau$=+21^p 9mr	^{152}Eu in Fe
$^{152}_{64}$Gd	344	29ps	[2]	+1.16 *22*		69Zm01	IPAC	$(\omega\tau)_{ave}$=37.5 *33*mr	Eu–Gd metal; H_{int}(85°K)=−320 *15*kG
$^{152}_{64}$Gd	344	29ps	[2]	±0.856 *62*		70Be36	AAC	$\omega^2\tau_c$=0.378 *55*r^2/ns $g/g_{2^+}^{154}$=1.003 *80*	CEx recoils in He
$^{154}_{64}$Gd	123	1.18ns	[2]	±0.72 *12*		61St04	IPAC	ω=26.6 *35*Mr/s	$GdCl_3$ at 980°C; H_o=15kG, β=1.042; G_2=0.8
$^{154}_{64}$Gd	123	1.18ns	[2]	+0.74 *8*		62Ba38	IPAC	ω=48 *4*Mr/s	anhydrous $^{154}EuCl_3$ at 1300°K H_o=26kG, β=1.042; G_2=0.93 *1*
$^{154}_{64}$Gd	123	1.18ns	[2]			67Pr16	IPAC	$\omega\tau$=+0.14^p 2r	^{154}Eu in Fe

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{154}_{64}$Gd	123	1.18ns	[2]	+0.90 *10*		70Be36 (68Be42)	CDPAC	$\omega(t_{ave})$=28.1 *41*mr	^{154}Gd recoils in He; H_o= 17.4 6kG; t_{ave}=735 *30*ps; for t/τ=1.043 *48*:G_2=0.838 *15* and G_4=0.587 *29*
				±0.854 *28*			AAC	$\omega^2\tau_c$=0.376 *24*, 0.161 *13*r^2/ns	CEx recoils in He,Ar
$^{154}_{64}$Gd	123	1.18ns	[2]	±0.86 *7*		70Wa26	AAC	$g/g_{2^+}^{156}$=1.11 *8* G_2/G_2^{156}=1.23 *17*	$^{154}Eu_2O_3$ and $^{156}Eu_2O_3$ in 1.0N $HClO_4$; assumed electric interaction negligible and $g_{2^+}^{156}$=0.389 *11*
$^{154}_{64}$Gd	371	39ps	[4]			67Pr16	IPAC	$\omega\tau$=+15[p] *4*mr $g/g_{2^+}^{152}$=±0.53 *27*	^{154}Eu in Fe
$^{155}_{64}$Gd	87	6.66ns	(5/2)	$\pm0.73^{+12}_{-10}$ $\pm0.90\ddagger^{+23}_{-10}$		64Bo16 66Hr02	AAC	A=20.6$^{+36}_{-28}$MHz	$^{155}TbCl_3$ in H_2O; used $\mu_{g.s.}^{155}$= 0.254 *2*, $A_{g.s.}^{155}$=11.9 *4*MHz ‡Internal field corrected for H_o=28kG
$^{155}_{64}$Gd	87	6.66ns	(5/2)	−0.97[d] *23*		66Hr02	IPAC DPAC	ω=+45.8 *103*Mr/s, ω=+45.3 *33*Mr/s	anhydrous $TbCl_3$+$GdCl_3$ at 1300°C; H_o=23.7kG, β=1.044
$^{155}_{64}$Gd	87	6.66ns	(5/2)	−0.92[p] *10*		71Be23	IPAC		Gd(p,); used β(320°K)=1.22; G=0.92 *2*
$^{155}_{64}$Gd	105	1.1ns	(3/2)	+0.68[p] *19*		71Be23	IPAC		Gd(p,); used β(320°K)=1.22; G=1
$^{156}_{64}$Gd	89	2.22ns	[2]	+0.64 *6*		62Ba38	IPAC	$\omega\tau$=133 *5*mr	anhydrous $^{156}EuCl_3$ at 1300°K H_o=26kG, β=1.042; G_2=0.89 *2*, G_4=0.85 *2*
$^{156}_{64}$Gd	89	2.22ns	[2]	+0.592 *36*		67Wo06	DPAD		CEx with ^{1}H on ^{156}Gd–Cu liquid metal at 1120°K, β= 1.086 *15*
$^{156}_{64}$Gd	89	2.22ns	[2]	=0.680 *26*		70Be36	AAC	$\omega^2\tau_c$=0.245 *18*r^2/ns $g/g_{2^+}^{154}$=0.807 *39*	CEx recoils in He
$^{156}_{64}$Gd	288	115ps	[4]	±1.32[ap] *48*		67Bo32	IMPAC	$\omega\tau$=0.087 *20*r	CEx with ^{16}O on ^{156}Gd on Fe
$^{156}_{64}$Gd	288	115ps	[4]	+1.48 *20*		68We17	IPAC		Gd metal(d,2n) at 77°K; H_o~ 13.2kG, H_{eff}=−312 *15*kG
$^{156}_{64}$Gd	1513	190ps	[4]	+3.12 *20*		68We17	IPAC	g(1513)/g(288)= 2.10 *27*	Gd metal(d,2n) or Tb metal(γ,3n) at 77°K; H_o~13.2kG, H_{eff}=−312 *15*kG
$^{158}_{64}$Gd	79.5	2.49ns	[2]	+0.630 *50*		67Wo06	DPAD		CEx with ^{1}H on Gd–Cu liquid metal at 1120°K; β=1.086 *15*
$^{158}_{64}$Gd	79.5	2.49ns	[2]	±0.664 *36*		70Be36	AAC	$\omega^2\tau_c$=0.220 *24*r^2/ns $g/g_{2^+}^{154}$=0.765 *48*	CEx recoils in He
$^{159}_{64}$Gd	gs	18h	(3/2)	±0.44 *3*		71Kr19 70Pr13	GAP	$\lvert\mu H/IkT\rvert$=0.24 *1*	$GdFe_2$(pile n,); H_{hf}=+453kG, T=20 *1*m°K; sign of μ not measured
$^{160}_{64}$Gd	75	2.7ns	[2]	+0.606 *52*		67Wo06	DPAD		CEx with ^{1}H on Gd–Cu liquid metal at 1120°K, β=1.086 *15*
$^{160}_{64}$Gd	75	2.7ns	[2]	±0.646 *30*		70Be36	AAC	$\omega^2\tau_c$=0.215 *20*r^2/ns $g/g_{2^+}^{154}$=0.756 *43*	CEx recoils in He
$^{156}_{65}$Tb	gs	5.4d	(3)	±1.45 *18* ±1.41[c] *18*	+1.4 *5* +1.40[c] *45*	62Lo01 63Bl25	GAO	A/k=±0.113 *10*°K P/k=+0.0045 *15*°K	Tb in NES
$^{159}_{65}$Tb	gs	–	(3/2)		+1.30	63Bl24 (62Lo12)	SpHt	A/k=+0.150°K P/k=+0.021°K	Tb metal; T=0.37 to 4.2°K; used $<r^{-3}>$=8.63a.u.
$^{159}_{65}$Tb	gs	–	(3/2)		+1.32[c] *10*	63Bl25	SpHt		

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{159}_{65}$Tb	gs	–	(3/2)		(+0.82‡)	64Va27	SpHt	A/k=+0.152 2°K P/k=+0.013 4°K	Tb metal; T=0.05 to 0.9°K
								‡Used 63Bl24, 63Bl25 and 62Lo12	
$^{159}_{65}$Tb	gs	–	(3/2)		(+0.99‡)	69Kr19	SpHt	A/k=+0.149°K P/k=+0.0158°K	Tb metal; T=0.03 to 0.5°K
								‡Used 63Bl24, 63Bl25 and 62Lo12	
$^{160}_{65}$Tb	gs	72d	(3)	±1.60 *25* ±1.56[c] *25*	+1.9 *5* +1.87[c] *70*	60Jo12 63Bl25	GAO	A/k=+0.125 *20*°K P/k=+6.1 *22*m°K	Tb in NES at 0.02°K
$^{155}_{66}$Dy	gs	10h	[3/2]	±0.21 *5*		61Na04	GAO	A/k=0.032 *8*°K	Dy in NES at 0.02°K
$^{157}_{66}$Dy	gs	8.1h	[3/2]	±0.32 *2*		61Na04	GAO	A/k=0.048 *3*°K	Dy in NES at 0.02°K
$^{158}_{66}$Dy	630	?	[6]	±2.16‡*42*		71Ka68	IMPAC		natural metallic Gd(α,), at 77,170,257,300°K; finds H_{eff}~2.8,2.3,0,0‡MG; H_{T_1}~15‡MG–ps from $\omega\tau$(t)
								‡Assumed $g(6+)=g(8+)=g(2+)$=0.36 for ^{160,162}Dy	
$^{160}_{66}$Dy	87	2.0ns	[2]	±0.48 *14* ±0.54‡ *16*		60Ma38	IPAC	$G_2\omega\tau$=0.19 *3*r ‡For β=5.4	Tb_2O_3 in HCl at 340°K; H_o=12kG, G_2=0.80 *12*, β=6.0
$^{160}_{66}$Dy	87	2.0ns	[2]	±0.83 *9* ±0.99‡ *11*		61Ku03	IPAC		Tb_2O_3 at 300,540,1333°K; H_o=18.3kG; used β=7.2,4.55,2.4
								‡For β=6.02, 3.8, 2.0	
$^{160}_{66}$Dy	87	2.0ns	[2]	+0.58 *18*		62Co28	IPAC	$\omega\tau$=–2.50 *70*r	DyFeGarnet; used H_{eff}=600kG from Mössbauer
$^{160}_{66}$Dy	87	2.0ns	[2]	±0.728 *22* +0.704 *38*		65Gu02	DPAC IPAC	ω=358 *11*Mr/s $G_2\omega\tau$=439 *12*mr	$TbCl_3$ in 3M HCl; H_o=33.5kG, β=6.02 for DPAC; H_o=20.19kG,
					±5 *1*		AAC	G_2=0.740 *20*, G_4=0.597 *25*	β=6.07 for IPAC
$^{160}_{66}$Dy	87	2.0ns	[2]		±1.67‡*36* ±1.76‡*39*	69Fo08, 70Wa25	DPAC DPAC	‡$Q(1-R)$	^{160}Tb in $HCLO_4$, H_2SO_4, HCl; used g=0.346 *11*
$^{160}_{66}$Dy	87	2.05ns	[2]	±0.712 *34*		70Be36	AAC	$\omega^2\tau_c$=0.281 *27*r^2/ns	CEx recoils in He
$^{160}_{66}$Dy	966	2.2ps	[2]	+0.46[ap] *22*		68Ca26	PAC		magnetized Gd alloy
$^{160}_{66}$Dy	966	2.2ps	[2]	+0.36 *12*		69Si01	IPAC	$\omega\tau$=14.3 *13*mr	Dy in Tb metal, single crystal; H_o=13.6kG, H_{int}=5.6 *4*MG
$^{161}_{66}$Dy	26	28.4ns	(5/2)	+0.75[p] *9* +0.78[p] *9*		71Be23	IPAC DPAC		^{160}Gd(pile n,); used G=0.38 *10*, β(320°K)=5.7
$^{161}_{66}$Dy	75	3.4ns	[3/2]	–0.35[p] *5*		71Be23	IPAC		^{160}Gd(pile n,); used G=0.89 β (320°K)=5.7
$^{162}_{66}$Dy	80.7	2.25ns	[2]	+0.724 *48*		67Ku07	DPAC		Dy–Cu eutectic liquid at 880°C(pulsed p,p'); H_o=25kG, β=2.30
$^{162}_{66}$Dy	80.7	2.25ns	[2]	±0.686 *28*		70Be36	AAC	$\omega^2\tau_c$=0.261 *22*, 0.100 *14*r^2/ns $g/g_{2^+}^{160}$=0.964 *62*	CEx recoils in He, Ar
$^{164}_{66}$Dy	73.3	2.39ns	[2]	+0.642 *50*		67Ku07	DPAC		Dy–Cu eutectic liquid at 880°C(pulsed p,p'); H_o=25kG, β=2.30
$^{164}_{66}$Dy	73.3	2.39ns	[2]	±0.730 *30*		70Be36	AAC	$\omega^2\tau_c$=0.296 *24*r^2/ns $g/g_{2^+}^{160}$=1.026 *65*	CEx recoils in He
$^{165}_{67}$Ho	gs	stable	(7/2)			64Va27	SpHt	A/k=+0.320 5°K P/k=+8.0 *15*m°K	Ho metal
$^{165}_{67}$Ho	gs	stable	(7/2)			69Kr19	SpHt	A/k=+0.319°K P/k=+4m°K	Ho metal, T=0.03 to 0.5°K
$^{166}_{67}$Ho	9	1.2ky	[7]	±4.14[p]‡*17*		59Po62	GAO	A/k=0.24 2°K, for I=7	Ho in NES single crystal
								‡Used μ^{165}=4.12 *2*, A^{165}/k=0.478 2°K	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{156}_{68}$Er	344	47.9ps	[2]	$g_{av}\sim\pm0.39$		70No01	AAC	$G_2(344)=0.23$ *4*	^{120}Sn(^{40}Ar,Ar′) recoils in
	453	7.83ps	[4]	to 0.42‡				$G_2(453)=0.73$ *8*	vacuum; assumed $H\sim41$ *7*MG,
									τ_c=3ps
								‡Depends on model used	
$^{158}_{68}$Er	193	433ps	[2]	$g_{av}\sim\pm0.34$		70No01	AAC	$G_2(193)=0.07$ *5*	^{122}Sn(^{40}Ar,Ar′) recoils in
	356	20.8ps	[4]	to 0.39‡				$G_2(356)=0.47$ *4*	vacuum; assumed $H\sim41$ *7*MG,
	434	4.04ps	[6]					$G_2(434)=0.93$ *8*	τ_c=3ps
								‡Depends on model used	
$^{160}_{68}$Er	264	49.8ps	[4]	$g_{av}\sim\pm0.26$		70No01	AAC	$G_2(264)=0.31$ *5*	^{124}Sn(^{40}Ar,Ar′) recoils in
	376	7.77ps	[6]	to 0.39‡				$G_2(376)=0.82$ *5*	vacuum; assumed $H\sim$ 41 *7*MG
	465	4.04ps	[8]					$G_2(465)=1.08$ *9*	τ_c=3ps
								‡Depends on model used	
$^{166}_{68}$Er	80.6	1.82ns	[2]	±0.56 *10*		60Ma38	IPAC	$\omega\tau$=0.14 *2*r	^{166}Ho in dilute HNO_3; H_o=5kG
				±0.62‡ *12*				‡For β=7.0	β=7.7, G_2=0.78 *12*, G_4=0.55 *5*
$^{166}_{68}$Er	80.6	1.82ns	[2]	+0.520 *68*		61Bo05	IPAC	ω=+140Mr/s	$HoCl_3$ aqueous solution;
				+0.614‡*80*		63Ge09		‡For β=7.08	H_o=13.55kG, β=8.36
$^{166}_{68}$Er	80.6	1.82ns	[2]	±0.71 *12*		61Ku03	IPAC		Ho_2O_3 at 80, 300, 1333°K;
				±0.76‡ *12*					used β=25.2, 7.9, 2.6
								‡For β=25.5, 6.8, 2.35	
$^{166}_{68}$Er	80.6	1.82ns	[2]	+0.658 *54*		67Ku07	DPAC		Er–Cu eutectic liquid at
									930°C(pulsed p,p′); H_o=25kG,
									β=2.48
$^{166}_{68}$Er	265	120ps	[4]	+1.08 *10*		63Ge09	IPAC	$\omega\tau$=83 *6*mr,	dilute aqueous $HoCl_3$ solu-
								corrected for	tion; H_o=53kG, β=7.08
								other cascades	
$^{166}_{68}$Er	265	120ps	[4]			68De28	IMPAC	$\omega\tau$=0.60 *5*r	CEx with ^{16}O on ^{166}Er on
									polarized Fe foil; find H_{hf}=
									−2.2 *3*MG
$^{166}_{68}$Er	265	120ps	[4]	±1.18[p]*7*		72Mi21	IPAC	$\omega\tau/\beta$=6.20 *21*mr	Ho metal(n,); $HoCl_3$;
									H_o=25.4 *3*kG
$^{168}_{68}$Er	79.8	1.91ns	[2]	+0.50 *6*		62Bo18	IPAC	$\omega\tau$=485 *51*mr	$Tm(NO_3)_3$ in 3N HNO_3; H_o=
				+0.53‡*6*				G_2=0.86 *7*	20.3kG, β(300°K)=7.26
								‡For β=6.82	
$^{168}_{68}$Er	79.8	1.91ns	[2]	+0.688 *56*		67Ku07	DPAC		Er–Cu eutectic liquid at
									930°C(pulsed p,p′); H_o=25kG,
									β=2.48
$^{168}_{68}$Er	79.8	1.91ns	[2]	±0.610 *20*		70Be36	AAC	$\omega^2\tau_c$=0.199 *13*,	CEx recoils in He, Ar
								0.100 *11*r^2/ns	
$^{168}_{68}$Er	264	120ps	[4]	+1.08‡*16*		68De28	IMPAC	$\omega\tau$=0.60 *5*r	CEx with ^{16}O on ^{168}Er on Fe
								$g/g_{4^+}^{166}$=1.00	foil; H_{hf}=−2.2 *3*MG
								‡Used $g_{4^+}^{166}$=1.08 *10*	
$^{168}_{68}$Er	~7800	?	[4]	−0.45 *74*		70Be13	‡	ΔE=0 *6*μeV	^{167}Er metal crystal (polar-
									ized n,); $H_{eff}\sim$6.2MG;
									assumed μ^{167}=−0.56
								‡Measured energy shift of neutron resonance	
								in strong magnetic field	
$^{168}_{68}$Er	~7800	?	[3]	±5.9 *12*		70Be13	‡	ΔE=−43.5 *80* μeV	^{167}Er metal crystal (polar-
									ized n,−); $H_{eff}\sim$6.2MG;
									assumed μ^{167}=−0.56
								‡Measured energy shift of neutron resonance	
								in strong magnetic field	
$^{170}_{68}$Er	79	1.90ns	[2]	+0.658 *50*		67Ku07	DPAC		Er–Cu eutectic liquid at
									930°C(pulsed p,p′); H_o=25kG,
									β=2.48
$^{170}_{68}$Er	79	1.90ns	[2]	±0.714 *30*		70Be36	AAC	$\omega^2\tau_c$=0.273 *23*r^2/ns	CEx recoils in He
								$g/g_{2^+}^{168}$=1.171 *62*	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{170}_{68}$Er	261	135ps	[4]	±1.25‡*21*		68De28	IMPAC	$\omega\tau$=0.62 *6*r g/g_{4+}^{166}=0.92 ‡Used g_{4+}^{166}=1.08 *10*	CEx with ^{16}O on ^{170}Er on Fe foil; H_{bf}=−2.2 *3*MG
$^{169}_{69}$Tm	118	62ps	[5/2]	+0.50 *15* +0.54‡ *16*		60Ma38	IPAC	$G_2\omega\tau$=5.6 *17*mr ‡For β=5.2	$^{169}Yb_2O_3$ in dilute HNO_3; H_o= 13kG, β~5.6, G_2~1
$^{169}_{69}$Tm	118	62ps	[5/2]	+0.61 *12*		65Bo08	PAC	$G_2\omega\tau$=5.9 *2*mr	$YbCl_3$ in H_2O; H_o=10.8 *4*kG, β=5.31, G_2=0.99
$^{169}_{69}$Tm	118	62ps	[5/2]	±0.73‡ *12*		66Ko01	IPAC	$g(139)/g(118)$= 1.28 *12* ‡Used $g(139)$=0.37 *4*	LuIG at liquid N temperature
$^{169}_{69}$Tm	118	62ps	[5/2]	+0.79 *8*		68Ka14	IPAC	$\omega\tau$=−21.8 *22*mr $\mu\tau$=70.2 *71*nm−ps	Yb_2O_3 in HCl; H_o=32.57 *30*kG, β(308°K)=4.98, G_2~1
$^{169}_{69}$Tm	118	62ps	[5/2]	+0.72 *8*		69Gu01	IPAC	$\mu\tau$=64.5 *70*nm−ps	$YbCl_3$ in 3N HCl; H_o=22.0 6kG β(300°K)=5.08
$^{169}_{69}$Tm	139	320ps	[7/2]	±1.22 *17*		65Bo08	IPAC	$G_2\omega\tau$=41.7 *40*mr	$YbCl_3$ in H_2O; H_o=10.8 *4*kG, β=5.31, G_2=0.95
$^{169}_{69}$Tm	139	320ps	[7/2]	+1.30 *7*		68Ka14	IPAC	$\omega\tau$=−133 *4*mr $\mu\tau$=600 *24*nm−ps	Yb_2O_3 in HCl; H_o=32.57 *30*kG, β(308°K)=4.98, G_2=0.956 *12*
$^{169}_{69}$Tm	139	320ps	[7/2]	+1.28 *8*		69Gu01	IPAC	$\mu\tau$=588 *29*nm−ps	$YbCl_3$ in 3N HCl; H_o=22.0 6kG β(300°K)=5.08
$^{169}_{69}$Tm	139	320ps	[7/2]			72Be43	PAC AAC	$Q(139)/Q(118)$= 1.0[p] *2*	^{168}Yb implanted in Fe
$^{169}_{69}$Tm	316	660ns	[7/2]	±0.154 *8*		72Ni03	DPAC	ω=6.30 *35*Mr/s	$^{169}Yb(C_2H_3O_2)_3$ solution; H_o~5.98kG, β(300°K)=5.08
$^{169}_{69}$Tm	379	36ns	[7/2]	±0.959[dp] *74*		67Ni05	DPAC	ω=85.1 *34*Mr/s	$YbCl_3$ in HCl; H_o=12.87kG, β=5.08
$^{171}_{69}$Tm	117	55ps	[5/2]	+0.81 *37*		68Ka14	IPAC	$\omega\tau$=−20.2 *80*mr $\mu\tau$=65 *26*nm−ps	$^{171}Er_2O_3$ in HCl; H_o=32.57 *30* kG, β(308°K)=4.98, G_2~1
$^{171}_{69}$Tm	129	362ps	[7/2]	+0.94 *18*		65Ag02	IPAC		$ErCl_3$ in H_2O; H_o=21.47kG, β(300°K)=5.08, assumed G_2=1
$^{171}_{69}$Tm	129	362ps	[7/2]	+1.44 *14*		68Ka14	IPAC	$\omega\tau$=−168 *15*mr $\mu\tau$=756 *67*nm−ps	$^{171}Er_2O_3$ in HCl; H_o=32.57 *30* kG,β(308°K)=4.98;G_2=0.949 *13*
$^{169}_{70}$Yb	gs	32d	[7/2]	±0.63 *9*		72Kr18	GAO	B_2=0.59 *10* $\Delta f/k$=±11.7 *15*m°K	Yb−Au;H_{int}=1.77MG; T=18 2m°K
$^{170}_{70}$Yb	84	1.58ns	[2]	+0.66 *4*		65Ti02	DPAD		CEx of ^{170}Yb metal target
$^{172}_{70}$Yb	78.7	1.6ns	[2]	+0.608 *68*		64Gu01	PAC	$\omega\tau$=305 *31*mr‡ ‡Unit not given	$LuCl_3$ in dilute HCl; H_o=35.9 kG, β=2.58 *10*, G_2=0.95 *2*
$^{172}_{70}$Yb	78.7	1.6ns	[2]	+0.558 *28*		66Ti01	DPAD		^{172}Yb metal(p,p′)
$^{172}_{70}$Yb	78.7	1.6ns	[2]		+2.7 *7*	69Fo07 70Wa25	DPAC	$Q(1-R)$=2.16 *37*b	Er_2O_3 in $HClO_4$; used R~0.2, g=0.328 *5*
$^{172}_{70}$Yb	1174	7.95ns	[3]	+0.67 *4*		65Gu01	IPAC		$LuCl_3$ in 0.1M HCl; H_o=28kG, β=2.58 *13*
$^{172}_{70}$Yb	1174	7.95ns	[3]		±3.6‡ *10*	70Ra18	DPAC	$\omega_o(1174)/\omega_o(79)$= 0.53 *6* $Q(1174)/Q(79)$= ±1.33 *15* ‡Used $Q(79)$=2.7 *7*	Yb in Tm metal; Tm_2O_3
$^{172}_{70}$Yb	1174	7.95ns	[3]		±3.6‡ *10*	70Wa25	DAAC	$Q(1174)/Q(79)$= 1.32 *14* ‡Used $Q(79)$=2.7 *7*	$^{171}Er_2O_3$ in 1N $HClO_4$, in 16.4N HCl at −30°C, and in ethyl alcohol at +20°C,−84°C
$^{172}_{70}$Yb	1174	7.95ns	[3]	+0.61 *9*		71Wa03	IPAC	$\omega\tau(1174)/\omega\tau(79)$= 3.01 *33*	used g_{2+}^{172}=0.332 *8* from Möss.

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{173}_{70}$Yb	79	38ps	[7/2]	−0.203[p] *66*		72Ka13	PAC		
$^{173}_{70}$Yb	179	36ps	[9/2]	+0.27[p] *36*		72Ka13	PAC		
$^{173}_{70}$Yb	351	0.45ns	[11/2]	−0.71[p] *71*		72Ka13	PAC		
$^{174}_{70}$Yb	76.5	1.79ns	[2]	+0.494 *26*		66Ti01	DPAD		^{174}Yb metal(p,p′)
$^{175}_{70}$Yb	gs	4.2d	[7/2]	±0.15 *4*		57Gr51	GAO	A/k=6.4m°K	Yb$(C_2H_5SO_4)_3$•9
				±0.18[c] *5*		62Li06			
$^{175}_{70}$Yb	gs	4.2d	[7/2]	±0.23°‡		71Sp16	GAO		ion implantation in YES;
				or 0.33°‡		(57Gr51)			H_{eff}=1.77MG
					6† *2*				ion implantation in Au
								‡For γ−mixing ratio + or −	
								†Assumed H_{eff}=1.77MG as for YES	
$^{175}_{70}$Yb	gs	4.2d	[7/2]	±0.40 *5*		72Kr18	GAO	B_2=0.315 *32*	Yb−Au;H_{int}=1.77MG; T=18 *2*m°K
$^{176}_{70}$Yb	82	1.76ns	[2]	+0.598 *30*		66Ti01	DPAD		^{176}Yb metal(p,p′)
$^{175}_{71}$Lu	114	100ps	[9/2]	+1.5 *5*		60Ma03	IPAC	$G_2\omega\tau$=−3.0 *10*mr	$^{174}Yb_2O_3$ in dilute HNO_3;
									H_o=13kG
$^{175}_{71}$Lu	114	100ps	[9/2]	+1.81 *20*		65Ka05	IPAC	$\omega\tau$=14.5 *14*mr	Yb metal from Yb_2O_3(pile n,)
									H_o=52.25 *50*kG, assumed β~1
								$\omega\tau$=15.6 *12*mr	$Yb(NO_3)_3$ in H_2O; H_o=52.3 *5*kG
				+1.99‡ *15*		69Wa30		$\omega\tau$=17.5 *16*mr	^{175}YbIG
								‡Based on average $\omega\tau$=15.86 *85*mr	
$^{175}_{71}$Lu	251	42ps	[11/2]	+1.9‡ *6*		66De08	IPAC		^{175}Yb in Fe foil
								‡Used g^{175}(114)=+0.403 *44* to obtain H_{int}=	
								−338 *42*kG	
$^{177}_{71}$Lu	971	155d	[23/2]		+12.6 *14*	66Bl05	GAO	Q/Q_{gs}=+2.33 *25*	Lu in NES
$^{176}_{72}$Hf	88.4	1.40ns	[2]	+0.532 *42*		68Be04	IPAC	$\omega\tau$=43.9 *30*mr	CEx recoils in liquid Ga;
									G=0.982 *23*; H_o not given
$^{177}_{72}$Hf	113	500ps	[9/2]	+0.82 *22*		60Ma03	IPAC	$G_2\omega\tau$=−9.1 *14*mr	Lu_2O_3 in nitric acid; H_o=
									13kG; assumed β=1, G_2=1
$^{177}_{72}$Hf	113	500ps	[9/2]	±1.14 *15*		62Bo27	IPAC		$Lu(NO_3)_3+H_2O$; H_o=26.30 *24*kG
$^{177}_{72}$Hf	113	500ps	[9/2]	+1.09[d] *6*		62Ma42	IPAC	$\omega\tau/H$=+0.824[d] *25*	dilute aqueous $LuCl_3$(pile n)
								mr/kG	H_o=29.2, 53.1kG; G_2>0.98
									(H_{int} uncertain ~10%,65Ma27)
$^{177}_{72}$Hf	113	500ps	[9/2]	±1.13[p] *5*		69Ni15	IPAC		H_o=18.48kG
$^{177}_{72}$Hf	250	98ps	[11/2]	+1.43 *50*		68Br15	IPAC	$\omega\tau_{250}/\omega\tau_{113}$=	Lu(pile n,) implanted in Fe
				+2.6‡ *8*				0.23 *6*	
								‡For $T_{1/2}$=55 *5*ps [73Go47]	
									foils; H_{int}=−140 *10*kG
$^{177}_{72}$Hf	321	660ps	[9/2]	−0.508 *17*		69Hu10	IPAC		Lu in Fe foil; H_o=10kG, H_{hf}=
									−286 *40*kG using data of
									62Ma42 for $g\tau$(113)
$^{178}_{72}$Hf	93	1.50ns	[2]	+0.71 *7*		62Bo13	IPAC	$\omega\tau$=182 *17*mr	aqueous $(NH_4)_2WO_4$;H_o=49.55kG
									(H_{int} uncertain ~10%,65Ma27)
$^{178}_{72}$Hf	93	1.50ns	[2]	+0.58[d] *4*		62Ka14	IPAC	$\omega\tau/H$=+3.0 *2*mr/kG	^{178}W in HF acid;H_o=25.2,45.7
									kG; G_2=0.74 *9*, G_4=0.818 *46*
									(H_{int} uncertain ~10%,65Ma27)
$^{178}_{72}$Hf	93	1.50ns	[2]	+0.59 *8*		67Gi02	IMPAC	$\omega\tau$=46.1 *28*mr	CEx with O, recoils in Cu;
									H_o=16.6kG; X=0.913 *87*
$^{178}_{72}$Hf	93	1.50ns	[2]	+0.464 *28*		68Be04	IMPAC	$\omega\tau$=41.2 *18*mr	CEx with O, recoils in
									liquid Ga; G_2=0.982 *23*, H_o
									not given
$^{178}_{72}$Hf	93	1.50ns	[2]			71Gu06	IMPAC	$\omega_Q\tau(^{178}Hf+^{180}Hf)$	CEx with ^{4}He and ^{16}O on Hf
								=0.34 *3*r at room T	metal crystal

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{180}_{72}$Hf	93	1.50ns	[2]	+0.757 *65*		61Bo25	IPAC	$\omega\tau$=166‡ *13*mr	liquid HfF_4 in HF; H_o=42.5kG (H_{int} uncertain~10%,65Ma27)
								‡Paper quotes $\omega\tau$=1.66 *13* (Unit not given)	
$^{180}_{72}$Hf	93	1.50ns	[2]	+0.626 *70*		67Gi02	IMPAC	$\omega\tau$=49.2 *25*mr	CEx with O, recoils in Cu; H_o=16.6kG, X=0.913 *87*
$^{180}_{72}$Hf	93	1.50ns	[2]	+0.526 *30*		68Be04	IPAC	$\omega\tau$=46.7 *20*mr	CEx with O, recoils in liquid Ga; G=0.982 *23*; H_o not given
$^{180}_{72}$Hf	309	71ps	[4]	+2.3 *4*		61Bo25	IPAC	$\omega\tau$=0.91 *16*°	liquid HfF_4 in HF; H_o=53.2kG (H_{int} uncertain ~10%,65Ma27)
$^{181}_{73}$Ta	482	10.8ns	[5/2]	±3.34[d] *4*		62Bo09	DPAC	ω=134.3 *7*Mr/s	HfF_4+H_2O; H_o=21.15 *20*kG
$^{181}_{73}$Ta	482	10.8ns	[5/2]		positive	63Be46	‡		$HfOCl_2$•*8*; $(NH_4)_2HfF_6$ single crystals
								‡Observed circular polarization of 482γ	
$^{181}_{73}$Ta	482	10.8ns	[5/2]	+3.23[d] *5*		63Ma10	DPAC		HfO_2(pile n,), dissolved in 26N HF; H_o=29.8 *3*,32.05 *32*kG (H_{int} uncertain~10%, 65Ma27)
$^{181}_{73}$Ta	482	10.8ns	[5/2]	+3.23[d] *5*		64Ag02	CDPAC		HfF_4 in 27N HF; H_o≤20kG t_{delay}=30.6, 40.0, 41.0ns
$^{181}_{73}$Ta	482	10.8ns	[5/2]	+3.03[dp] *18*		67Ka26	DPAC	ω=114Mr/s	dilute HfF_4 solution;H_o=20kG
$^{181}_{73}$Ta	482	10.8ns	[5/2]	±3.320[p] *25*		69Ni14	DPAC		H_o=22kG
$^{181}_{73}$Ta	482	10.8ns	[5/2]	±3.30[d] *12*		70Li16	DPAC	ν_Q=52.6 *6*MHz	Hf single crystal
							IPAC	ν=152 *5*MHz	H_{res}=24.2kG
$^{182}_{73}$Ta	gs	115d	[3]	±2.6 *2*		72Kr05	GAP	B_2=−0.705 *23* B_4=0.082 *5* Δ/k=21 *2*m°K	^{182}Ta + ^{54}Mn in Fe; H_{hf}=−656 kG; T=24 *2*m°K
$^{182}_{74}$W	100	1.37ns	[2]	+0.403 *38*		62Go17	IPAD		CEx with ^{1}H on ^{182}W metal; H_o=20.3 2kG; G_2=0.925 *30*
$^{182}_{74}$W	100	1.37ns	[2]	±0.49[a] *7*		63Kl04	IPAC	$G_2\omega\tau$=2° 5′	Ta metal; H_o=35kG; G_2=0.82
				±0.65[a] *10*				$\omega\tau$=2° 56′	Ta in HF+HNO_3; H_o=35kG, G_2=1
$^{182}_{74}$W	100	1.37ns	[2]	+0.67 *9*		63Ko02	DPAC	ω=47.5 *56*Mr/s	liquid TaF in HF;
				+0.74 *12*			IPAC	$\omega\tau$=103 *16*mr	G_2=1.5 *12*, G_4=0.91 *5* (H_{int} uncertain~10%, 65Ma27)
$^{182}_{74}$W	100	1.37ns	[2]	+0.478 *40*		64Sc21	DPAD		CEx with ^{1}H on ^{182}W metal; H_o~34kG
$^{182}_{74}$W	100	1.37ns	[2]	+0.466‡ *54*		65Ch14 72Gr22	IPAD		Mössbauer scattering from W foil using Ta source at 15°K; H_o= 22.5kG, assumed β=1, ω_E=0
								‡Coherence effects ignored in analysis	
$^{182}_{74}$W	100	1.37ns	[2]	+0.498 *48*		65Eb03	IPAD		CEx with ^{1}H on ^{182}W metal; H_o≤41.6kG
$^{182}_{74}$W	100	1.37ns	[2]	±0.520 *22*		70Be36	AAC	$\omega^2\tau_c$=0.0506 *41* r^2/ns	CEx with O, recoils in He gas
$^{182}_{74}$W	100	1.37ns	[2]	+0.38 *10*		71Se12	IPAC	$G_4\omega\tau$=0.028 *7*r	powdered Ta metal(pile n,); H_o=15.9kG
$^{182}_{74}$W	329	64ps	[4]	+0.64[p]‡ *28*		67Bo32	IMPAC	$\omega\tau_{4+}$=+32 *13*mr $\omega\tau_{2+}$=+1.00 *25*r	CEx with O on WO_3, recoils in Fe; used g_{2+}=0.244 to obtain H_{int}=−430 *100*kG
								‡Assumed pure magnetic interaction	
$^{182}_{74}$W	329	64ps	[4]	+0.73 *24*		67Gi03	IMPAC	$\omega\tau$=35 9mr	CEx with O, recoils in Fe; assumed H_{int}=460 *45*kG, X= 0.97 *3*, G_{ave}=0.87 *4*
				+0.84[c] *28*		67Be45		Used conical magnetic field calculations to account for anomalous field on recoils	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{182}_{74}W$	1289	1.04ns	[2]	+1.00 *24*		68Bh02	IPAC	$\omega\tau$=−116 *26*mr	H_o=32.5kG
$^{182}_{74}W$	1289	1.04ns	[2]	±1.83[p] *24*		72Se15	IPAC	$\omega\tau$=98 *13*mr	Ta powder(n,); H_o=15.9kG
$^{182}_{74}W$	1374	2.25ns	[3]	±0.096[p] *12*		72Se15	IPAC	$\omega\tau$=207 *26*mr	Ta–Fe(n,); H_{int}=598 *13*kG
$^{183}_{74}W$	99	700ps	[5/2]	+0.55 *28*		67Gi03	IMPAC	$\omega\tau$=17.4 *90*mr	CEx with O on W, recoils in Cu; H_o=16.6kG, X=0.97 *3*, G_2=0.95 *2*, G_4=0.97 *2*
$^{184}_{74}W$	111	1.26ns	[2]	±0.63 *8*		64Ko13	IPAC		$KReO_4+H_2O$; H_o=49.8kG; G_2=0.90 *20*, G_4=0.85 *8*
				±0.557 *34*			IPAC		W metal(d,p); H_o=49.8kG, $G_4\geq$0.93 *5*
$^{184}_{74}W$	111	1.26ns	[2]	+0.564 *36*		65Eb03	IPAD		CEx with ^1H on ^{184}W metal; $H_o\leq$41.6kG, G_2=0.916 *21*
$^{184}_{74}W$	111	1.26ns	[2]	+0.550 *50*		65Sc05	DPAD		CEx with ^1H on W metal
$^{184}_{74}W$	111	1.26ns	[2]	+0.62[a] *8*		67Gi02	IMPAC		CEx with O, recoils in Cu; X=0.912 *88*
$^{184}_{74}W$	111	1.26ns	[2]			71Ka33	AAC	$Q/Q^{182}(100)$=1.0 *1*	CEx implantation into Gd single crystal
$^{184}_{74}W$	364	43.5ps	[4]	+1.20 *36*		67Gi03	IMPAC	$\omega\tau$=40 *10*mr	CEx with O, recoils in Fe; assumed H_{int}=460 *45*kG; G_2=0.849 *25*, G_4=0.900 *18*
				+1.38[c] *40*		67Be45		Used conical field calculations to account for anomalous magnetic field on recoils	
$^{184}_{74}W$	364	43.5ps	[4]	+1.14 *14*		70Ge06	IPAC	$\omega\tau$=−51.7 *30*mr $\omega\tau_{2+}$=−1461 *66*mr g/g_{2+}=1.02 *14*	W in Fe at 300°K; used g_{2+}= 0.282 *9* and T_{2+}=1.26ns to get H_{int}=−610 *35*kG
$^{186}_{74}W$	123	1.01ns	[2]	+0.584 *54*		62Go17	IPAD		CEx with ^1H on ^{186}W metal; H_o=20.3 *2*kG; G_2=0.940 *25*
$^{186}_{74}W$	123	1.01ns	[2]	+0.77‡ *7*		65Ch14 72Gr22	IPAD		Möss. scattering from W foil using ^{186}Re source at 15°K; H_o=22.5kG, assumed β=1,ω_E=0
								‡Coherence effects ignored in analysis	
$^{186}_{74}W$	123	1.01ns	[2]	+0.56[a] *12*		65Eb03 63Kl02	IPAC	$g_{2+}^{182,184,186}$=0.276	W metal
$^{186}_{74}W$	123	1.01ns	[2]	+0.70 *7*		67Gi02	IMPAC	$\omega\tau$=38.9 *23*mr	CEx with O, recoils in Cu; H_o=16.6kG, X=0.94 *6*; G_2=0.900 *27*, G_4=0.947 *19*, G_{ave}=0.929 *10*
$^{186}_{74}W$	123	1.01ns	[2]	+0.702 *60*		67Ku07	DPAD		CEx with ^1H on polycrystalline W metal at room T; H_o=33kG
$^{186}_{74}W$	123	1.01ns	[2]	±0.644 *26*		70Be36	AAC	$\omega^2\tau_c$=0.0774 *63* or 0.0463 *36*r^2/ns $g/g^{182}(100)$= 1.237 *71*	CEx recoils in He or Ar gas
$^{186}_{74}W$	123	1.01ns	[2]			71Ka33	AAC	$Q/Q^{182}(100)$= 1.2 *2*	CEx implantation into Gd single crystal
$^{186}_{74}W$	399	25.4ps	[4]	+0.76 *52*		67Gi03	IPAD	$\omega\tau$=12.5 *80*mr	CEx with O, recoils in Fe; assumed H_{int}=460 *45*kG; G_2=0.900 *27*, G_4=0.947 *19*
				+0.87[c] *60*		67Be45		Used conical field calculations to account for anomalous magnetic field on recoils	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{183}_{75}$Re	gs	70d	[5/2]	±2.88[p] *12*		72Va26	GAP		Re–Fe; H_{hf}=–760 *15*kG
$^{183}_{75}$Re	gs	70d	[5/2]	±3.19 *15*		73Kr01	GAP	Δ=±35.5 *15*m°K	Re–Fe; H_{int}=760 *15*kG; used ^{54}Mn in Fe as thermometer
$^{183}_{75}$Re	496	7.89ns	[9/2]	±5.31 *31*		68Ge08	DPAC	ω=168 *10*Mr/s	Os electroplated on Cu foil, then melted; H_o=29.6 *3*kG
$^{184}_{75}$Re	gs	38d	[3]	±2.67[p] *16*		72Va26	GAP		Re–Fe; H_{hf}=–760 *15*kG
$^{184}_{75}$Re	gs	38d	[3]	±2.48 *12*		73Kr01	GAP	Δ=±23 *1*m°K	Re–Fe; H_{int}=760 *15*kG; used ^{54}Mn in Fe as thermometer
$^{184}_{75}$Re	188	165d	[8]	±2.77[p] *14*		72Va26	GAP		Re–Fe; H_{hf}=–760 *15*kG
$^{184}_{75}$Re	188	165d	[8]	±2.90 *15*		73Kr01	GAP	B_2=1.044 *38* B_4=0.311 *64* Δ=±10.1 *5*m°K	Re–Fe; H_{int}=760 *15*kG; used ^{54}Mn in Fe as thermometer
$^{187}_{75}$Re	206	560ns	[9/2]	±4.71[d] *14*		63Ko19	DPAC		Li_2WO_4+H_2O; H_o=1.72,5.02kG (H_{int} uncertain~10%, 65Ma27)
								No appreciable attenuation, $\Delta\nu_Q$<18MHz	
$^{187}_{75}$Re	206	560ns	[9/2]	+5.02 *6*		63Wa16	DPAC	ω=16.83 *11*Mr/s‡	saturated $(NH_4)_2WO_4$+H_2O; H_o= 3.15 *3*kG (H_{int} uncertain ~10%, 65Ma27)
								‡Unit given as MHz	
$^{187}_{75}$Re	206	560ns	[9/2]	+4.68[d] *18*		71Ni01	DPAC	ω=15.31 *53*Mr/s	$(NH_4)_2WO_4$ in aqueous solution; H_o=3.10 *3*kG measured by proton resonance with Beckman–Hall probe
$^{186}_{76}$Os	137	840ps	[2]	+0.632 *56*		61Bo08	IPAC	$\omega\tau$=98 *8*mr	$HReO_4$ aqueous solution; H_o= 53.50 *15*kG (H_{int} uncertain ~10%, 65Ma27)
$^{186}_{76}$Os	137	840ps	[2]	+0.50 *13*		61Le06	IPAC	$\omega\tau$=43 *10*mr	Re metal dissolved in HNO_3; H_o=29.2kG
$^{186}_{76}$Os	137	840ps	[2]	+0.64‡ *3*		65Ch14 72Gr22	IPAD		Möss. scattering from ^{186}Os metal powder using ^{186}Re source at 15°K; H_o=22.5kG; assumed β=1, ω_E=35.6Mr/s
								‡Coherence effects ignored in analysis	
$^{186}_{76}$Os	137	840ps	[2]	+0.548 *38*		67Gi02	IPAC	$\omega\tau$=25.0 *14*mr	CEx with ^{16}O, recoils in Cu; H_o=16.6kG, X=0.963 *37*
$^{188}_{76}$Os	155	710ps	[2]	+0.59 *7*		61Ka09	IPAC	$\omega\tau$=42.3 *34*mr	powdered Re metal in dilute HNO_3; H_o=29.2kG (H_{int} uncertain ~10%, 65Ma27)
$^{188}_{76}$Os	155	710ps	[2]	+0.41 *4*		63Go05	IPAD	$\omega\tau$=20 *1*mr	CEx with ^{1}H on Os metal; H_o=19.8 2kG
$^{188}_{76}$Os	155	710ps	[2]	+0.46 *6*		64Sp02	IPAD		CEx with ^{1}H on ^{188}Os metal; H_o=41.07kG, X_2=0.91 *10*, G_2=0.894 *20*
$^{188}_{76}$Os	155	710ps	[2]			64Sp09	AAC	$\Delta\nu_Q$=278 *32*MHz $Q/Q^{190}_{2+}=1.11^{+28}_{-19}$	CEx with ^{1}H on Os powder
$^{188}_{76}$Os	155	710ps	[2]	+0.61‡ *5*		65Ch14 72Gr22	IPAD		Möss. scattering from Os metal powder using ^{188}Re source at 15°K; H_o=22.5kG, assumed β=1, $\omega_E\tau$=0.034 *4*
								‡Coherence effects ignored in analysis	
$^{188}_{76}$Os	155	710ps	[2]	+0.540 *36*		66Go06	IMPAC	$\omega\tau$=21.9 *12*mr	CEx with O on ^{188}Os, recoils in Cu; H_o~17kG, G_2=0.956, G_4=0.917
				+0.560[e] *42*		67Gi02		Recalculated using X=0.964 *36*, H_o=16.6kG	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{188}_{76}$Os	155	710ps	[2]	±0.570 *24*		70Be36	AAC	$\omega^2\tau_c$=0.078 *6* or 0.046 *4*r^2/ns	CEx recoils in He or Ar gas
$^{188}_{76}$Os	155	710ps	[2]	±0.512[ap]*52*		71Si33	IMPAC		CEx recoils in Fe; compared with $g^{188}(633)$;$H_{\mathcal{T}_1}$= 17.9MG–ps
$^{188}_{76}$Os	633	5.6ps	[2]	+1.16 *36*		67Ke01	IPAC		Fe–Re(pile n,); H_{int}=1.4MG; corrected for (1308γ)(633γ)
$^{188}_{76}$Os	633	5.6ps	[2]	+0.86 *16*		67Mu05	IPAC		Re in Fe; H_{int}=1.145 *25*MG
$^{190}_{76}$Os	187	350ps	[2]			64Sp09	AAC	Q/Q^{192}(206)= 1.03 *30*	CEx with ^{1}H on Os powder
$^{190}_{76}$Os	187	350ps	[2]	+0.74 *10*		66Go06	IMPAC	$\omega\tau$=14.8 *13*mr	CEx with O on ^{190}Os, recoils in Cu; H_o~17kG; G_2=0.956, G_4=0.917
				+0.75[c] *10*		67Gi02		Recalculated using X=0.978 *23*, H_o=16.6kG	
$^{190}_{76}$Os	187	350ps	[2]	±0.662 *32*		70Be36	AAC	$\omega^2\tau_c$=0.062 *6*r^2/ns g/g^{188}(155)=1.162 *76*	CEx recoils in Ar gas
$^{190}_{76}$Os	187	350ps	[2]	+0.37‡ *4*		70Le04	IPAC	$\omega\tau$=650 *5*mr ‡Value of H_{int} may be uncertain, 71Ki13	^{190}Ir–Os in Fe; H_{int}=–1.43MG
$^{190}_{76}$Os	548	28ps	[4]	+0.88‡ *48*		70Le04	IPAC	$\omega\tau$=60 *14*mr ‡Value of H_{int} may be uncertain, 71Ki13	^{190}Ir–Os in Fe; H_{int}=–1.43MG
$^{192}_{76}$Os	206	280ps	[2]	+0.77 *11*		66Go06	IMPAC	$\omega\tau$=12.4 *11*mr	CEx with O on ^{192}Os, recoils in Cu; H_o~17kG; G_2=0.956, G_4=0.917
				+0.79[a] *10*		67Gi02		Recalculated using X=0.979 *21*; H_o=16.6kG	
$^{192}_{76}$Os	206	280ps	[2]			71Av06	AAC	$Q/Q^{190}_{2^+}$=0.97‡ *15* ‡Assumed only quadrupole interactions	CEx implantation into fused quartz
$^{192}_{76}$Os	206	280ps	[2]	+0.815 *37*		71Ki13	IPAC	$\omega\tau_{ave}$=223 *5*mr Great variation in $\omega\tau$ and A_2 in Fe–Ir samples casts doubt on earlier measurements in Fe hosts	Ni–Ir(pile n,); H_{int}= 282.3 *10*kG
$^{192}_{76}$Os	206	280ps	[2]	±0.754[ap]*48*		71Si32	IMPAC	$\omega\tau$=197 *8*mr	CEx with ^{16}O on Os metal on polarized Ni; used $H_{\mathcal{T}_1}$= 4.57 *88*MG–ps
$^{192}_{76}$Os	489	28ps	[2]	±0.66[p]≈21		71Si25	IMPAC	g/g^{192}(206)= 0.86[a] *22* ‡Used μ(206)=0.77 *11*	CEx on Os on Fe; $H_{\mathcal{T}_1}$= 17.9 *51*MG–ps
$^{191}_{77}$Ir	129	131ps	[5/2]	±3.00 *58*		68Da19	IPAD		Möss. scattered γ's from Ir; H_o=24.5kG
$^{191}_{77}$Ir	129	131ps	[5/2]	+0.42 *5*		69Ow02	IPAC	$\omega\tau$=229 *13*mr	^{191}Pt in Fe; H_{int}=1.510 *52*MG
$^{191}_{77}$Ir	129	131ps	[5/2]	±0.56 *10*		70Av02	AAC	$\omega^2\tau_c$=0.034 *7*r^2/ns $g/g^{193}_{5/2}$=0.79 *12*	CEx on H_2IrCl_6, recoils in Ar
$^{192}_{77}$Ir	171	4.9s	[11/2]	±6.3[b] *15*		64Ca11	GAP	μH=43 *3*a–ergs	^{191}Os and ^{60}Co in Fe; H_{int}= 135 *30*MG
$^{191}_{77}$Ir	171	4.9s	[11/2]	±6.03 *36*		71Es03	GAP–NMR	ν=389.690‡ *13*, 1174.85‡ *12*MHz ‡Extrapolated to H_o=0	Observed 0.129γ(θ,T) 0.08% ^{191}Os–Ni;H_{int}=–467 *3*kG 0.04% ^{191}Os–Fe; H_{int}=–1405 *8* kG
$^{192}_{77}$Ir	gs	74d	(4)	$\pm1.8^{+6}_{-5}$		63Ko21	GAP SpHt	μH=12^{+2}_{-1} a–ergs	Fe–Ir alloys
$^{192}_{77}$Ir	gs	74d	(4)	±1.8 *2*		64Ca15	GAP	μH=13.5 *3*a–ergs $\mu H(^{191,193}Ir)$= 1.14 *9*a–ergs	Ir in Fe; ^{60}Co in Fe used to measure T~0.1 to 0.012°K; used $\mu^{191,193}$=0.15 *1*

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{192}_{77}$Ir	gs	74d	(4)	±1.41 *8*		69Re06		μH=10.8 *3*a−ergs	^{192}Ir in Fe; ^{60}Co+^{192}Ir in Fe; T~0.013°K; assumed H_{eff}= −1.52 *3*MG
$^{192}_{77}$Ir	gs	74d	(4)	positive		70Hi12	BAP GAP	μH=13a−ergs	^{192}Ir in Fe; H_{eff} negative
$^{192}_{77}$Ir	gs	74d	(4)	±1.901[d] *11*		71Es03	GAP-NMR	ν=167.661‡ *35*, 504.192‡ *50*MHz ‡Extrapolated to H_o=0	0.03% ^{192}Ir−Ni;H_{int}=−467 *3*kG ^{192}Ir−Fe; H_{int}=−1405 *8*kG
$^{193}_{77}$Ir	139	90ps	[5/2]	+0.46 *8*		67Gu10	IPAC	$\omega\tau$=6.0 *7*mr	$^{193}OsO_4$ dissolved in aqua regia and H_2O; H_o=52.0 *5*kG
$^{193}_{77}$Ir	139	90ps	[5/2]	±0.71 *12*		70Av02	AAC	$\omega^2\tau_c$=0.055 *10*r^2/ns	CEx recoils in Ar gas
$^{194}_{77}$Ir	gs	17h	(1)	±0.37 *4*		69Re06	GAP	μH=2.8 *3*a−ergs	1% Ir in Fe; H_{int}=−1.52 *3*MG; assumed no hyperfine anomaly
$^{192}_{78}$Pt	316	35ps	[2]	+0.51 *8*		66Ag02	IPAC	$\omega\tau$=80 *5*mr	dilute Ir−Fe; H_{int}=1.32 *8*MG
$^{192}_{78}$Pt	316	35ps	[2]	±0.60 *6*		69Ke11	IPAC	$\omega\tau$=88 *5*mr	1% Ir in Fe; H_{int}=1.25 *3*MG; G_2=0.94, G_4=0.80
$^{192}_{78}$Pt	316	35ps	[2]	+0.584 *44*		70Be08	IPAC	$\omega\tau$=87.5 *24*mr	Ir−Fe; H_{int}=−1.235 *20*MG
$^{192}_{78}$Pt	316	35ps	[2]	+0.54 *4*		70Gr25	IPAC	$\omega\tau$=80 *2*mr	Pt implanted in Ir−Fe; H_{int}= −1.24 *3*MG
$^{192}_{78}$Pt	316	35ps	[2]	+0.56 *6*		70Le04	IPAC	$\omega\tau$=88 *6*mr	Ir melted into Fe; H_{int}= −1.235MG
$^{192}_{78}$Pt	316	35ps	[2]	+0.92 *11*		71Ki13	IPAC	$\omega\tau$=36 *4*mr	(Ni−Ir)(pile n,); H_{int}= 323 *10*kG
								Fe−Ir alloys not suitable for PAC	
$^{192}_{78}$Pt	316	34.6ps	[2]	+0.550[cp] *32*		72Ro30	IPAC		
$^{192}_{78}$Pt	612	20ps	[2]	±0.86‡ *21*		69Ke11	IPAC	$\omega\tau$=47† *11*mr ‡From $\omega\tau$−ratio and μ(316)=+0.92 †Corrected for (604γ)(316γ)	1% Ir in Fe; H_{int}=1.25 *3*MG
$^{192}_{78}$Pt	612	20ps	[2]	+0.98‡ *17*		70Be08	IPAC	$\omega\tau$=53 *9*mr ‡From $\omega\tau$−ratio and μ(316)=+0.92	Ir−Fe; H_{int}=1.235 *20*MG
$^{192}_{78}$Pt	612	20ps	[2]	+1.13‡$^{+20}_{-12}$		70Gr25	IPAC	$\omega\tau$=56†$^{+10}_{-6}$mr ‡From $\omega\tau$−ratio and μ(316)=+0.92 †Corrected for (604γ)(316γ)	Pt implanted in Ir−Fe;H_o~2kG H_{int}=−1.24 *3*MG
$^{192}_{78}$Pt	612	20ps	[2]	+0.99‡ *20*		70Le04	IPAC	$\omega\tau$=54 *11*mr ‡From $\omega\tau$−ratio and μ(316)=0.+92	^{192}Ir in Fe, melted; H_{int}= −1.235MG
$^{192}_{78}$Pt	612	20ps	[2]	+0.62[cp] *9* +1.04‡ *10*		72Ro30	IPAC	‡From $\omega\tau$−ratio and μ(316)=+0.92	
$^{192}_{78}$Pt	785	12ps	[4]	±0.86‡ *60*		69Ke11	IPAC	$\omega\tau$=14 *10*mr ‡From $\omega\tau$−ratio and μ(316)=+0.92	1% Ir in Fe; H_{int}=1.25 *3*MG
$^{194}_{78}$Pt	328	35ps	[2]	±0.54 *8* ±0.61‡ *9*		65Ke11	IPAC	$\omega\tau$=91.6† *67*mr ‡For H_{int}=1.25MG †Corrected for other cascades	Ir−Fe; H_{int}=1.42 *11*MG
$^{194}_{78}$Pt	328	35ps	[2]	+0.79$^{+36}_{-24}$		65Sp03	IPAC	$\omega\tau$=3.92mr	CEx with ^{1}H on ^{194}Pt metal; H_o=41.6kG
$^{194}_{78}$Pt	328	35ps	[2]	+0.62 *8* +0.66‡ *9*		66Ag02	IPAC	$\omega\tau$=99† *9*mr ‡For H_{int}=1.25MG †Corrected for other cascades	Dilute Pt−Fe; H_{int}=1.32 *8*MG
$^{194}_{78}$Pt	328	35ps	[2]	+0.64 *8*		67Ka16	IMPAC	$\omega\tau$=70 *5*mr, corrected for ^{196}Pt γ's	CEx with O, ^{194}Pt recoils in polarized Fe; H_{int}=−890 *70*kG
				+0.54[c]‡ *12*		69Ku06		‡Used data on $\omega\tau$ and τ to correct for transient fields. Used $H_i\tau_i$=17.7 *34*MG−ps and H_{int}=−1.21 *5*MG	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{194}_{78}$Pt	328	35ps	[2]	±0.57 *8* ±0.59‡ *6*		70Ke14	IPAC	$\omega\tau$=87 *4*mr $\omega\tau$=89‡ *3*mr ‡Weighted average of 70Ke14, 66Ag02, 65Ke11	Ir–Fe; H_{int}=1.25 *5*MG
$^{194}_{78}$Pt	328	35ps	[2]			70Ke18	IMPAC	$\omega\tau$=77 *5*mr If transient fields responsible for precession, $H_t\tau_t$~+11.6 *43*MG–ps	CEx with 2.5MeV ^{1}H
$^{194}_{78}$Pt	328	35ps	[2]	+0.596[cp] *36*		72Ro30	IPAC		
$^{194}_{78}$Pt	622	44ps	[2]	±0.36 *10* ±0.41‡ *11*		65Ke11	IPAC	$\omega\tau$=78 *13*mr ‡For H_{int}=1.25MG	Ir–Fe; H_{int}=1.42 *11*MG
$^{194}_{78}$Pt	622	44ps	[2]	+0.42 *14* +0.44‡ *14*		66Ag02	IPAC	$\omega\tau$=83 *20*mr ‡For H_{int}=1.25MG	Dilute Pt–Fe; H_{int}=1.32 *8*MG
$^{194}_{78}$Pt	622	44ps	[2]	±0.48 *12* ±0.44‡ *8*		70Ke14	IPAC	$\omega\tau$=91 *15*mr $\omega\tau$=84‡ *9*mr ‡Weighted average (70Ke14, 66Ag02, 65Ke11)	annealed Ir–Fe;H_{int}=1.25 *5*MG
$^{194}_{78}$Pt	622	35‡ps	[2]	+0.56[cp] *9*		72Ro30	IPAC	‡Remeasured	
$^{195}_{78}$Pt	210	67ps	[3/2]	+0.24 *9*		69Ku06	IMPAC	$\omega\tau$=80 *24*mr	CEx with ^{16}O; ^{195}Pt recoils in Fe; H_o=1.4kG; assumed H_{int}=–1.21 *5*MG and $H_t\tau_t$=17.7 *34*MG–ps
$^{195}_{78}$Pt	210	67ps	[3/2]	+0.33 *9*		69Va05	IPAC	$\omega\tau$=108 *25*mr	CEx with ^{1}H on Fe–Pt; H_{int}= 980 *80*kG measured with ^{194}Pt assumed g^{194}(328)=+0.32 *4*
$^{195}_{78}$Pt	240	230ps	[5/2]	+0.18 *5*		69Ku06	IMPAC	$\omega\tau$=135 *27*mr or $\omega\tau$=124 *48*mr	CEx with ^{16}O, recoils in Fe; observed (^{16}O′)(240γ) or (^{16}O′)(140γ); assumed H_{int}=–1.21 *5*MG and $H_t\tau_t$=17.7 *34*MG–ps
$^{195}_{78}$Pt	240	230ps	[5/2]	+0.26 *6*		69Va05	IPAC	$\omega\tau$=160 *22*mr	CEx with ^{1}H on Fe–Pt; assumed no transient fields; H_{int}=980 *80*kG measured with ^{194}Pt, assumed g^{194}(328)= +0.32 *4*
$^{195}_{78}$Pt	259	4.1d	[13/2]	±0.597‡ *15*		72Ba22	GAP–NMR	ν=89.5 *5*MHz ‡Uncorrected for hyperfine anomaly	Pt–^{60}Co–Fe; H_{hf}=–1280 *26*kG
$^{196}_{78}$Pt	356	35ps	[2]	+0.50 *8*		67Ka16	IMPAC	$\omega\tau_{ave}$=55‡ *3*mr ‡Corrected for ^{194}Pt γ's	CEx with O, ^{196}Pt recoils in polarized Fe; H_{int}=–890 *70*kG
$^{196}_{78}$Pt	356	35ps	[2]	+0.54 *7*		68Be61	IPAC	$\omega\tau$=4.97 *40*° $\omega\tau$=4.74 *44*° $\omega\tau_{ave}$=85.0 *52*mr	Au in Fe–Pt; H_{int}=–1.235 *5*MG Au implanted in Fe foils
$^{196}_{78}$Pt	356	35ps	[2]	+0.56 *7*		68Mu02	IPAC	$\omega\tau$=81.8 *47*mr	Au diffused into Fe; H_{int}= 1.25 *3*MG
$^{196}_{78}$Pt	356	35ps	[2]	+0.52°‡ *22*		69Ku06	IMPAC	‡Used data on $\omega\tau$ and τ to correct for transient fields; used $H_t\tau_t$=17.7 *34*MG–ps and H_{int}= –1.21 *5*MG	
$^{196}_{78}$Pt	356	35ps	[2]	+0.556[cp] *35*		72Ro30	IPAC		
$^{198}_{78}$Pt	408	19ps	[2]	+0.52 *8*		67Ka16	IMPAC	$\omega\tau_{ave}$=30.5 *20*mr	CEx with O, ^{198}Pt recoils in polarized Fe; H_{int}=–890 *70*kG
$^{195}_{79}$Au	gs	192d	(3/2)	±0.13 *4*		65Ca12	GAP		Au+^{60}Co in Fe; H_{int}=1.32 *5*MG based on μ^{198}=0.590 and μ^{199}=0.270
$^{196}_{79}$Au	596	9.7h	(12)	±5.35[d]‡ *20*		71Ba94 72Ba86	GAP	$\lvert\mu H\rvert_{ave}$=30.6 *12* or 6.4 *4*a–erg ‡Includes hyperfine anomaly correction	^{196}Au+^{60}Co in Fe or Ni; H_o~*4*kG

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat — Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{198}_{79}$Au	367	123ns	[3]	$\pm 3.60^{p}$ *24*		70Kl13	DPAC		
$^{198}_{79}$Au	?	49h	[12?]	$\pm 5.55^{dp}$ *34*		72Ba86	GAO		2.5% hyperfine anomaly included
$^{200}_{79}$Au	?	18.7h	[12]	$\pm 6.10^{dp}$ *10*		72Ba86	GAO-NMR		2.5% hyperfine anomaly included
$^{183}_{80}$Hg	gs	8.8s	1/2	$+0.518^{d}$ *9*		72Bo09	BAO-NMR		on-line mass separator
$^{185}_{80}$Hg	gs	50s	1/2	$+0.504^{d}$ *4*		72Bo09	BAO-OP		on-line mass separator
$^{187}_{80}$Hg	gs	2.4m	3/2	-0.586^{dp} *6*	-0.3^{p} *11*	72Ot03 71Bo31	BAO-OP		on-line mass separator
$^{197}_{80}$Hg	134	7.3ns	[5/2]	+0.950 *65*		70Ge01	DPAC		Cu-Hg amalgam; H_o=29.5 *3*kG, 33.2 2kG
$^{198}_{80}$Hg	412	22.0ps	[2]	+0.76 *22*		64Ke02	IPAC	$\omega\tau$=81 *16*mr	Fe-Au; H_{int}=1.42MG
$^{198}_{80}$Hg	412	22.0ps	[2]	$+1.10^{p}$ *22*		64Ko15	IPAC		^{198}Au-metal; H_o=57.15kG
$^{198}_{80}$Hg	412	22.0ps	[2]			70Ka09	IMPAC	$\Delta\theta$=24.5 *22*mr	CEx with O on ^{198}Hg, recoils in polarized Fe; H_o=1.4kG; $H_{\mathcal{T}_1}$=5.9 *23*MG, used $\omega\tau$=40 *4* mr of Murray to get transient fields
$^{199}_{80}$Hg	158	2.32ns	[5/2]		$+0.7^{+4}_{-2}$	56Po14	AAC	$eqQ=1100^{+650}_{-230}$MHz or 593^{+150}_{-100}MHz	Compared anisotropy in liquid metal with powdered $HgCl_2$ or frozen metal; used Q^{201}=0.45 and $eqQ^{201}(HgCl_2)$= 720MHz, eqQ^{201}(liquid metal) =708MHz
$^{199}_{80}$Hg	158	2.32ns	[5/2]	$+1.03^{d}$ *8*		61Gr29	PAC		Au(α,2n); H_o=26000 *75*G
$^{199}_{80}$Hg	533	44m	13/2		$+2.0^{p}$ *13*	72Ot03	GAO-OP		on-line mass separator
$^{200}_{80}$Hg	368	42ps	[2]	+0.86 *22*		70Ka09	IMPAC	$\Delta\theta$=47.8 *24*mr g/g_{2+}^{198}=0.79 *12*	CEx with O on ^{200}Hg, recoils in polarized Fe(See ^{198}Hg-70Ka09); used g_{2+}^{198}=0.55 *11*
$^{202}_{80}$Hg	439	26μs	[2]	+1.18 *30*		70Ka09	IMPAC	$\Delta\theta$=33 *3*mr g/g_{2+}^{198}=1.07 *17*	CEx with O on ^{202}Hg, recoils in polarized Fe(See ^{198}Hg-70Ka09); used g_{2+}^{198}=0.55 *11*
$^{204}_{80}$Hg	437	46ps	[2]	+0.80 *20*		70Ka09	IMPAC	$\Delta\theta$=50 *3*mr g/g_{2+}^{198}=0.73 *12*	CEx with O on ^{204}Hg, recoils in polarized Fe(See ^{198}Hg-70Ka09); used g_{2+}^{198}=0.55 *11*
$^{205}_{80}$Hg	gs	5.5m	1/2	$+0.5911^{p}$ *5*		72Ot03	BAO-OP		on-line mass separator
$^{202}_{81}$Tl	950	560μs	[7]	$\pm 0.896^{p}$ *42*		72Ha67	DPAD	ω=48.6 *10*kr/s	liquid Hg(pulsed p,); maximum H_o=80 *3*G
$^{203}_{81}$Tl	279	280ps	[3/2]	+0.16 *5*		65Ka02	IPAC	$\omega\tau$=10.7 *27*mr	$PbCl_2$ in 6N HCl; H_o=50.6kG
$^{204}_{82}$Pb	1274	260ns	[4]	+0.22 *2*		55Kr06	CDPAC		Tl in HNO_3; T_{delay}=352ns, Tl in H_2SO_4; T_{delay}=237ns
$^{204}_{82}$Pb	1274	260ns	[4]	+0.226 *8*		63Sa19	DPAC	ν=8.609MHz	Bi in HNO_3; H_o=31.81kG
$^{204}_{82}$Pb	1274	260ns	[4]	+0.220 *12*		67Li12	DPAC	ν=9.27 *5*MHz	liquid sources; H_o=35.2kG, G_2=0.978 *33*
$^{204}_{82}$Pb	1274	260ns	[4]		$\sim\pm 0.3$	71Bo65 (67Li12)	AAC	ν_o=2.23MHz	Pb in polycrystalline Tl; assumed $\gamma_\infty(Pb^{4+})\sim -50.88$
$^{205}_{82}$Pb	1014	5.55ns	[13/2]	−0.975 *40*		71Ma59	DPAD		liquid ^{204}Hg(pulsed α, 3n); diamagnetic correction ≈ −Knight shift (~1.7%)

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{206}_{82}$Pb	803	6ps	[2]	−0.02 *14*		70Za03	IPAC	$\omega\tau$=+0.4 *23*mr	Pb in Fe; H_{int}=660 *45*kG
$^{206}_{82}$Pb	2200	123μs	[7]	−0.57[p]‡ *5* or −0.35[p]‡		69Qu04	AAC	‡If $\tau_{relax}<\tau$ or >200μs	
$^{206}_{82}$Pb	2200	123μs	[7]	−0.1519 *28*		72Ma24	DPAD Strob		liquid ^{204}Hg(pulsed α,2n); diamagnetic correction ≈ −Knight shift (~1.7%)
$^{206}_{82}$Pb	2385	29ps	[6]	+0.78 *42*		70Za03	IPAC	$\omega\tau$=−16.7 *90*mr	Pb in Fe; H_{int}=660 *45*kG
$^{206}_{82}$Pb	4027	200ns	[12]	−1.860[p] *48*		72Na16	DPAD		liquid Hg(pulsed α,)
$^{207}_{82}$Pb	570	129ps	[5/2]	+0.72 *10*		64Gu03	IPAC	$\omega\tau$=+13.0 *13*mr	liquid $BiCl_3$; H_o=50.6kG
$^{207}_{82}$Pb	570	129ps	[5/2]	+0.96 *22*		65He10	IPAC	$\omega\tau$=3.4 *21*mr	liquid source; H_o=10kG
$^{207}_{82}$Pb	570	129ps	[5/2]	+0.65 *5*		66Ko16	IPAC	$\omega\tau$=12.9 *9*mr	liquid $^{207}BiCl_3$ in HCl; H_o=55.2kG
$^{207}_{82}$Pb	570	129ps	[5/2]	±0.79[p] *3*		72Sc36	IPAC	$\omega\tau$=26.6 *9*mr	H_o=94.4 *5*kG
$^{208}_{82}$Pb	2615	15ps	[3]	+1.74 *42*		69Bo12	IPAC	$\omega\tau$=1.80 *45*mr	^{228}Th in HCl; H_o~30.5kG
$^{208}_{82}$Pb	2615	15ps	[3]	±1.89[p] *29*		72Sc36	IPAC	$\omega\tau$=5.97 *79*mr	H_o=94.4 *5*kG
$^{208}_{82}$Pb	3198	298ps	[5]	+0.105 *35*		69Bo01	IPAC	$\omega\tau(2615)/\omega\tau(3198)$ =1.36 *21*	^{228}Th in Fe, Co; used $g(2615)$=+0.58 *14*
$^{207}_{83}$Bi	2102	182μs	[21/2]	+3.41 *6*		72Ma24	DPAD Strob		liquid Hg(^{7}Li,4n); diamagnetic correction ~ −Knight shift (~1.7%)
$^{210}_{83}$Bi	gs	5.0d	(1)	negative[p]	positive[p]	72Na17	BAP	observed positive asymmetry	ferromagnetic BiMn; H_{hf}~1MG; used $\mu/Q<0$ from atomic beams
$^{211}_{83}$Bi	405	318ps	[7/2]	+4.41 *67*		65Ag03	IPAC		liquid sources ^{211}Pb or ^{223}Ra + ^{211}Pb; H_o=18.3kG
$^{204}_{84}$Po	~1700	190ns‡	[8]	±8.32[p] *64*		72Br42	DPAD	‡quoted value	^{204}Pb foil (pulsed α,)
$^{204}_{84}$Po	~1700	140ns‡	[8]	±7.24[p] *32*		72Na18	Strob	‡quoted value	
$^{206}_{84}$Po	?	160ns‡	[8]	±7.60[p] *32*		72Br42	DPAD	‡quoted value	^{204}Pb foil (pulsed α,); H_o=15.9kG
$^{206}_{84}$Po	?	212ns‡	[8]	±7.24[p] *32*		72Na18	Strob	‡quoted value	^{206}Pb(pulsed ^{3}He,)
$^{207}_{84}$Po	1115	47μs	[13/2]	−0.930[dkp] *13*		72Fo19	DPAD		liquid ^{206}Pb(pulsed α,)
$^{208}_{84}$Po	>1520	380ns	[8]	±7.22 *5*		70Na11	Strob	H_o=11.62 *8*kG	^{206}Pb(α,2n); T_o=123.43ns
				±7.48 *40*			DPAD	ω=63.2 *34*Mr/s‡	^{208}Pb(^{3}He,3n); H_o=13.9kG; assumed Knight shift~1.47%
								‡Unit given as MHz	
$^{208}_{84}$Po	1532	380ns	[8]	±7.29[p] *8*		72Na18	Strob		^{208}Pb(pulsed ^{3}He,)
$^{209}_{84}$Po	>1327	~100ns	[17/2?]	+7.48 *43*		68Ya08	DPAD	ω=11.6 *7*Mr/s‡	metallic Pb(pulsed α,xn); H_o =2.760kG; recalculation includes Knight shift~1.4%
				+7.37[c] *43*		70Na11			
								‡Unit given as MHz	
$^{209}_{84}$Po	?	100ns	[17/2]	±7.62[p] *13*		72Na18	Strob		^{207}Pb(pulsed α,)
$^{210}_{84}$Po	1472	38ns	[6]	±5.58[dkp] *12*		72Ba87	DPAD		^{208}Pb(pulsed α,); H_o=13.76 *7*kG
$^{210}_{84}$Po	1552	110ns	[8]	+7.29 *8*		70Ya02	DPAD	ω=48.44 *4*Mr/s‡	metallic ^{208}Pb(pulsed α,2n); H_o=10.93kG; assumed Knight shift~1.47%
								‡Unit given as MHz	
$^{210}_{84}$Po	1552	110ns	[8]	±7.27[dkp] *12*		72Ba87	DPAD		^{208}Pb(pulsed α,); H_o=13.76 *7*kG
$^{210}_{84}$Po	1552	110ns	[8]	±7.21[p] *10*		72Na18	Strob		^{208}Pb(pulsed α,)
$^{210}_{84}$Po	2800	24ns	[11]	+11.99 *18*		70Ya06	DPAD	ω=101.0 *15*Mr/s‡	metallic ^{208}Pb(pulsed α,2n); H_o=19.05kG; assumed Knight shift~1.47%
								‡Unit given as MHz	

Table J: Nuclear Moments by Perturbed Angular Correlation, Aligned Nuclei, and Specific Heat – Continued

Nucleus	Level	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment & Comments
$^{210}_{84}$Po	4372	93ns	[13]	±7.10[P] *16*		72Ya08	DPAD	ω=56.2 *13*Mr/s	metallic ^{208}Pb(pulsed α,); H_o=21.03 *10*kG
$^{211}_{84}$Po	1064	16ns	[15/2]	±0.38[P] *15*		72Fa17	IPAD		^{208}Pb(pulsed α,); H_o=16.6kG
$^{211}_{85}$At	1416	50ns	[21/2]	±9.42[dkp] *17*		72In03	DPAD		^{209}Bi(pulsed α,); H_o=21.0kG
$^{211}_{85}$At	4816	4.2μs	[39/2, 41/2]	±14.0 *14*, ±14.8 *14*		71Ma70	DPAD		pulsed ^{4}He or ^{16}O on separated Hg, Tl, Pb, Bi
$^{212}_{86}$Rn	~1700	1.0μs	[8]	±7.12 *24*		71Ma70	DPAD		pulsed ^{4}He or ^{16}O on separated Hg, Tl, Pb, Bi
$^{222}_{86}$Rn	186	320ps	[2]	+0.90 *14*		70Or02	PAC	$\Delta\theta$=−1.59°‡	α-decay recoils from Ra or $RaCl_2$ in Gd, Pb, U_2O_3; H_o= 27.6 *5*kG ‡Corrected for beam deflection
$^{223}_{88}$Ra	50	630ps	[3/2]	+0.42 *6*		70Le13	PAC	$\omega\tau$=34 *3*mr	liquid ^{227}Ac in HNO_3; H_o=28kG
$^{233}_{92}$U	gs	162ky	(5/2)			58Da21 60Ro27	αAO	Anisotropy negative; $P\sim\pm0.03$cm^{-1}	$UO_2Rb(NO_3)_3$
$^{233}_{92}$U	gs	162ky	(5/2)			68Ma42	αAO		$UO_2Rb(NO_3)_3$ α's emitted perpendicular to alignment axis
$^{235}_{92}$U	gs	710My	(7/2)			58Da21	αAO	Anisotropy negative	$UO_2Rb(NO_3)_3$
$^{237}_{93}$Np	gs	2.1My	(5/2)		positive	58Da21 61Ha34	αAO	Anistropy negative; $A<0$, $P>0$	$NpO_2Rb(NO_3)_3$ crystal α's emitted parallel to nuclear spin
$^{237}_{93}$Np	60	63ns	[5/2]	+3.5‡ *5*		55Kr02 57Kr52	DPAC		liquid source in 1N $HClO_4$ ‡Solutions may have been imperfect
$^{237}_{93}$Np	60	63ns	[5/2]	±2.45[P] *10*		66He13	DPAC	ω=245.1 *10*Mr/s‡	concentrated $^{241}AmCl_3$ in HCl H_o=41.1 *4*kG; used β(20°C)= 1.28 *4* and G_2=0.45 ‡Unit given as MHz
$^{237}_{93}$Np	60	63ns	[5/2]	+1.90 *15*		67Gu08	DPAC IPAC	ω=−76.5 *35*Mr/s $g^{239}(75)/g^{237}(60)$= 1.04 *9*	AmO in 6N HCl; H_o=12.5kG, β=1.68 *11*
$^{239}_{93}$Np	75	1.40ns	[5/2]	+1.98 *24*		67Gu08	IPAC	$\omega\tau$=−238 *17*mr G_2=0.935 *10*	AmO in 6N HCl; H_o=18.5kG, β=1.68 *11*
$^{253}_{99}$Es	gs	20.5d	[7/2]	±2.7 *13*		70So09 62Na14	αAO	A_{ave}=0.26 *3*cm^{-1}	Es^{3+} in NES crystal; used $\langle r^{-3}\rangle_{5f}$=10.92au

*Polarization or Sternheimer correction included.

[a] Half-life used by authors not known, therefore μ not corrected to quoted half-life.

[b] Spin-value used by authors not known, therefore μ not corrected to quoted spin.

[c] Recalculation of earlier data.

[d] Diamagnetic correction included.

[k] Includes Knight shift correction.

[p] Preliminary value from meeting abstract, report, thesis, or private communication.

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron–Scattering

The following table lists values of nuclear moments derived from Coulomb excitation reorientation measurements and inelastic electron–scattering experiments. The possibility of determining nuclear electric quadrupole moments by the reorientation effect in Coulomb excitation was first proposed by Breit, [55Br64] and [56Br69]. He explained the effect as an interaction of the excited–state quadrupole moment with the electromagnetic field of the projectile after the nucleus is Coulomb–excited by the projectile. The name is derived from considering the effect as a second–order perturbation process where the E2 multipole interaction first causes a transition from the ground state to an excited state of the nucleus and then causes a transition from one magnetic sub–level to another of the same state, i.e. a reorientation of the nuclear axis. This is pictorially represented in figure 1. The second order excitation probability then depends on the static quadrupole moment of the excited state.

In Coulomb excitation the projectile does not penetrate the nucleus and the interactions with the nucleus are reasonably well understood. The major assumptions made in a semi–classical treatment are that 1) the projectile orbit can be treated classically and 2) that perturbation theory can be applied. For the first assumption to apply, the energy of the projectile must be low enough so that it can be described by a 'wave–packet' which is small with respect to nuclear dimensions. If the dimensionless parameter, η, is defined by:

$$\eta = 2\pi a/\lambda = 2\pi Z_1 Z_2 e^2/h v_\infty \qquad (1)$$

where a is 1/2 the distance of closest approach in a head–on collision; $\lambda = h/mv_\infty$, the deBroglie wavelength of the projectile; v_∞, the velocity of the projectile at infinity; and Z_1 and Z_2 are the projectile and target charges respectively, then this condition is fulfilled when $\eta >> 1$. For the energies used in Coulomb excitation, where $2a$ is greater than the nuclear radius, this condition is usually satisfied. A further requirement that the projectile may be treated as a classical particle moving in a hyperbolic orbit is that the energy loss in the excitation process be small compared to the incident energy. If we define an adiabaticity parameter:

$$\xi = 2\pi a \Delta E/h v_\infty \cong \tau_{\text{collision}}/\tau_{\text{nuclear}} \qquad (2)$$

where ΔE is the excitation energy between the initial and final states, then for $\xi << 1$, the excitation process can be treated as a sudden one and this condition obtains. For a classical particle, $\xi = 0$. For $\xi >> 1$, the process is adiabatic and the excitation probabilities vanish. The second assumption requires that the first–order excitation probabilities be small.

For a classical projectile, the angular distribution of the elastically scattered particle is given by the Rutherford cross section:

$$d\sigma_R = (a^2/4)\ \sin^{-4}(\theta/2)\ d\Omega \qquad (3)$$

where θ is the scattering angle; see figure 2. To obtain the cross section for Coulomb excitation of the nucleus, the Rutherford cross section is multiplied by the probability of exciting the nucleus to the final state. If the excitation probabilities are small, the first–order transition amplitudes can be calculated from:

$$b_{if}^{(1)} = (2\pi i/h) \int_{-\infty}^{\infty} \langle f|H_{int}|i\rangle \exp[(2\pi i/h)(E_f - E_i)t]dt \qquad (4)$$

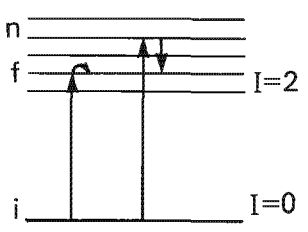

FIGURE 1. A pictorial representation of the reorientation effect. The E2 multipole interaction first causes a transition to an excited state and then a transition from one sub-level to another of the excited state.

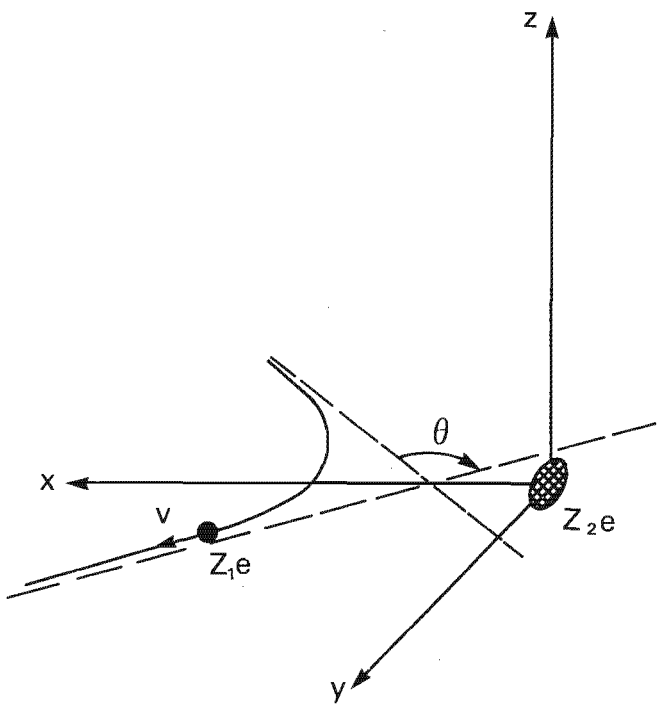

FIGURE 2. Focal–coordinate system of the scattering of a classical projectile of charge Z_1e by a nucleus of charge Z_2e. The path of the projectile is in the xy=plane and θ is the scattering angle.

where H_{int} denotes the time-dependent electromagnetic interaction and E_f and E_i, the energies of the final and initial states. In the semi-classical treatment, H_{int} is expanded in multipoles. The monopole interaction gives rise to the Rutherford scattering which is already accounted for by considering the projectile moving in a classical hyperbolic orbit. The magnetic multipole excitation amplitudes are smaller than the electric ones by the factor v/c, which is small for the energies of the projectiles used in Coulomb excitation. Magnetic excitation is therefore negligible except when the electric matrix elements vanish.

To first order, the electric Eλ multipole excitation amplitudes can be shown to be:

$$b_{if}^{(1)} = -i(-1)^{I_i-M_i}\left(\frac{8\pi^2 Z_1 e}{h v_\infty a^\lambda}\right)\frac{\langle I_i||\mathrm{ME}\lambda||I_f\rangle}{(2\lambda+1)} \times \sum_\mu \begin{pmatrix} I_i & \lambda & I_f \\ -M_i & \mu & M_f \end{pmatrix} Y_{\lambda\mu}(\pi/2,0)\, I_{\lambda\mu}(\theta,\xi) \quad (5)$$

where the reduced nuclear matrix element is defined by:

$$\langle I_i||\mathrm{ME}\lambda||I_f\rangle \equiv (-1)^{I_i-M_i}\begin{pmatrix} I_i & \lambda & I_f \\ -M_i & \mu & M_f \end{pmatrix}^{-1} \times \langle I_i M_i|\int r_2^\lambda\, \rho(r_2)\, Y_{\lambda\mu}(\Omega_2)\, d^3 r_2|I_f M_f\rangle \quad (6)$$

with $\rho(r_2)$ the nuclear charge density and where the $Y_{\lambda\mu}(\pi/2,0)$ and $I_{\lambda\mu}(\theta,\xi)$ are functions of the projectile orbits, see [68De34], page 7*. The functions $Y_{\lambda\mu}(\pi/2,0)$ and $I_{\lambda\mu}(\theta,\xi)$ are defined and tabulated in references [60Al23] and [56Al54]. This amplitude leads to the first order differential excitation cross section:

$$d\sigma = P_{i\to f}^{(11)} d\sigma_R = (2I_i+1)^{-1}\sum_{M_i M_f}|b_{if}|^2 d\sigma_R = \frac{64\pi^4 Z_1^2 e^2}{h^2 v_\infty^2 a^{2\lambda}}\,\frac{B(\mathrm{E}\lambda, I_i\to I_f)}{(2\lambda+1)^3} \times \sum_\mu |Y_{\lambda\mu}|^2\,|I_{\lambda\mu}|^2 a^2\,(4\sin^4\theta/2)^{-1} d\Omega \quad (7)$$

where $B(\mathrm{E}\lambda,\ I_i\to I_f) \equiv (2I_i+1)^{-1}\,|\langle I_i||\mathrm{ME}\lambda||I_f\rangle|^2$ (8)

In order to evaluate the reorientation effect, the calculations for the excitation must be carried out to second order.

$$b_{if}^{(2)} = b_{if}^{(1)} + \Sigma_n\, b_{inf} \quad (9)$$

*Note, in the definition of X, equation (12) of [68De34], $(\lambda+1)!$ should be replaced with $(\lambda-1)!$

where

$$b_{inf} = (ih/2\pi)^{-2}\int_{-\infty}^{\infty}\langle f|H_{int}|n\rangle \exp[(2\pi i/h)(E_f-E_n)t]dt \times \int_{-\infty}^{\infty}\langle n|H_{int}|i\rangle\exp[(2\pi i/h)(E_n-E_i)t']dt'$$

The sum extends over all intermediate states "n", including the initial and final states. This double integral can be simplified, see Alder [56Al54], p469, so that the total amplitude to second order is of the form:

$$b_{if}^{(2)} = A[i\langle I_i||\mathrm{ME}\lambda||I_f\rangle Y_{\lambda\mu} I_{\lambda\mu}/(v_\infty a^\lambda) + \Sigma_n B\langle I_i||\mathrm{ME}\lambda_1||I_n\rangle\langle I_n||\mathrm{ME}\lambda_2||I_f\rangle \times (\alpha_{\lambda,-\mu}+i\beta_{\lambda,-\mu})/v_\infty^2 a^{\lambda 1+\lambda 2}] \quad (10)$$

where A and B are functions of λ, Z_1, Z_2, I_i, I_f, M_i, M_f and where α and β are functions of the projectile parameters θ, λ_j, μ_j, and ξ_j. The last three quantities, with j=1 and 2, are defined for the transitions i→n and n→f respectively. The differential cross section to second order is then:

$$d\sigma = [P^{(11)} + P^{(12)} + O(P^{(22)})]d\sigma_R = d\sigma_R(2I_i+1)^{-1}\sum_{M_i M_f}[(b_{if}^{(1)})^2 + 2\mathrm{Re}\,(b_{if}^{(1)}\sum_n b_{inf}) + O(\mathrm{ME}\lambda)^4] \quad (11)$$

For the case of λ=2, the crossover term is seen to contain terms proportional to $[B(\mathrm{E2},I_i\to I_f)]Q$, since, for "n" equal to "i" or "f",

$$Qe = (16\pi/5)^{1/2}\,[I(2I-1)/(2I+1)(2I+3)(I+1)]^{1/2} \times \langle I||\mathrm{ME2}||I\rangle.$$

In order to account for the different velocities of the projectile before and after the excitation, the semiclassical expressions can be symmetrized by replacing $v_\infty\to\sqrt{(v_i v_f)}$, $a\to Z_1 Z_2 e^2\times(1+A_1/A_2)/A_1 v_i v_f$, $\xi\to\eta_f-\eta_i$ and by multiplying the resulting excitation probability by a factor v_f/v_i. With these substitutions, the semiclassical Coulomb excitation probabilities closely approximate the quantum mechanical results; see [56Al54, 65Bi14].

The application of perturbation theory assumes that the probability of excitation of any level is small and that higher order processes are negligible. This is true, in general, for excitation by p, d, and α's but not for higher Z projectiles nor for target nuclei with large transition probabilities between excited states and the ground or final states. For those cases, multiple Coulomb excitation becomes important. The nuclear system then interacts strongly with the time-dependent electromagnetic fields produced by the

projectile and many levels are excited simultaneously. Some higher levels can even be more strongly excited than lower lying ones. If multiple excitation effects are important, the final state amplitudes for the individual levels can be obtained by solving a set of coupled Schrödinger equations. The calculation of the reorientation effect must be carried out for the particular nucleus and for the actual bombarding conditions. All of the available information on the energies and spins of the individual nuclear levels which can contribute and on the matrix elements connecting them (experimentally determined or calculated from some model) must be used as input data in order to determine the quadrupole moments from the reorientation measurements. A representation of the types of virtual transitions which must be considered in such calculations is given in figure 3. Many Q-values have been determined using the deBoer-Winther computer code for the differential cross sections for multiple Coulomb excitation [65Wi14 or 66Al22]. This code can handle up to 10 nuclear levels with a total of 90 substates, for $\lambda = 2$. One of the major sources of uncertainty in the determination of Q's from such calculations is the relative phases of the matrix elements for excitation via different levels. In many cases, several values of Q are quoted, one for each of the different combinations of signs possible.

A code is also available to compute the angular distribution of the deexcitation γ-rays. When observing only the γ-ray angular distribution from a particular level, the situation is more complicated than when the scattered particles are observed. The level is not only populated by Coulomb excitation directly to that level but also by Coulomb excitation to higher levels with subsequent unobserved cascades of conversion electrons or γ-rays to the level. The contribution of these additional real transitions must be subtracted. It is therefore necessary to know the L-pole γ-transition rates and internal conversion coefficients for all transitions which could occur as well as the angular correlations between them if the reorientation effect is measured via the dexcitation γ-ray angular distributions.

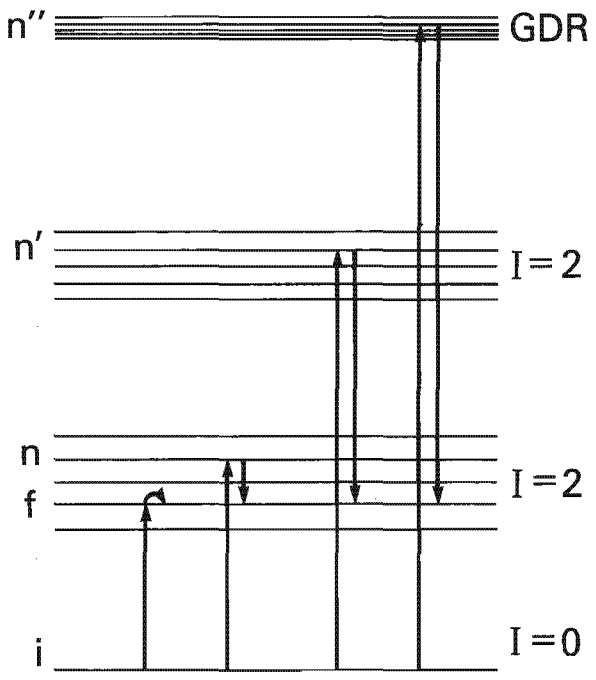

FIGURE 3. A representation of some of the kinds of transitions which must be included in the multiple Coulomb excitation of level 'f' from level 'i'. The first two represent the reorientation transitions: the third, a competing excitation of the level through a higher, $I=2$ level: and the fourth, an excitation of the level through the giant dipole resonance.

Several graphs are presented in deBoer and Eichler's article, [68De34], which are useful in establishing the values of some experimental variables. The bombarding energy must be kept small enough to insure that nuclear interactions, other than Coulomb, are not important. Such interactions are not well enough understood, generally, to be accounted for with sufficient accuracy. Two arbitrary limits were chosen by the authors to define a "maximum safe bombarding energy" for their plot of E_{max} as a function of the target mass, A_2, for values of the projectile mass, A_1, from 2 to 64 [68De34, figure 7]. The minimum distance between the two nuclear surfaces in a head-on collision must be 1) greater than 3 Fermi and 2) larger than the deBroglie wavelength of the projectile at infinity. The "safe bombarding energy" increases slowly with A_1 and A_2. In figure 8, [68De34], a similar plot of the corresponding values of η is given. A third useful graph, figure 9 in the same article, shows the interaction strength, $X_{i\to f}$, as a function of A_1 and A_2 for the excitation of the first 2^+-level by a projectile at the "maximum safe bombarding energy." The plot assumes a $B(E2, 0^+\to 2^+)$-value of 1.0 e^2b^2. For values of $X<0.1$, the use of second order perturbation theory yields excitation probabilities which are accurate to about 1%. The interaction strengths increase rapidly with A_1 so that second order perturbation theory may not be justified and a multiple-excitation calculation be required for heavy projectiles.

For the case of ^{114}Cd, on which the earliest reorientation experiments were performed and on which there has been very much activity, the "maximum safe bombarding energies," corresponding values of η, and the interaction strengths, $X_{i\to f}$, for a $B(E2, 0^+\to 2^+) = 1.0e^2b^2$ obtained from the graphs in [68De34] are presented in table 1. For the 558keV level, the actual $B(E2) = 0.51e^2b^2$. From the table it is seen that second order perturbation calculations would be applicable for ^{2}H-projectiles under 3MeV and possibly also for ^{4}He under 11MeV, but not for the heavier projectiles. For these, multiple Coulomb excitation must be considered. In the paper by

TABLE 1. Maximum safe bombarding energies, corresponding η's, and interactions strengths, $X_{i\to f}$, for projectiles on ^{114}Cd, as taken from the graphs in [68De34]

Projectile	Maximum safe bombarding energy (MeV)	η	$X_{i\to f}$†
^{2}H	3	5	0.07
^{4}He	11	9	0.22
^{8}C	23	17	0.50
^{16}O	50	33	0.85
^{32}S	100	65	1.5

†Assumed $B(E2,0\to2) = 1.0\ e^2b^2$

Berant et al., [71Be36], there is a discussion of the many papers on ^{114}Cd with an attempt to establish a best value for the static quadrupole moment of the 558keV level, which they give as -0.32 ± 8b. In the same paper they mention that with a precision level of 1%, they observe no deviations from pure Coulomb excitation for ^{4}He–projectiles up to 10MeV, but that deviations do occur for ^{16}O above about 46MeV. These are not consistent with the values in table 1. These "safe bombarding energies" should, therefore, be considered merely as a guide. It has been suggested that the lack of nuclear interactions should always be checked out experimentally by performing the reorientation experiments at at least two different bombarding energies.

Quadrupole moments can be obtained either by making high precision absolute cross section measurements or by studying the relative excitation of a level under different bombarding conditions. For example, eq (11) can be written as $d\sigma \cong P^{(11)}(1+r)d\sigma_R$ where, for the most frequently encountered case, one with $I_i=0$, $I_f=2$, $\lambda=2$, no other states excited and for low excitation energies, ΔE:

$$r \equiv P^{(12)}/P^{(11)} \approx A_1 \Delta E \langle f||ME2||f\rangle\ K(\xi,\theta) \times [Z_2(1+A_1/A_2)]^{-1}. \quad (12)$$

Here the A are in amu, ΔE in MeV, and $\langle f||ME||f\rangle$ in eb. K is a function of the projectile parameters: $Y_{2,\mu}$, $I_{2,\mu}$, $\beta_{2,-\mu}$. A plot of K as a function of ξ for different scattering angles can be found in deBoer and Eichler, [68De34], p33. For a given angle, K is a slowly varying function of ξ. It is a maximum for $\theta = \pi$. At backward angles, K is a maximum for small values of ξ. r is seen to be proportional to the excitation energy of the level and to the mass of the projectile used. However, the ratio $\Delta E/E$ must be kept small ($\xi<1$) if the projectile is to be treated semiclassically. The $P^{(11)}$ can be calculated from measurements of the lifetimes of the excited states. Since typical values of r are of the order of 0.10, the $B(E2)$'s and absolute cross sections must be known to a few percent or better in order to determine the quadrupole moment.

For relative excitation measurements, the ratio of the cross sections for two different bombarding conditions, a and b, can be expressed as:

$$d\sigma_a/d\sigma_b \approx (P_a^{(11)}/P_b^{(11)})\ (1 + r_a - r_b) \quad (13)$$

with

$$r_a - r_b \cong \Delta E\ \langle 2+||ME2||2+\rangle \times [A_{1a}K(\xi_a,\theta_a) - A_{1b}K(\xi_b,\theta_b)]/Z_2 \quad (14)$$

for $A_1 << A_2$, $P_a^{(11)}/P_b^{(11)}$ is independent of the nuclear transition matrix element and is easily calculated. The ratio of the cross sections can be made more sensitive to the quadrupole moment by choosing the projectile parameters, A_1, ξ, and/or θ, to make the term in the square brackets in (14) as large as possible.

The excitation cross sections are measured either by detecting the elastically and inelastically scattered projectiles or by observing the deexcitation of the nucleus, usually in coincidence with the scattered projectile. In the first type of experiment, the major difficulties are those associated with trying to separate the elastic and inelastic peaks. At high excitation energy, the excitation probabilities are small and it is difficult to observe the small inelastic peak in the tail of the elastic peak. At low excitation energies, the excitation probabilities are larger but the resolution of the two peaks frequently presents problems.

In the second type of experiment, the deexcitation γ's are measured in coincidence with the scattered projectile. A schematic diagram of a possible arrangement is shown in figure 4. The p'γ coincidence rate is given by:

$$\text{C.R.} = \epsilon_\gamma \sum_{n=1}^{\infty} f_n (d\sigma_n/d\Omega)_{lab} \Big/ \sum_{n=0}^{\infty} (d\sigma_n/d\Omega)_{lab} \quad (15)$$

where ϵ_γ is the counting efficiency for $\gamma_{f\to i}$; f_n, the fraction of decays of state n which give rise to a $\gamma_{f\to i}$;

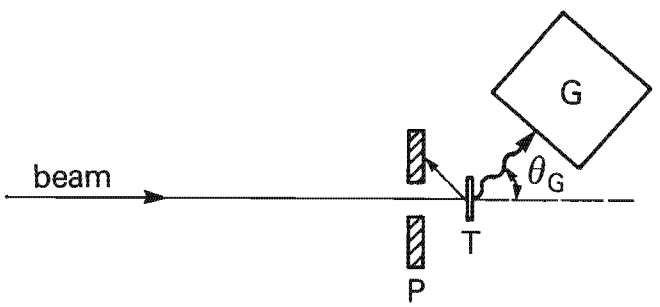

FIGURE 4. A schematic view of an experimental arrangement for the detection of γ-rays in coincidence with back-scattered projectiles. T represents the target: P, an annular particle detector: and G, the γ-ray detector at an angle θ_G to the beam.

$(d\sigma_n/d\Omega)_{lab}$, the differential excitation cross section for the state n, in the laboratory system. When only one level is excited and if that level decays solely by γ–emission, the coincidence rate is approximately $\epsilon_\gamma P_{i\to f}$. The counting efficiency, ϵ_γ, must be corrected for the anisotropic distribution of the deexcitation γ. The effect of the anisotropy can be reduced by the proper choice of θ_G and the distance of the γ–counter from the target.

The measurement of the scattering cross section as a function of energy is made difficult by the small dependence of K on ξ. These experiments require great accuracy if Q is to be determined from the measurements.

Several moments have been determined by the measurement of the reorientation effect in the projectile. This is an important mode of excitation for heavy projectiles on light nuclei. An approximate expression for this effect can be found by replacing Z_2 by Z_1 in equation (12).

There are several possible sources of errors which may need to be considered in the determination of Q–values from Coulomb excitation reorientation measurements in addition to those already mentioned. Among these are: deorientation caused by the atomic electrons, relativistic corrections to the motion of the projectile, the attenuation of the angular distributions by the interaction of the excited state moments with the electronic fields, and the recoil of the nucleus which could give rise to Doppler–shifted energies as well as additional γ–distribution attenuations.

This simplified discussion of the Coulomb excitation reorientation relies heavily on the material presented in [68De34, 65Bi14, 60Al23, 59Br23, and 56Al54], which should be referred to for more detailed descriptions of the actual measurements and calculations of the quadrupole moments therefrom. A collection of reprints of the important papers on Coulomb Excitation, including the deBoer–Winther computer code for multiple Coulomb excitation which is used in many reorientation calculations, is found in [66Al22]. Biedenharn and Brussard, [65Bi14], also discuss some of the features of Coulomb excitation using electrons.

Recently, Lightbody and Penner, see [72Li12], proposed the calculation of static quadrupole moments from high–resolution inelastic electron–scattering measurements. To date, the quadrupole moments derived from these measurements depend on the use of an oversimplified nuclear model for the states involved. The deduced Q–values for eight nuclei in the Cr and Cd regions, are in reasonably good agreement with the Coulomb excitation reorientation measurements on the same nuclei. The physical basis for the success of this model in giving the moments is not understood at this time. The electron–scattering experiments yield the sign of the quadrupole moments and are not plagued with the uncertainties connected with the relative signs of the matrix elements which are present in the reorientation calculations.

The last systematic literature search for data included in the table was done in early 1972.

Explanation of Table K

Nucl.	Chemical symbol with Z– and A–number
Level	Energy, in keV, of the level for which information is given Ground state levels are indicated by gs.
$T_{1/2}$	Half–life of the level The value quoted is taken from Table of Nuclear Half–Lives (68Ma49), Nuclear Data Sheets (through Volume B5), Table of Isotopes (67LeHo), or it is the value used in the referenced article.
I	Nuclear spin, in units of $h/2\pi$ Values enclosed in ( )'s have been determined by resonance or spectroscopic techniques. Values enclosed in [ ]'s have been inferred from decay characteristics.
μ	Nuclear magnetic dipole moment, in nuclear magnetons Nuclear magnetic octupole moments, Ω, in nuclear magneton–barns, have also been tabulated in this column. These have been obtained from elastic and inelastic electron–scattering cross sections. The values, which are model–dependent, have been enclosed in [ ]'s.
Q	Nuclear electric quadrupole moment, in barns, as given by the experimenter Those values marked by an asterisk, *, indicate that the experimenter has made some polarization or Sternheimer correction in computing the moment. Values which are enclosed in [ ]'s, have been derived from elastic and inelastic electron–scattering cross sections and are model–dependent. When two values of Q are given, for CExRO measurements, the first represents the value obtained assuming constructive interference; the second, destructive interference of the matrix elements. Values of the hexadecapole moment, in barns^2, are also tabulated in this column.
Refer.	Reference key number
Method	Codes used to designate the specific techniques are: CExRO Coulomb excitation reorientation eSc electron scattering
Measured Quantity	Measured quantities from which moments are derived
Environment and Comments	Nature of materials used, assumptions made, and comments

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron-Scattering

Nucleus	Level (keV)	$T_{1/2}$	I	μ	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{7}_{3}$Li	gs	–	(3/2)	[Ω = +0.091 *16*]		66Ra29	eSc	Ω/μ = 0.028 *5*b	
$^{7}_{3}$Li	gs	–	(3/2)		[−0.0302[c]]	69Vi02	eSc		
$^{9}_{4}$Be	gs	–	(3/2)	[Ω = −0.035]		65Gr18	eSc		
$^{9}_{4}$Be	gs	–	(3/2)	[Ω = −0.041 *6*]		66Ra29	eSc	Ω/μ = 0.035 *5*b	
$^{9}_{4}$Be	gs	–	(3/2)		[+0.0476[c]]	69Vi02	eSc		
$^{9}_{4}$Be	gs	–	(3/2)		[±0.0578[c]]	69Be50	eSc		
$^{10}_{5}$B	gs	–	(3)	[Ω ≤ 0.029]		66Ra29	eSc	Ω/μ ≤ 0.016 b	
$^{10}_{5}$B	gs	–	(3)		[±0.0675[c]]	69Vi02	eSc		
$^{11}_{5}$B	gs	–	(3/2)	[Ω = +0.081]		65Gr18	eSc		
$^{11}_{5}$B	gs	–	(3/2)	[Ω = +0.078 *5*]		66Ra29	eSc	Ω/μ = 0.029 *5*b	
$^{11}_{5}$B	gs	–	(3/2)		[±0.032[c]]	69Vi02	eSc		
$^{12}_{6}$C	14100	?	[4]		[[i]−0.201] [Q^{i}_{4} = +0.00215b^2]	71Na14	eSc		Used $<r^2>^{1/2}$ = 2.42F and $<r^4>^{1/4}$ = 2.68F
$^{20}_{10}$Ne	1630	0.7ps	[2]		−0.27 *11*	69Sc08	CExRO		Ne gas(^{32}S,S′)
$^{20}_{10}$Ne	1630	0.7ps	[2]		−0.24 *3*	70Na07	CExRO		CEx with Ne on ^{120}Sn; ^{130}Te; ^{148}Sm
$^{22}_{10}$Ne	1275	3ps	[2]		−0.21 *6*	69Sc08	CExRO		^{22}Ne gas(^{32}S,S′)
$^{22}_{10}$Ne	1275	3ps	[2]		−0.21 *4*	70Na07	CExRO		CEx with Ne on ^{130}Te; ^{148}Sm
$^{24}_{12}$Mg	1368	1ps	[2]		−0.26 *8*	68Ba44	CExRO		Mg(^{32}S,S′)
$^{24}_{12}$Mg	1368	1ps	[2]		−0.243 *35*	70Ha04	CExRO		Mg(^{35}Cl,Cl′)
$^{24}_{12}$Mg	1368	1ps	[2]		−0.305 *64*	71Vi01	CExRO		Mg(^{16}O,O′)
$^{27}_{13}$Al	gs	–	(5/2)		[±0.146]	67St01	eSc		
$^{27}_{13}$Al	gs	–	(5/2)	[Ω = ±0.34[p] *9*]		71de55	eSc		
$^{28}_{14}$Si	1779	0.5ps	[2]		+0.17 *5*	69Ha31	CExRO		^{62}Ni(^{28}Si,Si′)
$^{28}_{14}$Si	1779	0.5ps	[2]		+0.22 *9*	69Pe08	CExRO		Si(^{32}S^{6+},S′)
$^{28}_{14}$Si	1779	0.5ps	[2]		+0.11‡ *5*	70Na05	CExRO		Si(^{206}Pb,Pb′)
								‡Assumed $Q_{2+}(^{206}\mathrm{Pb})$ = (0.0 *5*)×$\lvert Q_{rot}\rvert$	
$^{32}_{16}$S	2237	0.25ps	[2]		−0.05 to +0.25	70Ha24	CExRO		^{50}Ti(^{32}S,S′)
$^{32}_{16}$S	2237	0.25ps	[2]		−0.20‡ *6*	70Na05	CExRO		S(^{206}Pb,Pb′)
								‡Assumed $Q_{2+}(^{206}\mathrm{Pb})$ = (0.0 *5*)×$\lvert Q_{rot}\rvert$	
$^{36}_{18}$Ar	1980	?	[2]		+0.11‡ *6*	71Na06	CExRO		^{206}Pb(150MeV ^{36}Ar,Ar′)
								‡Assumed $Q_{2+}(^{206}\mathrm{Pb})$ = (0.0 *5*)×$\lvert 2\ Q_o/7\rvert$	
$^{40}_{18}$Ar	1460	0.8ps	[2]		+0.01‡ *4*	70Na05	CExRO		CEx with ^{206}Pb, ^{130}Te, ^{120}Sn on Ar
								‡Assumed $Q_{2+}(^{206}\mathrm{Pb})$ = (0.0 *5*)×$\lvert Q_{rot}\rvert$	
$^{46}_{22}$Ti	889	7ps	[2]		−0.19 *10*	70Ha24	CExRO		^{46}Ti(^{35}Cl^{7+},Cl′)
$^{46}_{22}$Ti	889	7ps	[2]		−0.28 *14*	71De29	CExRO		^{46}Ti(^{16}O,O′)
$^{48}_{22}$Ti	983	3.6ps	[2]		−0.22 *8*	70Ha24	CExRO		^{48}Ti(^{35}Cl^{7+},Cl′)
$^{48}_{22}$Ti	983	3.6ps	[2]		−0.38 *13*	71De29	CExRO		^{48}Ti(^{16}O,O′)
$^{48}_{22}$Ti	983	3.6ps	[2]		−0.05[p] *7*	71Le17	CExRO		Ti(^{32}S,S′)
$^{48}_{22}$Ti	983	3.6ps	[2]		[−0.177 *8*]	72Li12	eSc		
$^{50}_{22}$Ti	1550	1ps	[2]		−0.02 *9*	70Ha24	CExRO		^{50}Ti(^{32}S^{6+},S′)
$^{50}_{24}$Cr	783	8.4ps	[2]		±0.30[p] *9*	72To12	CExRO		CEx with 62MeV ^{32}S on thin target

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron-Scattering – Continued

Nucleus	Level (keV)	$T_{1/2}$	I	μ or Ω	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{52}_{24}$Cr	1434	0.90ps	[2]		[−0.082 *16*]	72Pe22	eSc		
$^{52}_{24}$Cr	1434	0.90ps	[2]		−0.09[p] *13*	72To12	CExRO		CEx with ^{12}C, ^{16}O, ^{32}S;used $Q^{50}_{2^+}$ = 0.304 *91*b
$^{53}_{24}$Cr	gs	–	(3/2)		+0.04 *6*	71Th19	CExRO		CEx with 55; 59MeV ^{32}S
$^{54}_{24}$Cr	834	8.9ps	[2]		−0.12[p] *10*	72To12	CExRO		CEx with ^{12}C, ^{16}O, ^{32}S; used $Q^{50}_{2^+}$ = 0.304 *91* b
$^{56}_{26}$Fe	847	7.4ps	[2]		−0.345 *54*	70Sc15	CExRO		CEx with 25; 30MeV ^{16}O
$^{56}_{26}$Fe	847	7.4ps	[2]		−0.22[p] *6*	71Le17	CExRO		Fe(^{32}S,S′)
$^{56}_{26}$Fe	847	7.4ps	[2]		−0.23 *3*	71Th14	CExRO	$(M_{22})_{av}$ = 0.306 *37*	CEx with 25; 27.5MeV ^{16}O and 56.0MeV ^{32}S on Fe metal. For E_0>28 MeV, M_{22}affected by nuclear interactions.
$^{57}_{26}$Fe	gs	–	1/2			55Tr21			Fe(polarized thermal n,γ). Observed left circular polarization of 7640γ to g.s.
$^{58}_{28}$Ni	1450	0.67ps	[2]		−0.12[p] *13*	70Le17	CExRO		CEx with ^{12}C, ^{16}O,
					−0.16[p] *10*	71Le17			^{32}S on thick target
$^{58}_{28}$Ni	1450	0.67ps	[2]		−0.14[p] *10*	71Ch25	CExRO		^{58}Ni(^{16}O,O′)
$^{60}_{28}$Ni	1330	0.80ps	[2]		±0.00 *13*	69Cl05	CExRO		CEx with ^{16}O, ^{32}S
					+0.07[p] *9*	71Le17			
$^{60}_{28}$Ni	1330	0.80ps	[2]		+0.01[p] *10*	71Ch25	CExRO		^{60}Ni(^{16}O,O′)
$^{60}_{28}$Ni	1330	0.80ps	[2]		[−0.104 *18*]	72Li12	eSc		
$^{62}_{28}$Ni	1170	1.57ns	[2]		±0.08 *12*	69Ha31	CExRO		CEx with ^{28}Si on ^{62}Ni
$^{62}_{28}$Ni	1170	1.57ns	[2]		−0.08[p] *17*	70Le17	CExRO		CEx with ^{32}S, ^{16}O, ^{12}C on thick target
$^{62}_{28}$Ni	1170	1.57ps	[2]		+0.37[p] *20*	71Ch25	CExRO		^{62}Ni(^{16}O,O′)
$^{64}_{28}$Ni	1350	0.78ps	[2]		+0.35[p] *20*	71Ch25	CExRO		^{64}Ni(^{16}O,O′)
$^{64}_{30}$Zn	992	2.7ps	[2]		[−0.135 *16*]	72Li12	eSc		
$^{70}_{30}$Zn	884	3ps	[2]		[−0.21 *3*]	72Li12	eSc		
$^{70}_{32}$Ge	1040	1.3ps	[2]		+0.02 *11*	69Si15	CExRO		CEx with ^{16}O, ^{4}He on
					+0.003 *100*				^{70}Ge on C foil
$^{74}_{32}$Ge	596	12ps	[2]		−0.12 *16*	69Sc32	CExRO		^{74}Ge(^{16}O,O′)
$^{76}_{32}$Ge	563	17.6ps	[2]		−0.03 *17*	69Sc32	CExRO		^{76}Ge(^{16}O,O′)
$^{76}_{32}$Ge	563	17.6ps	[2]		−0.18 *14*	69Si15	CExRO		CEx with ^{16}O, ^{4}He on
					or +0.055 *140*				^{76}Ge on C foil
$^{104}_{44}$Ru	358	58ps	[2]		‡		CExRO	‡value attributed to Stelson deleted at request of author	
$^{104}_{46}$Pd	556	9.7ps	[2]		−0.28 *12*	70Ch01,	CExRO		CEx with ^{4}He, ^{16}O on
					or +0.01 *10*	71Ha08			^{104}Pd
$^{106}_{46}$Pd	512	12.0ps	[2]		−0.46 *6*	70Be45	CExRO		CEx with ^{16}O, ^{32}S on
					or −0.28 *6*				^{106}Pd
$^{106}_{46}$Pd	512	12.0ps	[2]		−0.52 *11*	70Ch01	CExRO		CEx with ^{4}He, ^{16}O on
					or −0.25 *12*	71Ha08			^{106}Pd
$^{108}_{46}$Pd	434	23.8ps	[2]		−0.58 *13*	71Ha08	CExRO		CEx with ^{4}He on ^{108}Pd
					or −0.37 *12*				on C foil; CEx with ^{16}O on ^{108}Pd on Ni or Al; included 4 excited states in analysis

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron-Scattering — Continued

Nucleus	Level (keV)	$T_{1/2}$	I	μ or Ω	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{108}_{46}$Pd	434	23.8ps	[2]		−0.57[P] *5* or −0.35 *5*	71Sc30	CExRO		^{108}Pd metal foils(^{32}S, S′)
$^{110}_{46}$Pd	374	45.8ps	[2]		−0.83[P] *19*	68St28	CExRO		CEx with ^{4}He, ^{16}O
$^{110}_{46}$Pd	374	45.8ps	[2]		−0.48 *5* or −0.27 *5*	70Be45	CExRO		CEx with ^{16}O, ^{32}S on ^{110}Pd
$^{110}_{46}$Pd	374	45.8ps	[2]		−0.72 *12* or −0.45 *12*	71Ha08	CExRO		CEx with ^{4}He on ^{110}Pd on C; CEx with ^{16}O on ^{110}Pd on Ni; included 5 excited states in analysis
$^{110}_{46}$Pd	374	45.8ps	[2]			71Wa07	CExRO	$Q_{2^+}^{110}-Q_{2^+}^{108}$=−0.11[P] *4* $Q_{2^+}^{110}-Q_{2^+}^{104}$=−0.34[P] *7*	CEx with ^{4}He, ^{12}C, ^{16}O, ^{35}Cl; assumed constructive interference.
$^{110}_{46}$Pd	374	45.8ps	[2]		[−0.28 *3*]	72Pe22	eSc		
$^{106}_{48}$Cd	633	6ps	[2]		−0.84‡ *28*	70St17	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S, ^{40}Ar ‡Could not separate γ's of ^{106}Cd and ^{108}Cd Based on $Q(^{114}$Cd 2^+state) = −0.38
$^{106}_{48}$Cd	633	6ps	[2]		−0.61‡ to −0.97‡	70Kl12	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S on ^{106}Cd ‡Corrected for γγ attenuation
$^{108}_{48}$Cd	633	5ps	[2]		−0.84‡ *28*	70St17	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S, ^{40}Ar ‡Could not separate γ's of ^{106}Cd and ^{108}Cd Based on $Q(^{114}$Cd 2^+state) = −0.38
$^{110}_{48}$Cd	656	4.6ps	[2]		−0.40[P] *10*	70Gr29	CExRO		CEx with ^{4}He, ^{16}O
$^{110}_{48}$Cd	656	4.6ps	[2]		−0.24‡ *10*	70St17	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S, ^{40}Ar ‡Based on $Q(^{114}$Cd 2^+state) = −0.38
$^{110}_{48}$Cd	656	4.6ps	[2]		−0.42 *10* or −0.21 *10*	71Be36	CExRO		CEx with 8–16MeV ^{4}He, 37–48MeV ^{16}O
$^{110}_{48}$Cd	656	4.6ps	[2]		−0.55 *8* or −0.31 *7*	71Ha08	CExRO		CEx with ^{4}He on ^{110}Cd on C; CEx with ^{16}O on ^{110}Cd on Ni; included 5 excited states in analysis
$^{112}_{48}$Cd	617	6.2ps	[2]		‡		CExRO	‡value attributed to Stelson deleted at request of author	
$^{112}_{48}$Cd	617	6.2ps	[2]		−0.15‡ *7*	70St17	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S, ^{40}Ar ‡Based on $Q(^{114}$Cd 2^+state) = −0.38
$^{114}_{48}$Cd	558	9ps	[2]		−0.49 *25*	67Si03	CExRO		CEx with ^{16}O, ^{32}S on ^{114}Cd; 7 states included in fit
$^{114}_{48}$Cd	558	9ps	[2]		−0.90 to −0.54 −0.58‡ to −0.35‡	67St03	CExRO		CEx with ^{4}He, ^{12}C, ^{16}O on $^{114}CdO_2$, measured at ~ 180°; 7 states included in fit ‡Corrected for perturbation of angular correlations by deBoer, quoted in 69Sa27
$^{114}_{48}$Cd	558	9ps	[2]		+0.05 *27* or −0.21 *28*	68Si05	CExRO		CEx with ^{4}He, ^{16}O on ^{114}Cd
$^{114}_{48}$Cd	558	9ps	[2]		−0.68 *10* to −0.43 *10*	69Sa27	CExRO		CEx with ^{4}He, ^{16}O on ^{114}Cd
$^{114}_{48}$Cd	558	9ps	[2]		−0.53[P] *17*	70An09	CExRO		CEx with He^{1+}, C^{3+}

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron–Scattering – Continued

Nucleus	Level (keV)	$T_{1/2}$	I	μ or Ω	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{114}_{48}$Cd	558	9ps	[2]		−0.28‡ *11* to −0.40‡ *12*	70Kl12	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S on ^{114}Cd on thin C foil or thick Ni foil
								‡Corrected for attenuation of angular correlation	
$^{114}_{48}$Cd	558	9ps	[2]		−0.64 *19*	70Sc15	CExRO		CEx with 25; 30MeV ^{16}O on ^{114}Cd in Cu sandwich
$^{114}_{48}$Cd	558	9ps	[2]		−0.28 *9* or −0.03 *9* −0.32‡ *8*	71Be36	CExRO		CEx with 8–16MeV ^{4}He, 37–48MeV ^{16}O. Deviations from Coulomb interactions observed for $E_\alpha > 10$ MeV and $E_O > 46$MeV
								‡Average of Q–values of 70Kl12 and 71Be36.	
$^{114}_{48}$Cd	558	9.2ps	[2]		−0.29 *3*	72Pe22	eSc		
$^{116}_{48}$Cd	513	13.7ps	[2]		−1.16 to −0.70	67St03	CExRO		CEx with ^{4}He, ^{12}C, ^{16}O on $^{116}CdO_2$; included 5 levels in fit
$^{116}_{48}$Cd	513	13.7ps	[2]		−0.88‡ *25*	70St17	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S, ^{40}Ar
								‡Based on $Q(^{114}$Cd 2^+ state) = −0.38	
$^{112}_{50}$Sn	1257	3ps	[2]		−0.15‡ *18*	70St20	CExRO		CEx with ^{4}He, ^{16}O
								‡Based on $Q(^{120}$Sn 2^+ state) = +0.09 *10*	
$^{116}_{50}$Sn	1290	0.4ps	[2]		+0.09 *13*	70Kl06	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S; included 4 levels in fit
$^{116}_{50}$Sn	1290	0.4ps	[2]		+0.07‡ *16*	70St20	CExRO		CEx with ^{4}He, ^{16}O
								‡Based on $Q(^{120}$Sn 2^+ state) = +0.09 *10*	
$^{116}_{50}$Sn	1290	0.4ps	[2]		[−0.14 *3*]	72Pe22	eSc		
$^{118}_{50}$Sn	1230	0.5ps	[2]		−0.23‡ *16*	70St20	CExRO		CEx with ^{4}He, ^{16}O
								‡Based on $Q(^{120}$Sn 2^+ state) = +0.09 *10*	
$^{120}_{50}$Sn	1170	0.5ps	[2]		+0.09 *10*	70St20	CExRO		CEx with ^{4}He, ^{16}O
$^{122}_{50}$Sn	1140	0.6ps	[2]		−0.28‡ *17*	70St20	CExRO		CEx with ^{4}He, ^{16}O
								‡Based on $Q(^{120}$Sn 2^+ state) = +0.09 *10*	
$^{124}_{50}$Sn	1130	0.8ps	[2]		−0.24 *15*	70Kl06	CExRO		CEx with ^{4}He, ^{16}O, ^{32}S on ^{124}Sn; 4 levels included in fit
$^{124}_{50}$Sn	1130	0.8ps	[2]		+0.07‡ *17*	70St20	CExRO		CEx with ^{4}He, ^{16}O
								‡Based on $Q(^{120}$Sn 2^+ state) = +0.09 *10*	
^{122}Te	564	7.6ps	[2]		‡		CExRO	‡Value attributed to Stelson deleted at request of author	
$^{124}_{52}$Te	603	4.3ps	[2]		−0.50^p *10* or −0.27^p *10*	72Kl02, 71Kl06	CExRO		CEx with ^{4}He, ^{16}O on ^{124}Te
$^{126}_{52}$Te	667	4.4ps	[2]		−0.50 to −0.16	67St16	CExRO		CEx with ^{4}He, ^{16}O
$^{126}_{52}$Te	667	4.4ps	[2]		−0.20^p *9* or −0.00^p *9*	72Kl02, 71Kl06	CExRO		CEx with ^{4}He, ^{16}O on ^{126}Te
$^{128}_{52}$Te	743	3.2ps	[2]		−0.40 to −0.01	67St16	CExRO		CEx with ^{4}He, ^{16}O on ^{128}Te
$^{128}_{52}$Te	743	3.2ps	[2]		−0.07^p *9* +0.12^p *9*	72Kl02, 71Kl06	CExRO		CEx with ^{4}He, 160 on ^{128}Te
$^{130}_{52}$Te	840	2.0ps	[2]		−0.19 *15* or −0.12 *15*	70Ch01	CExRO		CEx with ^{4}He, ^{16}O on ^{130}Te

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron-Scattering – Continued

Nucleus	Level (keV)	$T_{1/2}$	I	μ or Ω	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{130}_{56}$Ba	356	63ps	[2]		−1.13 *29*; −1.10 *34*	67Si03	CExRO	perturbation calc.; 2 level calc.	CEx with ^{16}O,^{32}S on ^{130}Ba
$^{130}_{56}$Ba	356	63ps	[2]		+0.31[p] *22* or +0.43[pt] *22*	72To13	CExRO	‡For asymmetric rotor	CEx with ^{32}S,^{40}Ca
$^{134}_{56}$Ba	605	7ps	[2]		−0.46[p] *11* or −0.70[p] *11*	69Ke16	CExRO		CEx with ^{16}O
$^{134}_{56}$Ba	605	7ps	[2]		+0.16[p] *28* or +0.21[pt] *22*	72To13	CExRO	‡For asymmetric rotor	CEx with ^{32}S,^{40}Ca
$^{136}_{56}$Ba	818	1.5ps	[2]		negative, small[p]	69Ke16	CExRO		CEx with ^{16}O
$^{136}_{56}$Ba	818	1.5ps	[2]		+0.34[p] *52* or +0.43[pt] *52*	72To13	CExRO	‡For asymmetric rotor	CEx with ^{40}Ca
$^{142}_{58}$Ce	650	6.2ps	[2]		−0.12 *9*	70En01	CExRO		CEx with ^{16}O
$^{144}_{60}$Nd	695	4.2ps	[2]		+0.03‡ *21* or −0.07‡ *15*	70Ge08	CExRO	‡Used $Q_{2+}(^{150}\text{Nd})$ = −1.48 or −2.00 *51*	CEx with He,O,S on thick Nd metal targets
$^{144}_{60}$Nd	695	4.2ps	[2]		−0.17 or −0.61	71Cr01	CExRO		$^{144}Nd_2O_3$ on C(42MeV ^{16}O,O′)
$^{146}_{60}$Nd	454	21ps	[2]		−0.63‡ *10*, −0.78‡ *9*	70Ge08	CExRO	‡Used $Q_{2+}(^{150}\text{Nd})$ = −1.48, −2.00 *51*	CEx with He,O,S
$^{146}_{60}$Nd	454	21ps	[2]		−0.72 *20*	71Cr01	CExRO		$^{146}Nd_2O_3$ on C(42MeV ^{16}O,O′)
$^{148}_{60}$Nd	300	116ps	[2]		−1.24‡ *14*, −1.46‡ *13*	70Ge08	CExRO	‡For $Q_{2+}(^{150}\text{Nd})$ = −148, −2.00 *51*	CEx with He,O,S on Nd metal
$^{148}_{60}$Nd	300	116ps	[2]		−1.36 *30*	71Cr01	CExRO		$^{148}Nd_2O_3$ on C(42MeV ^{16}O,O′)
$^{150}_{60}$Nd	132	1.52ns	[2]		−1.34[p] *54*	69Ke17	CExRO		CEx with ^{4}He,^{16}O
$^{150}_{60}$Nd	132	1.52ns	[2]		−2.00‡ *51*	70Ge08	CExRO	‡For best fit to Nd data of Crowley and this paper	CEx with He,O,S on Nd
$^{148}_{62}$Sm	551	7ps	[2]		−0.77 *34*; −0.73 *38*	67Si03	CExRO	perturbation calc.; 4 level calc.	CEx with ^{16}O,^{32}S on ^{148}Sm
$^{148}_{62}$Sm	551	7ps	[2]		−0.24 *28* or +0.28 *28*	70Ge07	CExRO		CEx with He,O
$^{148}_{62}$Sm	551	7ps	[2]		−0.97[p] *27*	72Cl12, 71Cl13	CExRO		CEx with ^{4}He,^{16}O, or ^{32}S on thick Sm target; used $Q_{2^+}^{152}$ = −1.653b
$^{150}_{62}$Sm	334	48ps	[2]		−1.28 *20*; −1.22 *22*	67Si03	CExRO	perturbation calc.; 4 level calc.	CEx with ^{16}O,^{32}S on ^{150}Sm
$^{150}_{62}$Sm	334	48ps	[2]		−1.21[ct]	68Gr03	CExRO	‡Corrections to reorientation by β and γ bands reduce Q ~ 10%.	
$^{150}_{62}$Sm	334	48ps	[2]		−1.31[p] *19*	72Cl12, 71Cl13	CExRO		CEx with ^{4}He,^{16}O,^{32}S; used $Q_{2^+}^{152}$ = −1.653b
$^{152}_{62}$Sm	122	1.4ns	[2]		−1.8 *6*	65Go06	CExRO		CEx with ^{16}O
$^{152}_{62}$Sm	122	1.4ns	[2]		−1.65 *19*	70Ka45	CExRO		CEx with ~ 23MeV ^{16}O
$^{152}_{62}$Sm	122	1.4ns	[2]		−1.82[p] *12*	71Cl13	CExRO		CEx with ^{4}He,^{16}O,^{32}S
$^{166}_{68}$Er	80.6	1.82ns	[2]		−2.87 *95*	70Ka45	CExRO		CEx with ~ 35MeV ^{16}O
$^{166}_{68}$Er	265	120ps	[4]		−2.67[p]‡ *90*	69Mc20	CExRO		CEx with ^{4}He,^{16}O
$^{166}_{68}$Er	787	?	[2]		+2.00[p] *32*	69Mc20	CExRO		CEx with ^{4}He,^{16}O
$^{168}_{68}$Er	264	120ps	[4]		−2.2[p] *10*	70Mc27	CExRO		CEx with ^{4}He,^{16}O on ^{168}Er

Table K: Nuclear Moments by Coulomb Excitation Reorientation and Inelastic Electron-Scattering — Continued

Nucleus	Level (keV)	$T_{1/2}$	I	μ or Ω	Q	Refer.	Method	Measured Quantity	Environment and Comments
$^{170}_{68}$Er	79	2.0ns	[2]		−1.95[p]‡ *26*	72Ke22	CExRO	‡No appreciable higher-state corrections needed	CEx with ^{81}Br
$^{170}_{68}$Er	261	135ps	[4]		−2.2[p] *10*	70Mc27	CExRO		CEx with ^{4}He, ^{16}O on ^{170}Er
$^{172}_{70}$Yb	260	132ps	[4]		−2.3[p] *12*	70Mc27	CExRO		CEx with ^{4}He, ^{16}O on ^{172}Yb
$^{174}_{70}$Yb	252	?	[4]		−1.8[p] *12*	70Mc27	CExRO		CEx with ^{4}He, ^{16}O on ^{174}Yb
$^{176}_{70}$Yb	270	?	[4]		−0.93[p] *120*	70Mc27	CExRO		CEx with ^{4}He, ^{16}O on ^{176}Yb
$^{186}_{74}$W	399	25ps	[4]		−2.6[p] *13*	70Mc27	CExRO		CEx with ^{4}He, ^{16}O on ^{186}W
$^{186}_{74}$W	730	4.2ps	[2]		+0.74 *42*	69Mc20	CExRO		CEx with ^{4}He, ^{16}O
$^{184}_{76}$Os	?	?	[2]		−2.4[p] *11*	71La24	CExRO		Relative to $Q_{2^+}^{188,190,192}$(70Pr09)
$^{186}_{76}$Os	137	840ps	[2]		±1.47[p] *54*	71La24	CExRO		Relative to $Q_{2^+}^{188,190,192}$(70Pr09)
$^{188}_{76}$Os	155	710ps	[2]		−0.39 *38* or −1.31 *34*	70Pr09	CExRO		CEx with ^{4}He, ^{16}O
$^{190}_{76}$Os	187	350ps	[2]		+0.27 *12* or −0.99 *13*	70Pr09	CExRO		CEx with ^{4}He, ^{16}O
$^{192}_{76}$Os	206	280ps	[2]		+1.22 *19* or −0.41 *20*	70Pr09	CExRO		CEx with ^{4}He, ^{16}O
$^{194}_{78}$Pt	328	35ps	[2]		+0.64 *16* or +0.87 *18*	69Gl08	CExRO		CEx with ^{16}O, ^{1}H on ^{194}Pt
$^{196}_{78}$Pt	356	35ps	[2]		+0.51 *18* or +0.58 *18*	69Gl08	CExRO		CEx with ^{16}O, ^{1}H on ^{196}Pt
$^{198}_{78}$Pt	408	19ps	[2]		+1.22 *50*	69Gl08	CExRO		CEx with ^{16}O, ^{1}H on ^{198}Pt
$^{208}_{82}$Pb	2615	15ps	[3]		−1.3 *6*	69Ba51	CExRO		CEx with ^{4}He, ^{16}O
$^{208}_{82}$Pb	2615	15ps	[3]		−1.1[pi] *4* or −0.9[p]‡ *4*	72Ba88	CExRO	‡For $Q_{2^+}^{206}$ = 0 or −0.36 b	CEx with ^{12}C, ^{20}Ne, ^{32}S, ^{40}Ar on Pb; measured relative γ-yields

* Polarization or Sternheimer correction included

[c] Recalculation of earlier data

[i] Intrinsic quadrupole moment

[p] Preliminary value from meeting abstract, report, thesis, or private communication

6. References

The references are listed here according to their alphanumeric code number. The first two digits represent the year of publication. The two letters that follow are the first two letters of the first surname. Compound surnames, such as those beginning with de, Van, von, zu, are alphabetized by the first two letters of the compound name, e.g. De, Va, Vo, Zu. The digits that follow are merely ordering numbers.

The references before 1960 had originally been given single letter codes, as they appear in the tables. The Nuclear Data Project reference numbers have all been converted to two letter (six alphanumeric) codes, which keep the same ordering number for numbers below 100. For those above 100, the hundreds digit has been dropped, while 100 becomes 10. Since there are less than 10 references with the same letter for any year before 1960 in our table, it will not be difficult to find the correct reference.

24Pa01 W.Pauli,Jr. - Naturwissenschaften 12, 741 (1924)
27De01 D.M.Dennison - Proc.Roy.Soc.(London) 115A, 483 (1927)
27Go01 S.Goudsmit, E.Back - Z.Physik 43, 321 (1927)
27Ha01 H.Hansen - Naturwissenschaften 15, 163 (1927)
28Ba01 E.Back, S.Goudsmit - Z.Physik 47, 174 (1928)
28Or01 L.S.Ornstein, W.R.van Wijk - Z.Physik 49, 315 (1928)
Untersuchungen uber das negative Stickstoffbandenspektrum
29Ga01 H.G.Gale, G.S.Monk - Astrophys.J. 69, 77 (1929)
29Mu01 R.S.Mulliken - Trans.Faraday Soc. 25, 634 (1929)
29Sc01 H.Schuler, H.Bruck - Z.Physik 56, 291 (1929)
29Wh01 H.E.White - Phys.Rev. 34, 1397 (1929)
30Br01 T.L.deBruin - Nature 125, 414 (1930)
The Moment of the Bromine Nucleus
30Ch01 W.H.J.Childs, R.Mecke - Z.Physik 64, 162 (1930)
30Ha01 A.Harvey, F.A.Jenkins - Phys.Rev. 35, 789 (1930)
30He02 K.Hedfeld, R.Mecke - Z.Physik 64, 151 (1930)
30Wh01 H.E.White, R.Ritschl - Phys.Rev. 35, 208 (1930); Erratum Phys.Rev. 35, 1146 (1930)
Hyperfine Structure in the Spectra of Neutral Manganese
31Fr01 S.Frisch - Z.Physik 71, 89 (1931)
31Ko01 H.Kopfermann - Z.Physik 73, 437 (1931)
Uber die Bestimmung des mechanischen Moments des Casiumkernes aus der Hyperfeinstruktur einigen Cs^{+}-Linien
31Me01 W.F.Meggers, A.S.King, R.F.Bacher - Phys.Rev. 38, 1258 (1931)
31Mu02 K.Murakawa - Z.Physik 72, 793 (1931)
Untersuchungen uber die Hyperfeinstruktur von Spektrallinien
31Na01 S.M.Naude, A.Christy - Phys.Rev. 37, 490 (1931)
31Sc01 H.Schuler, J.E.Keyston - Z.Physik 67, 433 (1931)
31Sc02 H.Schuler, J.E.Keyston - Z.Physik 70, 1 (1931)
31Sc03 H.Schuler, J.E.Keyston - Z.Physik 72, 423 (1931)
Hyperfeinstrukturen und Kernmomente des Quecksilbers
31To01 S.Tolansky - Proc.Roy.Soc.(London) 130A, 558 (1931)
31Ze01 P.Zeeman, J.G.Gisolf, T.L.deBruin - Nature 128, 637 (1931)
32Ba01 J.S.Badami - Z.Physik 79, 206 (1932)
Hyperfeinstrukturen im Antimonfunkenspektrum und die Kernmomente der Antimon-Isotopen
32Gr03 L.P.Granath - Phys.Rev. 42, 44 (1932)
The Nuclear Spin and Magnetic Moment of Li^{7}
32Ja02 D.A.Jackson - Z.Physik 75, 223 (1932)
32Ja04 D.A.Jackson - Z.Physik 75, 229 (1932)
Das Kernmoment des Galliums
32Ko01 H.Kopfermann - Z.Physik 75, 363 (1932)
Uber die Kernmomente der drei Bleiisotope
32Mu06 K.Murakawa - Sci.Papers, Inst.Phys.Chem.Res.(Tokyo) 18, 304 (1932)
32Ri02 R.Ritschl - Z.Physik 79, 1 (1932)
Die Hyperfeinstruktur des Bogenlinien und das Kernmoment von Kupfer
32To01 S.Tolansky - Proc.Roy.Soc.(London) 137A, 541 (1932)
The Nuclear Spin of Arsenic
32To02 S.Tolansky - Proc.Roy.Soc.(London) 136A, 585 (1932)
Fine Structure in the Arc Spectra of Bromine and Iodine
33As01 M.F.Ashley - Phys.Rev. 44, 919 (1933)
33Ca02 J.S.Campbell - Nature 131, 204 (1933)
Nuclear Moments of the Gallium Isotopes 69 and 71
33Ca04 J.S.Campbell - Z.Physik 84, 393 (1933)
33Gi02 J.H.Gisolf, P.Zeeman - Nature 132, 566 (1933)
Nuclear Moment of Tantalum
33Gr03 L.P.Granath, C.M.Van Atta - Phys.Rev. 44, 935 (1933)
33Ja03 D.A.Jackson - Z.Physik 80, 59 (1933)
33Jo02 E.G.Jones - Proc.Phys.Soc.(London) 45, 625 (1933)
33Jo04 J.Joffe, H.C.Urey - Phys.Rev. 43, 761 (1933)
33Ko01 H.Kopfermann - Z.Physik 83, 417 (1933); See Also 36Ko05
Hyperfeinstruktur und Kernmomente des Rubidiums
33Ko02 H.Kopfermann, N.Wieth-Kundsen - Z.Physik 85, 353 (1933)
Hyperfeinstruktur und Kernmomente des Kryptons
33Le02 G.N.Lewis, M.F.Ashley - Phys.Rev. 43, 837 (1933)
33Mc01 E.McMillan, N.S.Grace - Phys.Rev. 44, 949 (1933)
33Ra02 S.Rafalowski - Acta Phys.Polon. 2, 119 (1933)
Uber die Kernmomente der Te- und Se-Isotopen
33Sc03 H.Schuler, H.Westmeyer - Naturwissenschaften 21, 660 (1933)
Das Kernmoment des Zinns

34An02 O.E.Anderson - Phys.Rev. 45, 685 (1934)
34Ba01 S.S.Ballard - Phys.Rev. 46, 806 (1934)
34Co04 V.W.Cohen - Phys.Rev. 46, 713 (1934)
The Nuclear Spin of Caesium
34Cr03 M.F.Crawford, S.Bateson - Can.J.Research 10, 693 (1934)
Nuclear Moments of Antimony Isotopes - Discussion of Lande's Theory
34De01 P.Debye - Physik.Z. 35, 923 (1934)
Die magnetische Methode zur Erzeugung tiefster Temperaturen
34El02 A.Ellett, N.P.Heydenburg - Phys.Rev. 46, 583 (1934)
34Go01 C.J.Gorter - Physik.Z. 35, 928 (1934)
Discussion Following Paper by 34De01
34Gr04 N.S.Grace, K.R.More - Phys.Rev. 45, 166 (1934)
Isotope Displacement and Hyperfine Structure in the Arc Spectra of Chromium, Molybdenum and Tungsten
34He03 N.P.Heydenburg - Phys.Rev. 46, 802 (1934)
34Ja02 D.A.Jackson - Proc.Roy.Soc.(London) 143A, 455 (1934)
34Jo01 E.G.Jones - Proc.Roy.Soc.(London) 144A, 587 (1934)
34Ko01 H.Kopfermann, E.Rasmussen - Z.Physik 92, 82 (1934)
Uber das Kernmoment des Scandiums
34Ko02 H.Kopfermann, E.Rindal - Z.Physik 87, 460 (1934)
34Mu03 G.M.Murphy, H.Johnston - Phys.Rev. 46, 95 (1934)
The Nuclear Spin of Deuterium
34Ol01 E.Olsson - Z.Physik 90, 138 (1934)
34Pa01 F.Paschen, I.S.Campbell - Naturwissenschaften 22, 136 (1934)
34Ra01 I.I.Rabi, V.W.Cohen - Phys.Rev. 46, 707 (1934)
34Sc01 H.Schuler, T.Schmidt - Naturwissenschaften 22, 758 (1934)
34Sc02 H.Schuler, H.Gollnow - Naturwissenschaften 22, 730 (1934)
34Sc03 H.Schuler, T.Schmidt - Naturwissenschaften 22, 838 (1934)
Uber die Kernmomente von Thulium (Tu^{169}), Yttrium (Y^{89}) und Rhodium (Rh^{103})
34Sc04 H.Schuler, H.Gollnow - Naturwissenschaften 22, 511 (1934)
34Sc05 H.Schuler - Z.Physik 88, 323 (1934)
34To01 S.Tolansky - Proc.Roy.Soc.(London) 144A, 574 (1934)
The Nuclear Spin of Tin
35Fo03 M.Fox, I.I.Rabi - Phys.Rev. 48, 746 (1935)
35Fu06 B.Fuchs, H.Kopfermann - Naturwissenschaften 23, 372 (1935)
35Gi01 J.H.Gisolf - Dissertation, Amsterdam (1935)
35Ko05 H.Kopfermann, E.Rasmussen - Z.Physik 94, 58 (1935)
Uber das mechanische Moment des Kobaltkernes
35Mi08 S.Millman - Phys.Rev. 47, 739 (1935); See Also 35Fo03
On the Nuclear Spins and Magnetic Moments of the Principal Isotopes of Potassium
35Mo07 K.R.More - Phys.Rev. 47, 256A (1935)
The Nuclear Magnetic Moment of Cobalt
35Ra01 E.Rasmussen - Naturwissenschaften 23, 69 (1935)
35Sc01 H.Schuler, T.Schmidt - Z.Physik 94, 457 (1935)
35Sc02 H.Schuler, T.Schmidt - Naturwissenschaften 23, 69 (1935)
35Sc04 H.Schuler, T.Schmidt - Z.Physik 98, 430 (1935); See Also 38Sc10 (Bi^{209})
Bemerkungen zu den elektrischen Quadrupolmomenten einiger Atomkerne und dem magnetischen Moment des protons
35St06 R.K.Stranathan, L.P.Granath - Phys.Rev. 47, 801 (1935)
The Hyperfine Structure and Nuclear Magnetic Moment of Caesium
35Ve01 B.Venkatesachar, L.Sibaiya - Proc.Indian Acad.Sci. 2A, 203 (1935)
36Go03 H.Gollnow - Z.Physik 103, 443 (1936)
Uber ein zweites Isotop des Cassiopeiums und uber das magnetische Moment und Quadrupolmoment des ^{175}Cp-Kernes
36Ja01 B.Jaeckel - Z.Physik 100, 513 (1936)
36Ko04 H.Kopfermann, E.Rasmussen - Z.Physik 98, 624 (1936)
Uber die Hyperfeinstruktur einiger Vanadiummultiplette
36Ko05 H.Kopfermann, H.Kruger - Z.Physik 103, 485 (1936)
36Ma03 J.H.Manley - Phys.Rev. 49, 921 (1936)
36Mi01 S.Millman, M.Fox - Phys.Rev. 50, 220 (1936)
36Ol01 E.Olsson - Z.Physik 100, 656 (1936)
36Sc05 H.Schuler, M.Marketu - Z.Physik 102, 703 (1936)
Quadrupolmoment und magnetisches Moment von ^{75}As
36Sc07 H.Schuler, T.Schmidt - Z.Physik 100, 113 (1936)
Uber das elektrische Quadrupolmoment und das Magnetische Moment von ^{63}Cu und ^{65}Cu
36Sc08 T.Schmidt - Z.Physik 101, 486 (1936)
36Sc10 H.Schuler, H.Korsching - Z.Physik 103, 434 (1936)
37Ba08 R.F.Bacher, D.H.Tomboulian - Phys.Rev. 52, 836 (1937)

37Be09 A.N.Benson, R.A.Sawyer - Phys.Rev. 52, 1127 (1937)
37Ja01 D.A.Jackson, H.Kuhn - Proc.Roy.Soc.(London) 158A, 372 (1937)
The Hyperfine Structure and Zeeman Effect of the Resonance Lines of Silver
37Ja02 D.A.Jackson, H.Kuhn - Nature 140, 276 (1937)
37Ko02 H.Kopfermann, H.Wittke - Z.Physik 105, 16 (1937)
Uber das magnetische Moment des Scandiumkernes
37Ko03 H.Kopfermann, H.Kruger - Z.Physik 105, 389 (1937)
37Ly07 J.M.Lyshede, E.Rasmussen - Z.Physik 104, 434 (1937)
Uber die Kernmomente des Zinkisotops Zn^{67}
37Ma06 J.H.Manley, S.Millman - Phys.Rev. 51, 19 (1937)
The Nuclear Spin and Magnetic Moment of Li^{6}
37Sc09 J.Schwinger - Phys.Rev. 52, 1250 (1937)
On the Spin of the Neutron
37Sc11 H.Schuler, T.Schmidt - Z.Physik 104, 468 (1937)
37Sc12 H.Schuler, H.Korsching - Z.Physik 105, 168 (1937)
Eine Gesetzmassigkeit beim Aufbau des Atomkerns und Bestimmung des Quadrupolmomentes von ^{187}Re und ^{185}Re
37To03 S.Tolansky, E.Lee - Proc.Roy.Soc.(London) 158A, 110 (1937)
37To04 H.C.Torrey - Phys.Rev. 51, 501 (1937)
38He05 M.Heyden, H.Kopfermann - Z.Physik 108, 232 (1938)
38He06 M.Heyden, R.Ritschl - Z.Physik 108, 739 (1938)
38Ko02 H.Korsching - Z.Physik 109, 349 (1938); See Also 38Sc10
Quadrupolmoment von ^{83}Kr, ^{131}Xe und mechanisches Moment von ^{83}Kr
38Mi05 S.Millman, I.I.Rabi, J.R.Zacharias - Phys.Rev. 53, 384 (1938)
38Mu06 K.Murakawa - Z.Physik 109, 162 (1938)
38Po08 P.N.Powers - Phys.Rev. 54, 827 (1938)
38Sc09 T.Schmidt - Z.Physik 108, 408 (1938); See Also 38S10
38Sc10 H.Schuler, J.Roig, H.Korsching - Z.Physik 111, 165 (1938)
Mechanische Momente von ^{171},^{173}Yb, Quadrupolmoment von ^{173}Yb und Haufigkeitsverhaltnis von $^{173}Yb/^{171}Yb$
38Sc11 H.Schuler, H.Korsching - Z.Physik 111, 386 (1938)
39El03 R.M.Elliott, J.Wulff - Phys.Rev. 55, 170 (1939)
39Fi03 R.A.Fisher, E.R.Peck - Phys.Rev. 55, 270 (1939)
Hyperfine Structure of Manganese I and Nuclear Magnetic Moment
39Ha12 D.R.Hamilton - Phys.Rev. 56, 30 (1939)
39Ke12 J.M.B.Kellogg, I.I.Rabi, N.F.Ramsey,Jr., J.R.Zacharias - Phys.Rev. 56, 728 (1939)
The Magnetic Moments of the Proton and the Deuteron. The Radiofrequency Spectrum of H_2 in Various Magnetic Fields
39Kr11 H.Kruger - Z.Physik 111, 467 (1939)
39Ku07 P.Kusch, S.Millman - Phys.Rev. 56, 527 (1939)
On the Nuclear Magnetic Moments of the Isotopes of Rubidium and Chlorine
39Ku09 P.Kusch, S.Millman, I.I.Rabi - Phys.Rev. 55, 666 (1939)
39Ku10 P.Kusch, S.Millman, I.I.Rabi - Phys.Rev. 55, 1176 (1939)
The Nuclear Magnetic Moments of N^{14}, Na^{23}, K^{39} and Cs^{133}
39Mi05 S.Millman, P.Kusch, I.I.Rabi - Phys.Rev. 56, 165 (1939)
On the Nuclear Magnetic Moments of the Boron Isotopes
39Mi08 S.Millman, P.Kusch - Phys.Rev. 56, 303 (1939)
39Sc14 H.Schuler, H.Gollnow - Z.Physik 113, 1 (1939)
Uber das mechanische und magnetische Moment und uber das Quadrupolmoment des seltenen ^{176}Cp-Kernes
39Sc15 T.Schmidt - Z.Physik 112, 199 (1939)
40Ha20 D.R.Hamilton - Phys.Rev. 58, 122 (1940)
On Directional Correlation of Successive Quanta
40Ke10 J.M.B.Kellogg, I.I.Rabi, N.F.Ramsey,Jr. - Phys.Rev. 57, 677 (1940)
An Electrical Quadrupole Moment of the Deuteron. The Radiofrequency Spectra of HD and D_2 Molecules in a Magnetic Field
40Mr10 S.Mrozowski - Phys.Rev. 57, 207 (1940)
40Sc09 T.Schmidt - Naturwissenchaften 28, 565 (1940)
40To03 D.H.Tomboulian, R.F.Bacher - Phys.Rev. 58, 52 (1940)
40Wi08 H.Wittke - Z.Physik 116, 547 (1940)
40Wo10 R.W.Wood, G.H.Dieke - J.Chem.Phys. 8, 351 (1940)
The Negative Bands of the Heavy Nitrogen Molecules
40Za02 J.R.Zacharias, J.M.B.Kellogg - Phys.Rev. 57, 570A (1940)
The Nuclear Magnetic Moment of N^{15}
41Ha14 R.H.Hay - Phys.Rev. 60, 75 (1941)
The Nuclear Magnetic Moments of C^{13}, Ba^{135} and Ba^{137}
41La03 W.E.Lamb,Jr. - Phys.Rev. 60, 817 (1941)
41Mi08 S.Millman, P.Kusch - Phys.Rev. 60, 91 (1941)
On the Precision Measurement of Nuclear Magnetic Moments by the Molecular Beam Magnetic Resonance Method

42Ha07 T.C.Hardy, S.Millman - Phys.Rev. 61, 459 (1942)
Radiofrequency Spectrum of Indium. Nuclear Spin of In^{113}
43Sc15 T.Schmidt - Z.Physik 121, 63 (1943)
46Co10 D.K.Coles, W.E.Good - Phys.Rev. 70, 979 (1946); See Also 47Fe14
Stark and Zeeman Effects in the Inversion Spectrum of Ammonia
46Go05 G.Goertzel - Phys.Rev. 70, 897 (1946)
Angular Correlation of Gamma-Rays
46Ke05 J.B.M.Kellogg, S.Millman - Revs.Modern Phys. 18, 323 (1946)
Molecular Beam Magnetic Resonance Method: The Radiofrequency of Atoms and Molecules
47An09 H.L.Anderson, A.Novick - Phys.Rev. 71, 372 (1947)
Magnetic Moment of the Triton
47Bl31 F.Bloch, A.C.Graves, M.Packard, R.W.Spence - Phys.Rev. 71, 373 (1947)
Spin and Magnetic Moment of Tritium
47Bl32 F.Bloch, A.C.Graves, M.Packard, R.W.Spence - Phys.Rev. 71, 551 (1947); See Also 47Bl31
47Br24 S.B.Brody, W.A.Nierenberg, N.F.Ramsey - Phys.Rev. 72, 258 (1947)
Nuclear Moments of the Bromine Isotopes
47Fe14 B.T.Feld - Phys.Rev. 72, 1116 (1947)
47Go20 W.Gordy, A.G.Smith, J.W.Simmons - Phys.Rev. 72, 249 (1947)
Analysis of the Hyperfine Structure in the Microwave Spectrum of the Symmetric Top Molecule CH_3I
47Me27 W.W.Meeks, R.A.Fisher - Phys.Rev. 72, 451 (1947)
Hyperfine Structure and Nuclear Moments of Cb^{93}
47Po16 R.V.Pound - Phys.Rev. 72, 1273 (1947)
The Nuclear Magnetic Moments of Bromine
47To16 C.H.Townes, A.N.Holden, J.Bardeen, F.R.Merritt - Phys.Rev. 71, 644 (1947)
The Quadrupole Moments and Spins of Br, Cl, and N Nuclei
47To19 S.Tolansky - High Resolution Spectroscopy, Methuen and Co.Ltd., London (1947)
48Ar06 O.H.Arroe - Phys.Rev. 74, 1263A (1948)
Hyperfine Structure of Zn^{67}
48Be17 G.E.Becker, P.Kusch - Phys.Rev. 73, 584 (1948); See Also 50Ku10
48Bl29 F.Bloch, D.Nicodemus, H.H.Staub - Phys.Rev. 74, 1025 (1948)
A Quantitative Determination of the Magnetic Moment in Units of the Proton Moment
48Bl32 N.Bloembergen, E.M.Purcell, R.V.Pound - Phys.Rev. 73, 679 (1948)
Relaxation Effects in Nuclear Magnetic Resonance Absorption
48Da08 B.P.Dailey, K.Rusinov, R.G.Shulman, C.H.Townes - Phys.Rev. 74, 1245A (1948)
Pure Rotational Spectrum of AsF_3
48Go22 W.Gordy, J.W.Simmons, A.G.Smith - Phys.Rev. 74, 243 (1948)
Nuclear Moments of B^{10} and B^{11}
48Go25 W.Gordy - Revs.Modern Phys. 20, 668 (1948); See Also 48Go22 (Br,I), 47Go20 (I)
48Je21 F.A.Jenkins - Phys.Rev. 74, 355 (1948)
Nuclear Spins of the Carbon Isotopes
48Ko30 H.Kopfermann, D.Meyer - Z.Physik 124, 685 (1948)
48Po09 R.V.Pound - Phys.Rev. 73, 1112 (1948); Erratum (Ga) Phys.Rev. 74, 228 (1948); Q(Br^{79}) Calculated from Widths Quoted in 47Po16 and Q(I^{127}) = -0.79
On the Nuclear Moments of I^{127}, Ga^{69}, Ga^{71} and P^{31}
48Po11 R.V.Pound - Phys.Rev. 73, 523 (1948)
Magnetic Moments of Cu^{63} and Cu^{65}
48To08 F.S.Tomkins - Phys.Rev. 73, 1214 (1948)
Hyperfine Structure in the Spectrum of Np^{237}
48To10 C.H.Townes, A.N.Holden, F.R.Merritt - Phys.Rev. 74, 1113 (1948); See Also 47To16 (N,Br), 49To17 (Cl)
Microwave Spectra of Some Linear X Y Z Molecules
48To13 C.H.Townes, S.Geschwind - Phys.Rev. 74, 626 (1948)
Spins and Quadrupole Moment of S^{33}
49An11 H.L.Anderson - Phys.Rev. 76, 1460 (1949)
Precise Measurement of the Gyromagnetic Ratio of He^3
49An12 D.A.Anderson - Phys.Rev. 76, 434 (1949)
Magnetic Moment of B^{11}
49Ar06 O.H.Arroe, J.E.Mack - Phys.Rev. 76, 873 (1949)
Nuclear Spin 5/2 for Zr^{91}
49Bi07 F.Bitter - Phys.Rev. 75, 1326A (1949)
Magnetic Resonance Frequencies for Several Nuclei
49Br61 P.Brix - Z.Physik 126, 725 (1949)
Eine Bemerkung zu den elektrischen Kernquadrupolemomenten der beiden Kupferisotope Cu 63 und Cu 65

49Br65 J.Brossel, A.Kastler - Compt.rend. 229, 1213 (1949)

49Co12 V.W.Cohen, W.S.Koski, T.Wentink, Jr. - Phys.Rev. 76, 703 (1949)
Nuclear Spin and Quadrupole Coupling of S^{35}

49Cr17 M.F.Crawford, N.Olson - Phys.Rev. 76, 1528 (1949)
Nuclear Moments of Y^{89}

49Cr18 M.F.Crawford, F.M.Kelly, A.L.Schawlow, W.M.Gray - Phys.Rev. 76, 1527 (1949)
Nuclear Moments of Mg^{25}

49Cr31 M.F.Crawford, J.Levinson - Can.J.Research 27A, 156 (1949)
The Nuclear Moments of P^{31}

49Da01 L.Davis,Jr., D.E.Nagle, J.R.Zacharias - Phys.Rev. 76, 1068 (1949)
Atomic Beam Magnetic Resonance Experiments with Radioactive Elements Na^{22}, K^{40}, Cs^{135}, and Cs^{137}

49Da14 L.Davis,Jr., B.T.Feld, C.W.Zabel, J.R.Zacharias - Phys.Rev. 76, 1076 (1949)
The Hyperfine Structure and Nuclear Moments of the Stable Chlorine Isotopes

49Di13 W.C.Dickinson - Phys.Rev. 76, 1414 (1949)
Magnetic Moment of La^{139}

49Di25 W.C.Dickinson, T.F.Wimett - Phys.Rev. 75, 1769 (1949)
The Magnetic Moment of Be^{9}

49Di31 G.H.Dieke, F.S.Tomkins - Phys.Rev. 76, 283 (1949)
The Molecular Spectrum of Hydrogen. The Fulcher Bands of TH and T_2

49Do24 A.E.Douglas, G.Herzberg - Phys.Rev. 76, 1529 (1949)
The Nuclear Spin of He^{3}

49Gi25 D.A.Gilbert, A.Roberts, P.A.Griswold - Phys.Rev. 76, 1723 (1949)

49Gi28 O.R.Gilliam, H.D.Edwards, W.Gordy - Phys.Rev. 75, 1014 (1949)

49Go19 W.Gordy, O.R.Gilliam, R.Livingston - Phys.Rev. 76, 443 (1949)
Nuclear Magnetic Moments from Microwave Spectra: I^{127} and I^{129}

49Gu02 M.Gurevitch - Phys.Rev. 75, 767 (1949)
On the Stability of Isobaric In^{115}-Sn^{115}

49Kn24 W.D.Knight, V.W.Cohen - Phys.Rev. 76, 1421 (1949)
The Nuclear Gyromagnetic Ratio of V^{51}

49Ko21 J.Koch, E.Rasmussen - Phys.Rev. 76, 1417 (1949)
Hyperfine Structure and Nuclear Spin of Kr-83 and Ne-21 Investigated

49Ku29 P.Kusch - Phys.Rev. 76, 138 (1949); See Also 52Lo30
On the Sign of the Electric Quadrupole Mcment of Li^{7}

49Ku31 P.Kusch, A.K.Mann - Phys.Rev. 76, 707 (1949)
A Precision Measurement of the Ratio of the Nuclear Values of Li^{7} and Li^{6}

49Le15 H.Lew - Phys.Rev. 76, 1086 (1949)
The Hyperfine Structure of the $^2P_{3/2}$ State of Al^{27}. The Nuclear Quadrupole Moment

49Li09 R.Livingston, O.R.Gilliam, W.Gordy - Phys.Rev. 76, 149 (1949)
The Nuclear Spin and Quadrupole Moment of I^{129}

49Lo21 W.Low, C.H.Townes - Phys.Rev. 75, 529 (1949)
O^{17} and S^{36} in the Rotational Spectrum of OCS

49Ma47 J.E.Mack, O.H.Arroe - Phys.Rev. 76, 1002 (1949)
Nuclear Spin 1/2 for Te^{123} and Isotope Shift in the Tellurium Spectrum

49Mu48 K.Murakawa, S.Suwa - Phys.Rev. 76, 433 (1949)
Quadrupole Moment of Sb^{121} and Sb^{123}

49Po08 H.L.Poss - Phys.Rev. 75, 600 (1949)
On the Magnetic Moments of C^{13}, F^{19}, Tl^{203}, Tl^{205}

49Ro15 E.H.Rogers, H.H.Staub - Phys.Rev. 76, 980 (1949)
The Signs of the Magnetic Moments of Neutron and Proton

49Si37 K.Siegbahn, G.Lindstrom - Arkiv Fysik 1, 193 (1949)
The Nuclear Magnetic Moments of D^{2}, Li^{7}, and F^{19} Studied by the Magnetic Resonance Absorption Method

49Si56 K.Siegbahn, G.Lindstrom - Nature 163, 211 (1949); See Also 49Si37
Magnetic Moments of Deuterium-2, Lithium-7 and Flourine-19

49St07 M.W.P.Strandberg, T.Wentink,Jr., A.G.Hill - Phys.Rev. 75, 827 (1949)

49Ta01 H.Taub, P.Kusch - Phys.Rev. 75, 1481 (1949)
The Magnetic Moment of the Proton

49To09 C.H.Townes, J.M.Mays, B.P.Dailey - Phys.Rev. 76, 700 (1949)
Evidence on Nuclear Moments of Stable Ge and Si Isotopes from Microwave Spectra

49To10 C.H.Townes, L.C.Aamodt - Phys.Rev. 76, 691 (1949)
Nuclear Spin and Quadrupole Moment of Cl^{36}

49To17 C.H.Townes, B.P.Dailey - J.Chem.Phys. 17, 782 (1949)
Determination of Electronic Structure of Molecules from Nuclear Quadrupole Effects

49Zi02 J.R.Zimmerman, D.Williams - Phys.Rev. 76, 350 (1949)
Determination of Nuclear Gyromagnetic Ratios I

50Ar51 O.H.Arroe - Phys.Rev. 79, 836 (1950)

50Bl73 F.Bloch, C.D.Jeffries - Phys.Rev. 80, 305 (1950); See Also 51Je10
50Bl86 B.Bleaney, H.E.D.Scovil - Proc.Phys.Soc.(London) 63A, 1369 (1950)
Nuclear Spins of Neodymium 143 and 145
50Br27 E.L.Brady, M.Deutsch - Phys.Rev. 78, 558 (1950)
Angular Correlation of Successive Gamma-Rays
50Br75 P.Brix, H.Kopfermann, W.v.Siemens - Naturwissenschaften 37, 397 (1950)
Uber die Kernmomente der Iridium-Isotope
50Co57 V.W.Cohen, W.D.Knight, T.Wentink,Jr., W.S.Koski - Phys.Rev. 79, 191 (1950)
Nuclear Magnetic Resonance of Sb^{121} and Sb^{123}
50Co65 T.L.Collins - Phys.Rev. 80, 103 (1950)
Nuclear Magnetic Resonance for K^{39}
50Cr26 M.F.Crawford, A.L.Schawlow, F.M.Kelly, W.M.Gray - Can.J.Research 28A, 558 (1950)
An Atomic Beam Source and Spectrograph for Hyperfine Structure. Nuclear Moments of Silver
50Di10 W.C.Dickinson - Phys.Rev. 80, 563 (1950)
Hartree Computation of the Internal Diamagnetic Field for Atoms
50Fo08 G.R.Fowles - Phys.Rev. 78, 744 (1950)
Hyperfine Structure and Nuclear Spins of Tungsten and Tellurium
50Fr51 M.Fred, F.S.Tomkins, J.K.Brody - Phys.Rev. 79, 212A (1950)
The Spectrum of He^3
50Ge05 S.Geschwind, H.Minden, C.H.Townes - Phys.Rev. 78, 174 (1950)
50Go10 W.Gordy, H.Ring, A.B.Burg - Phys.Rev. 78, 512 (1950)
Microwave Determination of the Structure of Borine Carbonyl and of the Nuclear Moments of the Stable Boron Isotopes
50Gu65 E.W.Guptill, W.J.Archibald, E.S.Warren - Can.J.Research 28A, 359 (1950)
50Ha67 M.Hamermesh, E.Eisner - Phys.Rev. 79, 888 (1950)
The Spin of the Neutron
50Hu15 D.M.Hunten - Phys.Rev. 78, 806 (1950)
Nuclear Magnetic Moment of Sc^{45}
50Ka16 A.Kastler - J.phys.radium 11, 255 (1950)
50Ke55 K.G.Kessler - Phys.Rev. 79, 167 (1950)
The Hyperfine Structure of Ni^{61}
50Ke59 F.M.Kelly, R.Richmond, M.F.Crawford - Phys.Rev. 80, 295 (1950)
50Ko09 J.Koch, E.Rasmussen - Phys.Rev. 77, 722 (1950)
Nuclear Spin and Isotope Shift of Xenon Investigated with Separated Isotopes
50Ku10 P.Kusch - Phys.Rev. 78, 615 (1950)
Nuclear Magnetic Moments of the Gallium Isotopes
50Ku69 H.Kuhn, G.K.Woodgate - Proc.Phys.Soc.(London) 63A, 830 (1950)
Hyperfine Structure and Nuclear Spin of Y^{89}
50Le06 E.C.Levinthal - Phys.Rev. 78, 204 (1950)
Relative Nuclear Moments of H^1 and H^2
50Ma02 A.K.Mann, P.Kusch - Phys.Rev. 77, 427 (1950)
The Hyperfine Structure of the Stable Isotopes of Indium
50Ma50 J.E.Mack - Revs.Modern Phys. 22, 64 (1950)
A Table of Nuclear Moments, January 1950
50Ne03 G.F.Newell - Phys.Rev. 78, 711 (1950)
The Electric Quadrupole Moment of the Deuteron
50Oc01 S.A.Ochs, R.A.Logan, P.Kusch - Phys.Rev. 78, 184 (1950)
50Po15 R.V.Pound, W.D.Knight - Rev.Sci.Instr. 21, 219 (1950)
A Radiofrequency Spectrograph and Simple Magnetic-Field Meter
50Po66 R.V.Pound - Phys.Rev. 79, 685 (1950)
50Pr06 W.G.Proctor, F.C.Yu - Phys.Rev. 77, 716 (1950)
On the Magnetic Moments of Mn^{55}, Co^{59}, Cl^{37}, N^{15} and N^{14}
50Pr51 W.G.Proctor - Phys.Rev. 79, 35 (1950)
On the Magnetic Moments of Tl^{203}, Tl^{205}, Sn^{115}, Sn^{117}, Sn^{119}, Cd^{111}, Cd^{113} and Pb^{207}
50Sh51 J.Sheridan, W.Gordy - Phys.Rev. 79, 513 (1950)
The Nuclear Quadrupole Moment of N^{14} and the Structure of Nitrogen Triflouride from Microwave Spectra
50Sh58 R.E.Sheriff, D.Williams - Phys.Rev. 79, 175 (1950)
The Nuclear Magnetic Moment of $Scandium^{45}$
50Si31 J.W.Simmons, W.E.Anderson, W.Gordy - Phys.Rev. 77, 77 (1950)
Microwave Spectrum and Molecular Constants of Hydrogen Cyanide
50Sm56 D.F.Smith, M.Tidwell, D.V.P.Williams - Phys.Rev. 79, 1007 (1950)
50St32 R.Sternheimer - Phys.Rev. 80, 102 (1950)
On Nuclear Quadrupole Moments
50St88 H.H.Staub, E.H.Rogers - Helv.Phys.Acta 23, 63 (1950); See Also 49Ro15
The Signs of the Magnetic Moments of Neutron and Proton
50Th06 H.A.Thomas - Phys.Rev. 80, 901 (1950)
The Diamagnetic Correction for Protons in Water and Mineral Oil

50Th07 H.A.Thomas, R.L.Driscoll, J.A.Hipple - Phys.Rev. 78, 787 (1950)
Measurement of the Proton Moment in Absolute Units
50We03 M.T.Weiss, M.W.P.Strandberg, R.B.Lawrance, C.C.Loomis - Phys.Rev. 78, 202 (1950)
On the Nuclear Spin of B^{10}
51Ab28 A.Abragam, M.H.L.Pryce - Proc.Roy.Soc.(London) 206A, 164 (1951)
51Ad27 N.I.Adams, T.F.Wimett, F.Bitter - MIT Res.Lab. Electronics Quarterly Prog.Rept., p.30 (April 1951)
51Ad31 N.I.Adams,III, T.F.Wimett, F.Bitter - Phys.Rev. 82, 343A (1951)
51Al08 F.Alder, F.C.Yu - Phys.Rev. 81, 1067 (1951)
On the Spin and Magnetic Moment of O^{17}
51Al11 F.Alder, F.C.Yu - Phys.Rev. 82, 105 (1951)
On the Magnetic Moments of Mg^{25}, Re^{185}, Re^{187} and Be^{9}
51Ar29 H.Arroe - Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen (1951)
51Be82 G.J.Bene - Helv.Phys.Acta 24, 367 (1951)
Contribution a l'Etude des Moments Magnetiques Nucleaires
51Be98 G.Becker - Z.Physik 130, 415 (1951)
Zum Verhaltnis der Kernquadrupolmomente der Kupferisotope
51Bl09 B.Bleaney, H.E.D.Scovil - Proc.Phys.Soc.(London) 64A, 204 (1951)
Nuclear Spin of Erbium 167
51Bl30 B.Bleaney, D.J.E.Ingram - Proc.Roy.Soc.(London) 205A, 336 (1951)
The Paramagnetic Resonance Spectra of Two Salts of Manganese
51Bl38 B.Bleaney, D.J.E.Ingram - Proc.Roy.Soc.(London) 208A, 143 (1951)
51Bl43 B.Bleaney, D.J.E.Ingram, H.E.D.Scovil - Proc.Phys.Soc.(London) 64A, 601 (1951)
Paramagnetic Resonance in Vanadous Ammonium Sulphate
51Bl74 B.Bleaney, K.D.Bowers - Proc.Phys.Soc.(London) 64A, 1135 (1951)
Nuclear Spin of ^{53}Chromium
51Br32 P.Brix, H.Kopfermann, R.Martin, W.Walcher - Z.Physik 130, 88 (1951)
Die Isotopieverschiebung im Spektrum des Silbers und die magnetischen Kernmomente des Ag^{107} und Ag^{109}
51Da28 C.F.Davis, A.F.Kip, R.Malvano - Atti accad.Nazl.Lincei, Rend., Classe sci.fis.mat.e nat. 11, 77 (1951); Nucl.Sci.Abstr. 6, 455, Abstr. 3679 (1952)
Paramagnetic Resonance at Very Low Temperatures in Hydrated Praseodymium Chloride
51De13 H.G.Dehmelt, H.Kruger - Z.Physik 129, 401 (1951)
51De15 H.G.Dehmelt, H.Kruger - Z.Physik 130, 385 (1951)
Über des Quadrupolresonanzspektrum in kristallinen Antimontrichlorid und das Verhaltnis der Antimonkernquadrupolmomente
51De16 H.G.Dehmelt - Z.Physik 130, 480 (1951)
Quadrupolresonanzfrequenzen des kristallinen Broms
51Ga31 J.H.Gardner - Phys.Rev. 83, 996 (1951)
Measurement of the Magnetic Moment of the Proton in Bohr Magnetons
51Ge06 S.Geschwind, R.Gunther-Mohr, C.H.Townes - Phys.Rev. 81, 288 (1951)
51Go37 W.Gordy - J.Chem.Phys. 19, 792 (1951)
Interpretation of Nuclear Quadrupole Coupling in Molecules
51Ha50 J.Hatton, B.V.Rollin, E.F.W.Seymour - Phys.Rev. 83, 672 (1951)
Nuclear Magnetic Resonance Measurements on Be^{9}, Al^{27} and Si^{29} in Beryl
51Hu54 D.M.Hunten - Can.J.Phys. 29, 463 (1951)
Nuclear Magnetic Moment of Scandium, Mass 45
51Ja20 V.Jaccarino, J.G.King - Phys.Rev.83, 471 (1951)
On the Ratio of the Nuclear Magnetic and Electric Quadrupole Interactions for Atomic Cl^{35} and Cl^{37}
51Je10 C.D.Jeffries - Phys.Rev. 81, 1040 (1951)
A Direct Determination of the Magnetic Moment of the Protons in Units of the Nuclear Magneton
51Jo21 C.M.Johnson, W.Gordy, R.Livingston - Phys.Rev. 83, 1249 (1951)
51Ka25 T.Kanda, Y.Masuda, R.Kusaka, Y.Yamagata, J.Itoh - Phys.Rev. 83, 1066 (1951)
51Ki31 J.G.King, V.Jaccarino - Phys.Rev. 84, 852 (1951)
51Kr51 H.Kruger - Z.Physik 130, 371 (1951)
51Ku41 H.Kuhn, G.K.Woodgate - Proc.Phys.Soc.(London) 64A, 1090 (1951)
Nuclear Spin and Magnetic Moment of Rhodium ^{103}Rh
51Li09 R.Livingston - Phys.Rev. 82, 289 (1951)
The Quadrupole Moment Ratio of Cl^{35} and Cl^{37} from Pure Quadrupole Spectra
51Lo24 C.C.Loomis, M.W.P.Strandberg - Phys.Rev. 81, 798 (1951)
Microwave Spectrum of Phosphine, Arsine, and Stibene
51Lo28 R.A.Logan, P.Kusch - Phys.Rev. 81, 280 (1951)
On the Nuclear Magnetic Moment of Na^{23}

51Mi20 S.L.Miller, A.Javan, C.H.Townes - Phys.Rev. 82, 454 (1951)
The Spin of O^{18}
51Pr02 W.G.Proctor, F.C.Yu - Phys.Rev. 81, 20 (1951)
On the Nuclear Magnetic Moments of Several Stable Isotopes
51Sc07 N.A.Schuster, G.E.Pake - Phys.Rev. 81, 157 (1951)
The Electric Quadrupole Moment of Li^{6}
51Sc17 N.A.Schuster, G.E.Pake - Phys.Rev. 81, 886 (1951)
The Spin of Be^{9}
51Sh33 R.E.Sheriff, D.Williams - Phys.Rev. 82, 651 (1951)
Nuclear Gyromagnetic Ratios. III
51Sm72 B.Smaller - Phys.Rev. 83, 812 (1951)
Precise Determination of the Magnetic Moment of the Deuteron
51So34 H.Sommer, H.A.Thomas, J.A.Hipple - Phys.Rev. 82, 697 (1951)
The Measurement of e/m by Cyclotron Resonance
51St93 R.Sternheimer - Phys.Rev. 84, 244 (1951)
On Nuclear Quadrupole Moments
51To19 F.S.Tomkins, M.Fred, W.F.Meggers - Phys.Rev. 84, 168 (1951)
Nuclear Spin of Actinium
51Vr06 J.A.Vreeland, K.Murakawa - Phys.Rev. 83, 229A (1951)
51Wa12 H.Walchli, R.Livingston, G.Hebert - Phys.Rev. 82, 97 (1951)
The Nuclear Magnetic Moment of I^{129}
51Wa24 G.D.Watkins, R.V.Pound - Phys.Rev. 82, 343 (1951)
51We11 T.Wentink,Jr., W.S.Koski, V.W.Cohen - Phys.Rev. 81, 948 (1951); See Also 49Co12
The Mass of S^{35} from Microwave Spectroscopy
51Ya03 E.Yasaitis, B.Smaller - Phys.Rev. 82, 750 (1951)
Nuclear Magnetic Moment of Rb^{85}, Rb^{87} and I^{127}
52Ae01 H.Aeppli, H.Albers-Schonberg, H.Frauenfelder, P.Scherrer - Helv.Phys.Acta 25, 339 (1952)
Bestimmung des magnetischen Momentes eines angeregten Kernes (Cd^{111})
52Ba63 J.M.Baker, B.Bleaney - Proc.Phys.Soc.(London) 65A, 952 (1952)
Nuclear Spin of Vanadium-50
52Bo21 G.S.Bogle, H.E.D.Scovil - Proc.Phys.Soc.(London) 65A, 368 (1952)
Nuclear Spins of Samarium 147 and 149
52Bo57 A.Bohr, J.Koch, E.Rasmussen - Arkiv Fysik 4, 455 (1952)
Hyperfine Structure and Nuclear Moments of Xe^{129} and Xe^{131}
52Bo66 K.D.Bowers - Proc.Phys.Soc.(London) 65A, 860 (1952); See Also 51Bl74
52Br40 P.J.Bray, R.G.Barnes, N.J.Harrick - Phys.Rev. 87, 229A (1952)
52Br71 B.M.Brown, D.H.Tomboulian - Phys.Rev. 88, 1158 (1952); Erratum Phys.Rev. 91, 1580 (1953)
The Nuclear Moments of Ta^{181}
52Da19 J.M.Daniels, M.A.Grace, H.Halban, N.Kurti, F.N.H.Robinson - Phil.Mag. 43, 1297 (1952)
The Alignment of Cobalt 58
52De21 H.G.Dehmelt - Z.Physik 133, 528 (1952)
Kernquadrupolspektren in zwei Bortrialkylen
52Ei09 J.T.Eisinger, B.Bederson, B.T.Feld - Phys.Rev. 86, 73 (1952)
The Magnetic Moment of K^{40} and the Hyperfine Structure Anomaly of the Potassium Isotopes
52Es07 J.R.Eshbach, R.E.Hillger, M.W.P.Strandberg - Phys.Rev. 85, 532 (1952); See Also 52Ki31
The Nuclear Magnetic Moment of S^{33} from Microwave Spectroscopy
52Ge26 S.Geschwind, G.R.Gunther-Mohr, G.Silvey - Phys.Rev. 85, 474 (1952)
Spin and Quadrupole Moment of O^{17}
52Gi04 D.A.Gilbert - Phys.Rev. 85, 716A (1952)
52Gr19 J.H.E.Griffiths, J.Owen - Proc.Phys.Soc.(London) 65A, 951 (1952)
The Nuclear Spins of ^{99}Ru and ^{101}Ru
52Ja18 V.Jaccarino, B.Bederson, H.H.Stroke - Phys.Rev. 87, 676 (1952)
The Nuclear Spin and Magnetic Moment of Cs^{134}
52Je05 C.D.Jeffries, H.Loeliger, H.H.Staub - Phys.Rev. 85, 478 (1952)
Nuclear Magnetic Resonance of Titanium and Arsenic
52Ka06 T.Kanda, Y.Masuda, R.Kusaka, Y.Yamagata, J.Itoh - Phys.Rev. 85, 938 (1952)
Gyromagnetic Ratios of Li^{7}, Na^{23}, Al^{27} and P^{31}
52Ka43 T.Kamei - J.Phys.Soc.Japan 7, 649 (1952)
Quadrupole Resonance in Solid Iodine
52Ke07 F.M.Kelly - Proc.Phys.Soc.(London) 65A, 250 (1952)
The Nuclear Magnetic Moment of Au^{197}
52Ki31 C.Kikuchi, M.H.Sirvetz, V.W.Cohen - Phys.Rev. 88, 142 (1952)
Nuclear Spin of V^{50} by Paramagnetic Resonance
52Ko10 G.F.Koster - Phys.Rev. 86, 148 (1952)

52Ko22 H.G.Kolsky, T.E.Phipps, N.F.Ramsey, H.B.Silsbee - Phys.Rev. 87, 395 (1952)
52Ko32 S.H.Koenig, A.G.Prodell, P.Kusch - Phys.Rev. 88, 191 (1952)
The Anomalous Magnetic Moment of the Electron
52Kr28 H.Kruger, U.Meyer-Berkhout - Z.Physik 132, 221 (1952)
52Kr29 H.Kruger, U.Meyer-Berkhout - Z.Physik 132, 171 (1952)
52Li18 G.Lindstrom - Arkiv Fysik 4, 1 (1952)
Nuclear Resonance Absorption Applied to Precise Measurements of Nuclear Magnetic Moments and the Establishment of an Absolute Energy Scale in β-Spectroscopy
52Lo30 R.A.Logan, R.E.Cote, P.Kusch - Phys.Rev. 86, 280 (1952)
The Sign of the Quadrupole Interaction Energy in Diatomic Molecules
52Mi26 S.L.Miller, M.Kotani, C.H.Townes - Phys.Rev. 86, 607A (1952)
52Mu40 K.Murakawa, S.Suwa - Phys.Rev. 87, 1048 (1952)
Hyperfine Structure in the Spectra of Iridium and Osmium
52Ro05 J.S.Ross, K.Murakawa - Phys.Rev. 85, 559 (1952)
Hyperfine Structure and Isotope Shift in the Spectrum of Tellurium
52St56 A.Steudel - Z.Physik 132, 429 (1952)
Die Hyperfeinstruktur im Pd I-Spectrum und die Kernmomente des Pd^{105}
52Wa02 H.Walchli, R.Livingston, W.J.Martin - Phys.Rev. 85, 479 (1952)
The Nuclear Magnetic Moment of Tc^{99}
52Wa08 H.E.Walchli, W.E.Leyshon, F.M.Scheitlin - Phys.Rev. 85, 922 (1952)
Nuclear Gyromagnetic Ratio of V^{50} and Measurements on Rb^{85} and Cl^{35}
52Wa21 H.E.Walchli, H.W.Morgan - Phys.Rev. 87, 541 (1952)
Magnetic Shielding Effects in Compounds of Vanadium
53Ab15 A.Abragam, R.V.Pound - Phys.Rev. 92, 943 (1953)
Influence of Electric and Magnetic Fields on Angular Correlations
53Al06 F.Alder, K.Halbach - Helv.Phys.Acta 26, 426 (1953)
Das magnetische Kernmoment von Cr^{53}
53Ba91 A.Bassompierre - Compt.rend. 237, 1224 (1953); Calculated Using Data from 53Go38
53Be19 E.H.Bellamy, K.F.Smith - Phil.Mag. 44, 33 (1953)
The Nuclear Spins and Magnetic Moments of ^{24}Na, ^{42}K, ^{86}Rb, ^{131}Cs and ^{134}Cs
53Bi10 L.C.Biedenharn, M.E.Rose - Revs.Modern Phys. 25, 729 (1953); Erratum 64Ch27
Theory of Angular Correlations of Nuclear Radiations
53Bl28 J.Blaise, H.Cantrel - J.phys.radium 14, 135 (1953)
Spins et Moments Nucleaires du Palladium 105
53Br26 P.Brix - Phys.Rev. 89, 1245 (1953)
Nuclear Magnetic Moment of Pr^{141} from the Hyperfine Structure of Pr(II)
53Bu92 C.A.Burrus,Jr., W.Gordy - Phys.Rev. 92, 274 (1953)
53Cr40 N.G.Cranna - Can.J.Phys. 31, 1185 (1953)
A Note on the Ratio of the Quadrupole Moments of Li^6 and Li^7
53De13 H.G.Dehmelt - Z.Physik 134, 642 (1953); See Also 52De21
Nachtrag zu Kernquadrupolspektren in zwei Bortrialkylen
53De16 H.G.Dehmelt - Phys.Rev. 91, 313 (1953); Q^{35} Calculated Using Data of 51We11
Nuclear Quadrupole Resonance in Rhombic Sulfur and the Quadrupole Moments of S^{33} and S^{35}
53De22 H.G.Dehmelt - Phys.Rev. 92, 1240 (1953)
Nuclear Quadrupole Resonance of the Stable Gallium Isotopes
53De42 H.G.Dehmelt - Am.J.Phys. 22, 110 (1953)
53Fa33 B.P.Fabricand, R.O.Carlson, C.A.Lee, I.I.Rabi - Phys.Rev. 91, 1403 (1953)
Molecular Beam Investigation of Rotational Transitions II. The Rotational Levels of KBr and their Hyperfine Structure
53Fr01 M.Fred, F.S.Tomkins - Phys.Rev. 89, 318 (1953)
Nuclear Spin of Am^{241}
53Go38 W.Gordy, W.V.Smith, R.F.Trambarulo - Microwave Spectroscopy, John Wiley and Sons, Inc., New York (1953)
53Gu12 H.S.Gutowsky, B.R.McGarvey - Phys.Rev. 91, 81 (1953)
Nuclear Magnetic Resonance in Thallium Compounds
53Ha50 W.A.Hardy, G.Silvey, C.H.Townes, B.F.Burke, M.W.P.Strandberg, G.W.Parker, V.W.Cohen - Phys.Rev. 92, 1532 (1953)
The Nuclear Moments of Se^{79}
53Ha80 E.G.Harris, M.A.Melkanoff - Phys.Rev. 90, 585 (1953); Used Data of 52Lo30
53Ja23 V.Jaccarino, J.G.King, H.H.Stroke - Quoted by 53Li24
53Je06 C.D.Jeffries - Phys.Rev. 90, 1130 (1953)
The Spin and Magnetic Moment of Ca^{43}
53Je14 C.D.Jeffries, P.B.Sogo - Phys.Rev. 91, 1286 (1953)
53Je16 C.D.Jeffries - Phys.Rev. 92, 1262 (1953)
The Spin and Magnetic Moment of Ti^{47} and Ti^{49} and the Magnetic Moment of Ge^{73}
53Ke49 K.G.Kessler, R.E.Trees - Phys.Rev. 92, 303 (1953); Priv.Comm.
The Nuclear Moments of Technetium-99

53Ki14 J.G.King, H.H.Stroke, V.Jaccarino - Phys.Rev. 91, 476A (1953)
53Ki41 C.Kikuchi, M.H.Sirvetz, V.W.Cohen - Phys.Rev. 92, 109 (1953); See Also 52Ki31
Paramagnetic Resonance Hyperfine Structure of V^{50} and V^{51}
53Kn50 W.D.Knight - Phys.Rev. 92, 539A (1953)
Nuclear Resonance Line Broadening and Quadrupole Splitting in Metallic Beryllium
53Ko22 S.Kojima, K.Tsukada, S.Ogawa, A.Shimauchi - J.Chem.Phys. 21, 1415 (1953)
53Ko39 H.Kopfermann, A.Steudel, S.Wagner, W.Walcher - Nachr.Akad.Wiss.Gottingen, Math.-physik.Kl.IIa, No.1 (1953)
Nuclear Quadrupole Moment of the $Copper^{63}$ Isotope
53Ku43 P.Kusch - Phys.Rev. 92, 268 (1953)
Sign of the Quadrupole Interaction of Li^{6} in LiCl
53Le15 H.Lew, G.Wessel - Phys.Rev. 90, 1 (1953)
53Le22 H.Lew - Phys.Rev. 91, 619 (1953)
The Hyperfine Structure and Nuclear Moments of Pr^{141}
53Le33 C.A.Lee, B.P.Fabricand, R.O.Carlson, I.I.Rabi - Phys.Rev. 91, 1395 (1953)
Molecular Beam Investigation of Rotational Transitions. I. The Rotational Levels of KCl and their Hyperfine Structure
53Li16 R.Livingston, H.Zeldes - Phys.Rev. 90, 609 (1953)
The Quadrupole Moment Ratio of I^{129} and I^{127} from Pure Quadrupole Spectra
53Li24 R.Livingston, B.M.Benjamin, J.T.Cox, W.Gordy - Phys.Rev. 92, 1271 (1953)
The Nuclear Spin and Quadrupole Moment of I^{131}
53Me73 H.Meyer - Helv.Phys.Acta 26, 811 (1953)
Die isotopen Verschiebungen im Spektrum des Argons
53Mu65 K.Murakawa, T.Kamei - Phys.Rev. 92, 325 (1953)
Hyperfine Structure of the Spectra of Dysprosium, Cobalt, Vanadium, Manganese, and Lanthanum
53Ra34 N.F.Ramsey - Experimental Nuclear Physics, Vol.I, E.Segre, Ed., John Wiley and Sons, Inc., New York, N.Y., p.358 (1953)
Nuclear Moments and Statistics
53Ro33 H.Robinson, H.G.Dehmelt, W.Gordy - Phys.Rev. 89, 1305 (1953)
53Si60 W.Von Siemens - Ann.Physik 13, 158 (1953)
Das Quadrupolmoment der Goldkerns Au^{197}
53Si61 W.Von Siemens - Ann.Physik 13, 136 (1953)
Hyperfeinstrukturen im Iridium I-Spektrum und die Kernmomente der stabilen Iridium-Isotope
53Sp17 G.Sprague, D.H.Tomboulian - Phys.Rev. 92, 105 (1953)
The Quadrupole Moments of Sb^{121} and Sb^{123}
53St67 R.M.Sternheimer, H.M.Foley - Phys.Rev. 92, 1460 (1953); Used Data of 52Lo30
Nuclear Quadrupole Coupling in the Li_2 Molecule
53Ti01 Y.Ting, D.Williams - Phys.Rev. 89, 595 (1953)
Nuclear Gyromagnetic Ratios IV
53Ti29 Y.Ting, E.Manring, D.Williams - Phys.Rev. 92, 1581 (1953)
53Wa63 H.E.Walchli - ORNL-1469 (1953); and Suppl. 2 (1955)
A Table of Nuclear Moment Data
53We01 G.Weinreich, V.W.Hughes - Phys.Rev. 90, 377A (1953)
Atomic Beam Magnetic Resonance Experiments on Helium 3
53We33 G.Wessel, H.Lew - Phys.Rev. 92, 641 (1953)
53We46 G.Wessel - Phys.Rev. 92, 1581 (1953); Used Q Ratio of 52De21
Hyperfine Structure and Nuclear Electric Quadrupole Moment of Boron II
53We51 H.E.Weaver,Jr. - Phys.Rev. 89, 923 (1953)
Magnetic Moments of Si^{29}, S^{33}, Zn^{67}, As^{75}, Se^{77}, Te^{123} and Te^{125}
53Wh39 R.L.White, C.H.Townes - Phys.Rev. 92, 1256 (1953)
The Spin of Si^{29} and Mass Ratios of the Stable Si Isotopes
53Wi23 T.F.Wimett - Phys.Rev. 91, 499A (1953)
The Deuteron-Proton Magnetic Moment Ratio
54Ak27 S.I.Aksenov, K.V.Vladimirskii - Doklady Akad.Nauk SSSR 96, 37 (1954)
Magnetic Moment of Ge^{73}
54Al49 H.Albers-Schonberg, E.Heer, T.B.Novey, P.Scherrer - Helv.Phys.Acta 27, 547 (1954)
Die Messung des Kernquadrupolmoments des Ersten Angeregten Zustands des Cd^{111} mit Hilfe der γ-γ Richtungskorrelation
54Be11 R.Beringer, M.A.Heald - Phys.Rev. 95, 1474 (1954)
Electron Spin Magnetic Moment in Atomic Hydrogen
54Bi40 G.R.Bird, C.H.Townes - Phys.Rev. 94, 1203 (1954); Calculated Using Data of 51We11
Sulfur Bonds and the Quadrupole Moments of O, S, and Se Isotopes
54Bi92 F.Bitter, S.P.Davis, B.Richter, J.E.R.Young - Phys.Rev. 96, 1531 (1954)
Optical Studies of Radioactive Mercury

54Bl07 B.Bleaney, J.M.Daniels, M.A.Grace, H.Halban, N.Kurti, F.N.H.Robinson, F.E.Simon - Proc.Roy.Soc.(London) 221A, 170 (1954)
Experiments on Nuclear Orientation at Very Low Temperatures. I. Establishment of a Method of Nuclear Alinement and its Application to Cobalt-60

54Bl21 B.Bleaney, H.E.D.Scovil, R.S.Trenam - Proc.Roy.Soc.(London) 223A, 15 (1954)
The Paramagnetic Resonance Spectra of Gadolinium and Neodymium Ethyl Sulphates

54Bl72 B.Bleaney, P.M.Llewellyn, M.H.L.Pryce, G.R.Hall - Phil.Mag. 45, 991 (1954); See Also 55Bo56
Nuclear Spins of ^{241}Pu

54Bl73 B.Bleaney, P.M.Llewellyn, M.H.L.Pryce, G.R.Hall - Phil.Mag. 45, 992 (1954); See Also 55Bo56
Paramagnetic Resonance in Neptunyl Rubidium Nitrate

54Br03 E.Brun, J.Oeser, H.H.Staub, C.G.Telschow - Helv.Phys.Acta 27, 173A (1954); See Also 54Br13 (Xe)
Kernresonanz in Edelgasen

54Br09 E.Brun, J.Oeser, H.H.Staub, C.G.Telschow - Phys.Rev. 93, 172 (1954)
The Nuclear Magnetic Moments of K^{41}, Y^{87}, Ag^{107} and Ag^{109}

54Br13 E.Brun, J.Oeser, H.H.Staub, C.G.Telschow - Phys.Rev. 93, 904 (1954)
The Nuclear Magnetic Moments of Xe^{129} and Xe^{131}

54Bu05 B.F.Burke, M.W.P.Strandberg, V.W.Cohen, W.S.Koski - Phys.Rev. 93, 193 (1954)
The Nuclear Magnetic Moment of S^{35} by Microwave Spectroscopy

54Co19 J.G.Conway, R.D.McLaughlin - Phys.Rev. 94, 498 (1954)
Nuclear Spin of Am^{243} and Isotope Shift in the Americium Spectrum

54Co39 V.W.Cohen, D.A.Gilbert - Phys.Rev. 95, 569 (1954)
Nuclear Spin and Hyperfine Structure Interaction of the 3.1 h Cs^{134} Isomer

54Da05 S.P.Davis - Phys.Rev. 93, 159 (1954)
Nuclear Spins and Band Spectra of the Selenium Isotopes

54Da26 R.T.Daly,Jr., J.H.Holloway - Phys.Rev. 96, 539 (1954)
Nuclear Magnetic Octupole Moments of the Stable Gallium Isotopes

54De01 H.G.Dehmelt, H.G.Robinson, W.Gordy - Phys.Rev. 93, 480 (1954)
Nuclear Quadrupole Resonance of Hg^{201}

54Fl41 R.C.Fletcher, W.A.Yager, G.L.Pearson, A.N.Holden, W.L.Read, L.R.Merritt - Phys.Rev. 94, 1392 (1954)

54Fo28 H.M.Foley, R.M.Sternheimer, D.Tycko - Phys.Rev. 93, 734 (1954)
Nuclear Quadrupole Coupling in Polar Molecules

54Go40 L.S.Goodman, S.Wexler - Phys.Rev. 95, 570 (1954)
Nuclear Spin and Magnetic Moment of 3.1 hr Cs^{134m}

54Ha39 K.Halbach - Helv.Phys.Acta 27, 259 (1954); AEC-tr-3567 (1959)
Uber eine Methode zur Messung von Relaxations-zeiter und uber den Spin von Cr^{53}

54Ja07 V.Jaccarino, J.G.King, R.A.Satten, H.H.Stroke - Phys.Rev. 94, 1798 (1954)
Hyperfine Structure of I^{127}. Nuclear Magnetic Octupole Moment

54Ja16 A.Javin, A.Englebrecht - Phys.Rev. 96, 649 (1954)
Microwave Absorption Spectra of MnO_3F and ReO_3Cl

54Ke14 F.M.Kelly, H.Kuhn, A.Pery - Proc.Phys.Soc.(London) 67A, 450 (1954)
Hyperfine Structures in the Atomic Spectra of Calcium

54Ki11 J.G.King, V.Jaccarino - Phys.Rev. 94, 1610 (1954)
Hyperfine Structure and Nuclear Moments of the Stable Bromine Isotopes

54Kr52 K.Krebs, H.Nelkowski - Ann.Physik 15, 124 (1954)
Zur Hyperfeinstruktur des Ytterbiums

54Le40 A.Lemonick, F.M.Pipkin - Phys.Rev. 95, 1356 (1954)
Spins and Hyperfine Splittings of Ag^{111} and Cu^{64}

54Lo36 H.R.Loeliger, L.R.Sarles - Phys.Rev. 95, 291 (1954)
Magnetic Moment of Os^{189}

54Mu15 K.Murakawa - Phys.Rev. 93, 1232 (1954)
Hyperfine Structure in the Spectra of Sb, Sm, Hg and Cl

54Mu91 K.Murakawa - Phys.Rev. 96, 1543 (1954)
Hyperfine Structure of the Spectra of Nd and Gd

54Og01 R.A.Ogg,Jr., J.D.Ray - J.Chem.Phys. 22, 147 (1954)
The Nuclear Spin Quantum Number of Si^{29} Isotope

54Pl30 E.A.Plassmann, L.M.Langer - Phys.Rev. 96, 1593 (1954)
Beta Spectrum of Radium E

54Ro34 V.Royden - Phys.Rev. 96, 543 (1954)
Measurement of the Spin and Gyromagnetic Ratio of C^{13} by the Collapse of Spin-Spin Splitting

54Ro43 H.Robinson, H.G.Dehmelt, W.Gordy - J.Chem.Phys. 22, 511 (1954)

54Sa34 P.L.Sagalyn - Phys.Rev. 94, 885 (1954)
The Hyperfine Structure of the $3P_{3/2}$ State of Na^{23}

54Sc10 A.L.Schawlow - J.Chem.Phys. 22, 1211 (1954)
54Sm96 K.F.Smith - Quoted by 54P130
54So05 P.B.Sogo, C.D.Jeffries - Phys.Rev. 93, 174 (1954)
The Magnetic Moments of Ag^{107} and Ag^{109} and the Hyperfine Structure Anomaly
54St11 R.M.Sternheimer - Phys.Rev. 95, 736 (1954)
Effect of the Atomic Core on the Nuclear Quadrupole Coupling
54St90 C.P.Stanford, T.E.Stephenson, S.Bernstein - Phys.Rev. 96, 983 (1954)
Neutron Spin from Magnetic Resonance Experiment
54Tr35 J.W.Trischka, R.Braunstein - Phys.Rev. 96, 968 (1954)
Rotational Spectra of RbCl by the Molecular Beam Electric Resonance Method
54Va01 K.L.Vander Sluis, J.R.McNally,Jr. - J.Opt.Soc.Am. 44, 87 (1954)
Nuclear Moments of U^{233} and U^{235}
54Va06 M.van den Berg, P.F.A.Klinkenberg - Physica 20, 461 (1954)
The Optical Spectrum of Plutonium and its Hyperfine Structure
54Wa37 H.E.Walchli - ORNL-1775 (1954)
Some Improved Measurements of Nuclear Magnetic Dipole Moments by Means of Nuclear Magnetic Resonance
54Wi08 G.A.Williams, D.W.McCall, H.S.Gutowsky - Phys.Rev. 93, 1428 (1954)
The Nuclear Spin of Si^{29}
54Wo07 E.C.Woodward,Jr. - Phys.Rev. 93, 954A (1954)
Nuclear Spins of Mo^{95} and Mo^{97}
55Aa06 L.C.Aamodt, P.C.Fletcher - Phys.Rev. 98, 1224 (1955)
Spin, Quadrupole Moment, and Mass of Selenium-75
55Aa23 L.C.Aamodt, P.C.Fletcher - Phys.Rev. 98, 1317 (1955)
Magnetic Moment and Mass of Chlorine-36
55Al56 K.Althoff - Z.Physik 141, 33 (1955)
55An65 E.R.Andrew - Nuclear Magnetic Resonance, Cambridge University Press (1955)
55Ba04 J.M.Baker, B.Bleaney - Proc.Phys.Soc.(London) 68A, 1090 (1955)
The Nuclear Magnetic Moment of Holmium 165
55Ba08 J.M.Baker, B.Bleaney - Proc.Phys.Soc.(London) 68A, 936 (1955)
Nyperfine Structure of Praseodymium
55Ba54 A.Bassompierre - Compt.rend. 240, 285 (1955); Calculated Using Data of 50Si31
Evaluation of the Nuclear Quadrupole Moment of N^{14}
55Bl16 B.Bleaney, W.Low - Proc.Phys.Soc.(London) 68A, 55 (1955)
Nuclear Spins and Ratio of Magnetic Moments of Europium 151 and 153
55Bl21 B.Bleaney, K.D.Bowers, M.H.L.Pryce - Proc.Roy.Soc.(London) 228A, 166 (1955)
Paramagnetic Resonance in Diluted Copper Salts III. Theory and Evaluation of the Nuclear Electric Quadrupole Moments of ^{63}Cu and ^{65}Cu
55Bl51 B.Bleaney - Proc.Phys.Soc.(London) 68A, 937 (1955); See Also 54Bl21 (Nd), 50Bl86 (Nd)
Nuclear Moments of the Lanthanons from Paramagnetic Resonance
55Bo56 K.D.Bowers, J.Owen - Repts.Progr. In Phys. 18, 304 (1955)
55Br11 L.C.Brown, D.Williams - Phys.Rev. 98, 1537A (1955)
Nuclear Magnetic Moment of Potassium
55Br64 G.Breit, J.P.Lazarus - Phys.Rev. 100, 942 (1955)
Effects of Finite Amplitude in Coulomb Excitation
55Ca48 C.F.M.Cacho, M.A.Grace, C.E.Johnson, A.C.Knipper, R.G.Scurlock, R.T.Taylor - Phil.Mag. 46, 1287 (1955)
Nuclear Orientation of Cerium 141
55Co36 D.J.Collington, A.N.Dellis, J.H.Sanders, K.C.Tuberfield - Phys.Rev. 99, 1622 (1955); See Also 57Sa07
Magnetic Moment of the Proton
55Fa45 P.S.Farago, M.Gecs, J.Merz - Nuovo cimento 2, 1110 (1955)
55Fr26 M.Fred, F.S.Tomkins, W.F.Meggers - Phys.Rev. 98, 1514 (1955); Erratum Phys.Rev. 111, 1747 (1958)
Nuclear Moments of Ac^{227}
55Gi04 D.A.Gilbert, V.W.Cohen - Phys.Rev. 98, 1194A (1955); See Also 54Co39
55Go31 L.S.Goodman, S.Wexler - Phys.Rev. 99, 192 (1955); See Also 54Go40
Nuclear Spin and Magnetic Moment of 3.1-hr $Cs^{134}m$
55Ja30 A.W.Jache, G.S.Blevins, W.Gordy - Phys.Rev. 97, 680 (1955)
55Ka23 T.Kamei - Phys.Rev. 99, 789 (1955)
Quadrupole Moments of Ta^{181} and Lu^{175}
55Ka40 N.I.Kaliteevskii, M.P.Chaika - Doklady Akad.Nauk SSSR 103, 49 (1955)
The Hyperfine Structure of the Spectra of Plutonium and of Uranium Isotopes
55Ko36 L.A.Korostyleva, A.R.Striganov, N.M.Iashin - Zhur.Eksptl.i Teoret.Fiz. 28, 471 (1955); Soviet Phys.JETP 1, 310 (1955)
Hyperfine Structure of Spectral Lines and Nuclear Spins of Uranium-233 and Plutonium 233
55Kr02 V.E.Krohn, T.B.Novey, S.Raboy - Phys.Rev. 98, 1187A (1955)
Gyromagnetic Ratio of 6 x 10^{-8} sec Np^{237} by Angular-Correlation Techniques

55Kr06 V.E.Krohn, S.Raboy - Phys.Rev. 97, 1017 (1955)
Gyromagnetic Ratio of an Excited State and Other Angular Correlation Measurements for Pb^{204m}
55Kr33 K.Krebs, H.Nelkowski - Z.Physik 141, 254 (1955)
Die Hyperfeinstruktur der Resonanzlinien des Yttebium II
55Ku48 P.Kusch - Phys.Rev. 100, 1188 (1955)
55Li49 K.H.Lindenberger - Z.Physik 141, 476 (1955)
Magnetisches Kerndipolmoment und Kerndrehimpulsquantenzahl des Tm^{169}
55Lu59 G.Luhrs - Z.Physik 141, 486 (1955)
Das Kernquadrupolmoment des La^{139}
55Me07 U.Meyer-Berkhout - Z.Physik 141, 185 (1955)
55Mu45 K.Murakawa - Phys.Rev. 98, 1285 (1955)
Nuclear Moments of Nb^{93}, La^{139}, Os^{187}, Hg^{201}
55Mu56 K.Murakawa - J.Phys.Soc.Japan 10, 336 (1955)
Hyperfine Structure of the Spectrum of Mn I
55Mu78 K.Murakawa - J.Phys.Soc.Japan 10, 919 (1955)
Hyperfine Structure of the Spectrum of Ruthenium Part III
55Mu88 K.Murakawa - Phys.Rev. 100, 1369 (1955)
Nuclear Moments of Mo^{95}, Mo^{97}, Zr^{91}, I^{127}, Sb^{121} and Sb^{123}
55Pe33 M.L.Perl, I.I.Rabi, B.Senitzky - Phys.Rev. 98, 611 (1955)
Nuclear Electric Quadrupole Moment of Na^{23} by the Atomic Beam Resonance Method
55Po17 O.J.Poppema, M.J.Steenland, J.A.Beun, C.J.Gorter - Physica 21, 233 (1955)
Experiments on Oriented ^{60}Co Nuclei
55Ra13 E.Rasmussen, V.Middelboe - Z.Physik 141, 160 (1955)
Hyperfeinstruktur und Kernmomente von Kr^{85*}
55Ra46 E.Rasmussen, V.Middelboe - Kgl.Danske Videnskab.Selskab, Mat.-fys.Medd. 30, No.13 (1955)
Spectroscopic Investigations of Separated Krypton Isotopes
55Ri35 M.Rice, R.V.Pound - Phys.Rev. 99, 1036 (1955); Used Ga^{71} Data of 48Po09
Ratio of the Magnetic Moments of the Stable Gallium Isotopes
55Sm12 K.F.Smith - Molecular Beams, Methuen and Co.Ltd., London (1955)
55So10 P.B.Sogo, C.D.Jeffries - Phys.Rev. 98, 1316 (1955)
Nuclear Magnetic Moments of Cl^{36}, Rh^{103}, and W^{183}
55So31 P.B.Sogo, C.D.Jeffries - Phys.Rev. 99, 613A (1955); Oral Report; Used La^{139} of 51Sh33
Spin, Magnetic Moment, and Electric Quadrupole Moment of La^{138}, and the Magnetic Moment of Cl^{36}
55To31 C.H.Townes, A.L.Schawlow - Microwave Spectroscopy, McGraw Hill, New York (1955)
55Tr21 G.Trumpy - Nature 176, 507 (1955)
Circular Polarization of Gamma-Rays Following Polarized Neutron Capture
55Va07 K.L.Vander Sluis, J.R.McNally,Jr. - J.Opt.Soc.Am. 45, 65 (1955)
Nuclear Spin of Uranium-235
55Va16 K.L.Vander Sluis, P.M.Griffin - J.Opt.Soc.Am. 45, 1087 (1955)
55Wa24 T.C.Wang - Phys.Rev. 99, 566 (1955)
Pure Nuclear Quadrupole Spectra of Chlorine and Antimony Isotopes in Solids
55Wh42 J.C.Wheatley, W.J.Huiskamp, A.N.Diddens, M.J.Steenland, H.A.Tolhoek - Physica 21, 841 (1955)
Circular Polarization of Gamma Radiation Emitted by Oriented ^{60}Co Nuclei
56Al54 K.Alder, A.Bohr, T.Huus, B.Mottelson, A.Winther - Revs.Modern Phys. 28, 432 (1956); Erratum Revs.Modern Phys. 30, 353 (1958)
Study of Nuclear Structure by Electromagnetic Excitation with Accelerated Ions
56Ba69 J.M.Baker, B.Bleaney, P.M.Llewellyn, P.F.D.Shaw - Proc.Phys.Soc.(London) 69A, 353 (1956)
Nuclear Spins and Magnetic Moments of Cobalt 56 and 57
56Be24 H.G.Bennewitz, W.Paul, P.Toschek - Z.Naturforsch. 11a, 956 (1956)
Die Kernmomente des radioaktiven Tl^{204}
56Bl29 B.Bleaney, C.A.Hutchison,Jr., P.M.Llewellyn, D.F.D.Pope - Proc.Phys.Soc.(London) 69B, 1167 (1956)
Paramagnetic Resonance Absorption in $^{235}UCl_3$, and the Nuclear Electric Quadrupole Moment of ^{235}U
56Br48 L.C.Brown, D.Williams - J.Chem.Phys. 24, 751 (1956)
Quadrupolar Splitting of the Al^{27} and Be^{9} Magnetic Resonances in Beryl Crystals
56Br69 G.Breit, R.L.Gluckstern, J.E.Russell - Phys.Rev. 103, 727 (1956)
Reorientation Effect in Coulomb Excitation
56Bu19 P.Buck, I.I.Rabi, B.Senitzky - Phys.Rev. 104, 553 (1956)
Hyperfine Structure of K^{39} in 4P State and of Cs^{133} in the 6P State

56Ch08 R.L.Christensen, D.R.Hamilton, A.Lemonick, F.M.Pipkin, J.B.Reynolds, H.H.Stroke - Phys.Rev. 101, 1389 (1956)
Spins and Hyperfine Structure Separations of Radioactive Au^{198} and Au^{199}

56Co21 A.H.Cooke, J.G.Park - Proc.Phys.Soc.(London) 69A, 282 (1956)
Nuclear Spins and Magnetic Moments of ^{161}Dy, ^{163}Dy, ^{171}Yb, and ^{173}Yb

56Co57 V.W.Cohen, N.R.Corngold, N.F.Ramsey - Phys.Rev. 104, 283 (1956)
Magnetic Moment of the Neutron

56Do08 W.Dobrowolski, R.V.Jones, C.D.Jeffries - Phys.Rev. 101, 1001 (1956)
Paramagnetic Resonance Hyperfine Structure of Co^{60}

56Do45 W.Dobrowolski, R.V.Jones, C.D.Jeffries - Phys.Rev. 104, 1378 (1956)
Spin and Magnetic Moment of Mn^{53}

56Fe43 G.Feher - Phys.Rev. 103, 500 (1956); See Also 56Fe44
Method of Polarizing Nuclei in Paramagnetic Substances

56Fe44 G.Feher - Phys.Rev. 103, 834 (1956)
Observation of Nuclear Magnetic Resonances via the Electron Spin Resonance Line

56Ga77 J.J.Gallagher, C.M.Johnson - Phys.Rev. 103, 1727 (1956)
Uncoupling Effects in the Microwave Spectrum of Nitric Oxide

56Go14 G.Gould - Phys.Rev. 101, 1828 (1956)
hfs Separations and hfs Anomaly in the 6 $^2P_{3/2}$ Metastable Level of Tl^{203} and Tl^{205}

56He94 J.W.Heberle, H.A.Reich, P.Kusch - Phys.Rev. 101, 612 (1956)
Hyperfine Structure of the Metastable Hydrogen Atom

56Ho02 J.H.Holloway, B.B.Aubrey, J.G.King - NP-6012, p.35 (1956)
Hyperfine Structure and Nuclear Magnetic Octopole Moments of the Stable Chlorine Isotopes

56Ho52 J.P.Hobson, J.C.Hubbs, W.A.Nierenbeg, H.B.Silsbee, R.J.Sunderland - Phys.Rev. 104, 101 (1956)
Spins of Rubidium Isotopes of Masses 81, 82, 83, and 84

56Hu26 C.A.Hutchison,Jr., P.M.Llewellyn, E.Wong, P.Dorain - Phys.Rev. 102, 292 (1956)
Paramagnetic Resonance Absorption in Uranium (III) Chloride and the Nuclear Spin of Uranium-235

56Hu69 J.C.Hubbs, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Phys.Rev. 104, 757 (1956)
Spin of Rubidium-81m

56Hu70 J.C.Hubbs, G.M.Grosof - Phys.Rev. 104, 715 (1956)
Spin of Neon-21

56Ja29 D.A.Jackson - Phys.Rev. 103, 1738 (1956)
Isotope Effects in Hyperfine Structure of the Resonance Lines of Gallium I

56Jo06 R.V.Jones, W.Dobrowolski, C.D.Jeffries - Phys.Rev. 102, 738 (1956)
Paramagnetic Resonance Hyperfine Structure of Co^{56}

56Ka53 N.I.Kaliteevskii, M.P.Chaika - Optika i Spektroskopiya 1, 809 (1956); AEC-tr-2890; Nucl.Sci.Abstr. 11, 700, Abstr. 6512 (1957)
The Ratios of the Magnetic Spin and Quadrupole Moments of the Nuclei U^{233} and U^{235}

56Ka64 N.I.Kaliteevskii, M.P.Chaika - Optika i Spectroskopiya 1, 606 (1956); Nucl.Sci.Abstr. 12, 845, Abstr. 7445 (1958)

56Kn66 W.D.Knight, R.R.Hewitt, M.Pomerantz - Phys.Rev. 104, 271 (1956)
Nuclear Quadrupole Resonance in Metals

56Ko12 H.Kopfermann, A.Steudel, J.O.Trier - Z.Physik 144, 9 (1956)
Uber Feinstruktur und Hyperfeinstruktur im Rb II-Spektrum und das Kernquadrupolmoment von Rb^{87}

56Kr42 K.Krebs, N.Nelkowski - Z.Physik 145, 543 (1956)
Uber das Raman-Spektrum des Dekahydronaphthalins

56Lo29 W.Low - Phys.Rev. 103, 1309 (1956)
Hyperfine Structure and Nuclear Moments of Gadolinium from Paramagnetic Resonance Spectrum

56Lu53 A.Lurio, A.G.Prodell - Phys.Rev. 101, 79 (1956)
Hfs Separations and Hfs Anomalies in the $^2P_{1/2}$ State of Ga^{69}, Ga^{71}, Tl^{203}, and Tl^{205}

56Ma31 T.E.Manning, M.Fred, F.S.Tomkins - Phys.Rev. 102, 1108 (1956)
Nuclear Moments of Am^{241} and Am^{243}

56Mu36 K.Murakawa - J.Phys.Soc.Japan 11, 422 (1956)
The Quadrupole Moment of V^{51}

56Ni14 W.A.Nierenberg, J.S.Hubbs, H.A.Shugart, H.B.Silsbee, P.O.Strom - Bull.Am.Phys.Soc. 1, No.7, 343, R3 (1956)
The Spin of 7.1-Day Cs^{132}

56Ni16 W.A.Nierenberg, H.A.Shugart, H.B.Silsbee, R.J.Sunderland - Phys.Rev. 104, 1380 (1956)
Spins of Cesium-127, Cesium-129, and Cesium-130

56Nu12 P.B.Nutter - Phil.Mag. 1, 587 (1956)
The Spin and Magnetic Moment of ^{116*}In
56Ow04 J.Owen, I.M.Ward - Phys.Rev. 102, 591 (1956)
Nuclear Spins of Mo^{95} and Mo^{97}
56Pa60 G.E.Pake - Solid State Phys., Vol.2, F.Seitz, D.Turnbull, Eds., Academic Press Inc., New York, p.1 (1956)
Nuclear Magnetic Resonance
56Po14 R.V.Pound, G.K.Wertheim - Phys.Rev. 102, 396 (1956)
Directional Correlations and Electric Quadrupole Moments of Mercury Isotopes
56Ra58 N.F.Ramsey - Molecular Beams, Clarendon Press, Oxford (1956)
56Re57 H.A.Reich, J.W.Heberle, P.Kusch - Phys.Rev. 104, 1585 (1956)
Hyperfine Structure of the Metastable Deuterium Atom
56Se59 B.Senitzky, I.I.Rabi - Phys.Rev. 103, 315 (1956)
Hyperfine Structure of $Rb^{85,87}$ in the 5P State
56Sp21 D.R.Speck - Phys.Rev. 101, 1725 (1956)
Hyperfine Structure and Nuclear Moments of Gadolinium
56Sp22 D.R.Speck, F.A.Jenkins - Phys.Rev. 101, 1831 (1956)
Nuclear Moments of Hf^{177} and Hf^{179}
56Sp53 D.R.Speck - Bull.Am.Phys.Soc. 1, No.6, 282, C3 (1956)
Magnetic and Quadrupole Moments of Hf^{177} and Hf^{179}
56St50 R.M.Sternheimer, H.M.Foley - Phys.Rev. 102, 731 (1956)
Nuclear Quadrupole Coupling in Polar Molecules
56St63 R.M.Steffen, W.Zobel - Phys.Rev. 103, 126 (1956)
Magnetic Moment of the 247-keV Excited State of Cd^{111}
56Th18 R.Thorne - Nature 178, 484 (1956)
Nuclear Spin of Americium-241
56Tr19 K.R.Trigger - Bull.Am.Phys.Soc. 1, No.4, 220, UA8 (1956); Priv.Comm. (1956)
Magnetic Moment of the Proton
56Va27 K.L.Vander Sluis - ORNL-2236, p.35 (1956)
Ratios of the Nuclear Moments of U^{233} and U^{235}
56Wa20 H.E.Walchli, T.J.Rowland - Phys.Rev. 102, 1334 (1956)
Nuclear Magnetic Resonance Measurements of the Isotopes Barium-135 and Barium-137
56Wi41 W.Wilhelmy - Ann.Physik 19, 329 (1956); See Also 57Ki20
56Wi46 J.P.Wittke, R.H.Dicke - Phys.Rev. 103, 620 (1956)
Redetermination of the Hyperfine Splitting in the Ground State of Atomic Hydrogen
56Wo27 G.K.Woodgate, R.W.Hellwarth - Proc.Phys.Soc.(London) 69A, 581 (1956)
Hyperfine Structure of Radioactive Silver ^{111}Ag
56Zi05 A.G.Zimin, N.M.Iashin - Doklady Akad.Nauk SSSR 109, 283 (1956); Soviet Phys.Doklady 1, 419 (1956)
The Nuclear Quadrupole Moment of U^{233}
57Ab05 M.Abraham, R.Kedzie, C.D.Jeffries - Phys.Rev. 108, 58 (1957)
Spin and Magnetic Moment of Eu^{152} and Eu^{154} by Paramagnetic Resonance
57Ab07 M.Abraham, C.D.Jeffries, R.W.Kedzie, J.C.Wallmann - Phys.Rev. 106, 1357 (1957)
Paramagnetic Resonance Hyperfine Structure of Np^{239}
57Ba34 E.B.Baker - J.Chem.Phys. 26, 960 (1957)
NMR Spectra of Metal Alkyls; Magnetogyric Ratio of Pb^{207}
57Be36 W.E.Bell, A.L.Bloom - Phys.Rev. 107, 1559 (1957)
Optical Detection of Magnetic Resonance in Alkali Metal Vapor
57Be39 V.B.Belyanin - Optika i Spektroskopiya 3, 322 (1957); Nucl.Sci.Abstr. 12, 1317, Abstr. 11158 (1958)
57Bl04 R.J.Blin-Stoyle - Handbuch der Physik 42, Nuclear Reactions III, S.Flugge, Ed., Springer-Verlag, Gottingen, p.555 (1957)
Oriented Nuclei
57Bl10 J.Blaise, H.Chantrel - J.phys.radium 18, 193 (1957)
Structures Hyperfines de Raies du Spectre d'Arc du Mercure et Moment Quadrupolaire de ^{201}Hg
57Bl66 J.Blaise, S.Gerstenkorn, M.Louvegnies - J.phys.radium 18, 318 (1957)
Spin of ^{235}U and Ratios of the Nuclear Moments of ^{235}U and ^{233}U
57Bo10 K.Bockmann, H.Kruger, E.Recknagel - Ann.Physik 20, 250 (1957)
Bestimmung des elektrischen Quadrupolmomentes des Zn^{67}-Kerns durch Messung der Hochfrequenzubergange im 4 $^3P_1$-Zustand des Zn^{67}-Atoms
57Br26 E.Brun, J.Oeser, H.H.Staub - Phys.Rev. 105, 1929 (1957); See Also 57Br89
Magnetic Moment and Spin of Zr^{91}
57Br32 G.O.Brink, J.C.Hubbs, W.A.Nierenberg, J.L.Worcester - Phys.Rev. 107, 189 (1957)
Spins of Thallium-197, -198m, -199, and -204, and the Hyperfine-Structure Splitting of Thallium-204

57Br89 E.Brun, J.Oeser, H.H.Staub - Helv.Phys.Acta 30, 267 (1957)
Spin und magnetisches Moment von Zr^{91}
57Bu19 P.Buck, I.I.Rabi - Phys.Rev. 107, 1291 (1957)
Hyperfine Structure of K^{39} in the 4P State
57Co48 H.L.Cox,Jr., D.Williams - Bull.Am.Phys.Soc. 2, No.1, 30, JA3 (1957)
Zeeman Splitting of Nuclear Quadrupole Energy Levels in a Single Cuprite Crystal
57Do38 W.Dobrov, C.D.Jeffries - Phys.Rev. 108, 60 (1957)
Magnetic Moment of 72-Day Co^{58} by Paramagnetic Resonance
57Do40 P.B.Dorain, C.A.Hutchison,Jr., E.Wong - Phys.Rev. 105, 1307 (1957)
Paramagnetic Resonance Absorption in Uranium (III) Chloride and the Nuclear Spin, Magnetic Dipole Moment, and Electric Quadrupole Moment of Uranium-233
57Ec07 T.G.Eck, P.Kusch - Phys.Rev. 106, 958 (1957)
Hfs of the $5\ ^2P_{3/2}$ State of In^{115} and In^{113}: Octupole Interactions in the Stable Isotopes of Indium
57Ec09 T.G.Eck, A.Lurio, P.Kusch - Phys.Rev. 106, 954 (1957)
Hfs of the $5\ ^2P_{1/2}$ State of In^{115} and In^{113}: Hfs Anomalies in the Stable Isotopes of Indium
57Eh40 D.Ehrenstein, G.Fricke, H.Kopfermann, S.Penselin - Naturwissenschaften 44, 255 (1957)
57Es32 L.Essen, J.V.L.Parry - Phil.Trans.Roy.Soc.(London) 250A, 45 (1957)
57Fe32 G.Feher, C.S.Fuller, E.A.Gere - Phys.Rev. 107, 1462 (1957)
Spin and Magnetic Moment of P^{32} by the Electron Nuclear Double-Resonance Technique
57Fr20 R.Freeman, G.R.Murray, R.E.Richards - Proc.Roy.Soc.(London) 242A, 455 (1957)
57Fr53 M.Fred, F.S.Tomkins - J.Opt.Soc.Am. 47, 1076 (1957)
57Ga16 N.S.Garifyanov, M.M.Zaripov, B.M.Kozyrev - Doklady Akad.Nauk SSSR 113, 1243 (1957); Soviet Phys.Doklady 2, 195 (1957)
Nuclear Spin of Fe^{57}
57Ge89 J.S.Geiger, V.W.Hughes - Phys.Rev. 105, 183 (1957)
Electron g Value in the Ground State of Deuterium
57Go23 L.S.Goodman, S.Wexler - Phys.Rev. 108, 1524 (1957)
Nuclear Spins and Magnetic Dipole Moments of 50-Day In^{114m} and 54-min In^{116m}
57Gr51 M.A.Grace, C.E.Johnson, R.G.Scurlock, R.T.Taylor - Phil.Mag. 2, 1079 (1957)
Nuclear Alignment of Ytterbium 175
57Ho69 W.M.Hooke, R.L.Christensen, D.R.Hamilton, J.B.Reynolds, H.H.Stroke - Bull.Am.Phys.Soc. 2, No.7, 344, H1 (1957)
Hyperfine Structure of Au^{194}
57Hu75 J.C.Hubbs, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee, R.J.Sunderland - Phys.Rev. 107, 723 (1957)
Hyperfine-Structure Separations and Magnetic Moments of Rb^{81}, Rb^{82}, Rb^{83}, and Rb^{84}
57Hu80 W.J.Huiskamp, A.N.Diddens, J.C.Severiens, A.R.Miedema, M.J.Steenland - Physica 23, 605 (1957)
Anistropy and Polarization of Gamma Rays Emitted by Orientated ^{52}Mn Nuclei
57Hu86 J.C.Hubbs, W.A.Nierenberg, H.A.Shugart, J.L.Worcester - Phys.Rev. 105, 1928 (1957)
Odd-Odd Isotope Having Zero Spin
57Ka07 D.Kaplan, E.L.Hahn - Bull.Am.Phys.Soc. 2, No.8, 384 K10 (1957)
Double Resonance Detection of $K^{39,41}$ Quadrupole Interactions in $KClO_3$
57Ka27 R.A.Kamper, K.R.Lea, C.D.Lustig - Proc.Phys.Soc.(London) 70B, 897 (1957)
Hyperfine Structure and Nuclear Electric Quadrupole Moment of ^{17}O
57Ke13 R.W.Kedzie, M.Abraham, C.D.Jeffries - Phys.Rev. 108, 54 (1957)
Paramagnetic Resonance Hyperfine Structure of Ce^{141} and Nd^{147}
57Ki20 F.Kirchner, W.Wilhelmy - Nuovo cimento 6, Suppl.1, 246 (1957)
Eine Neubestimmung des Gyromagnetischen Verhaltnisses des Protons
57Kl31 M.P.Klein, B.E.Holder - Phys.Rev. 106, 837 (1957)
Determination of the Sign of the He^3 Nuclear Magnetic Moment
57Kr51 K.Krebs, R.Winkler - Ann.Physik 20, 60 (1957)
Die Hyperfeinstruktur des Grundzustandes des Europiums
57Kr52 V.E.Krohn, T.B.Novey, S.Raboy - Phys.Rev. 105, 234 (1957)
Attenuation of Am^{241} α-γ Angular Correlation in Liquid Film Sources
57La08 J.T.LaTourrette, W.E.Quinn, N.F.Ramsey - Phys.Rev. 107, 1202 (1957)
Magnetic Moment of Ne^{21}
57Lo50 W.Low - Phys.Rev. 105, 801 (1957)
Paramagnetic Resonance and Optical Absorption Spectra of Cr^{3+} in MgO
57Ma19 A.A.Manenkov, A.M.Prokhorov, P.S.Trukhliaev, G.N.Iakovlev - Doklady Akad.Nauk SSSR 112, 623 (1957); Soviet Phys.Doklady 2, 64 (1957)
Paramagnetic Resonance Hyperfine Structure Nuclear Spin and the Magnetic Moment of the 5.3-Year Radioactive Isotope Eu^{152}

57Ma24 L.L.Marino, W.B.Ewbank, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Bull.Am.Phys.Soc. 2, No.8, 383, K4 (1957)
Nuclear Spin of Bi^{206}

57Ma55 A.A.Manenkov, A.A.Prokhorov - Zhur.Eksptl.i Teoret.Fiz. 33, 1116 (1957); Soviet Phys.JETP 6, 860 (1958)
A Determination of the Nuclear Moments of Gd^{155} and Gd^{157} from the Hyperfine Structure of Paramagnetic Resonance

57Mu96 K.Murakawa, T.Kamei - Phys.Rev. 105, 671 (1957)
Quadrupole Moments of Os^{189}, Ta^{181}, Lu^{175}, and La^{139}

57Ni09 W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Bull.Am.Phys.Soc. 2, No.4, 200 KA11 (1957)
Nuclear Spin of Cu^{61} (3.3 hr)

57Ni25 W.A.Nierenberg - Ann.Rev. Nuclear Sci. 7, 349 (1957)
The Measurement of the Nuclear Spins and Static Moments of Radioactive Isotopes

57Og11 S.Ogawa - J.Phys.Soc.Japan 12, 1105 (1957)
Nuclear Quadrupole Resonance of Antimony Isotopes in Solids

57Pr46 A.G.Prodell, P.Kusch - Phys.Rev. 106, 87 (1957)
Hyperfine Structure of Tritium in the Ground State

57Ri37 G.J.Ritter, G.W.Series - Proc.Roy.Soc.(London) 238A, 473 (1957)
Double Resonance Measurements of Hyperfine Structures in Potassium

57Ri42 M.Rice, R.V.Pound - Phys.Rev. 106, 953 (1957)
Ratio of the Magnetic Moments of In^{115} and In^{113}

57Sa07 J.H.Sanders - Nuovo cimento 6, Suppl.1, 242 (1957)
A Precise Measurement of the Magnetic Moment of the Proton

57Sc28 C.Schwartz - Phys.Rev. 105, 173 (1957)
Theory of Hyperfine Structure

57Se32 S.L.Segel, R.G.Barnes - Phys.Rev. 107, 638 (1957)
Nuclear Quadrupole Moment Ratio of Re^{185} and Re^{187}

57St11 H.H.Stroke, V.Jaccarino, D.S.Edmonds,Jr., R.Weiss - Phys.Rev. 105, 590 (1957)
Magnetic Moments and Hyperfine-Structure Anomalies of Cs^{133}, Cs^{134}, Cs^{135} and Cs^{137}

57St39 R.M.Sternheimer - Phys.Rev. 105, 158 (1957)
Effect of the Atomic Core on the Nuclear Quadrupole Coupling

57St93 M.J.Stevenson, C.H.Townes - Phys.Rev. 107, 635 (1957)
Quadrupole Moment of O^{17}

57Ti12 Y.Ting, H.Lew - Phys.Rev. 105, 581 (1957)
Hyperfine Structure of Cu^{63} and Cu^{65}

57Ti30 Y.Ting - Phys.Rev. 108, 295 (1957)
Hyperfine Structure and Quadrupole Moment of Lanthanum-139

57We13 J.E.Wertz, P.Auzins, R.A.Weeks, R.H.Silsbee - Phys.Rev. 107, 1535 (1957)
Electron Spin Resonances of F Centers in Magnesium Oxide; Confirmation of the Spin of Magnesium-25

57We17 M.M.Weiss, R.I.Walter, O.R.Gilliam, V.W.Cohen - Bull.Am.Phys.Soc. 2, No.1, 31, JA9 (1957); Oral Report
Paramagnetic Resonance Spectrum of V^{49}

57Wo35 J.L.Worcester, W.A.Nierenberg, R.Marrus, J.C.Hubbs - Bull.Am.Phys.Soc. 2, No.8, 383, K2 (1957)
New Upper Limit for the Magnetic Moment of Gallium-66

57Wo46 G.K.Woodgate, J.S.Martin - Proc.Phys.Soc.(London) 70A, 485 (1957)
Hyperfine Structure in Manganese ^{55}Mn

58Ab18 M.Abraham, C.D.Jeffries, R.W.Kedzie, J.C.Wallmann - Phys.Rev. 112, 553 (1958); Corrects Data in 57Ab07
Re-Examination of the Paramagnetic Resonance of Np^{239}

58Al92 R.G.Albridge, J.C.Hubbs, R.Marrus - Phys.Rev. 111, 1137 (1958)
The Spin of Neptunium-238

58Ar06 M.Arditi, T.R.Carver - Phys.Rev. 109, 1012 (1958)
Optical Detection of Zero-Field Hyperfine Splitting of Na^{23}

58Ba35 J.M.Baker, B.Bleaney - Proc.Roy.Soc.(London) 245A, 156 (1958); See Also 55Ba04 (Ho), 55Ba08 (Pr)
Paramagnetic Resonance in Some Lanthanon Ethyl Sulphates

58Be85 V.B.Belyanin - Optika i Spektroskopia 5, 340 (1958); Chem.Abstr. 53, 12842g (1959)
Magnetic Moment of Holmium

58Be99 P.L.Bender, E.C.Beaty, A.R.Chi - Phys.Rev.Letters 1, 311 (1958)
Optical Detection of Narrow Rb^{87} Hyperfine Absorption Lines

58Bl58 N.Bloembergen, P.P.Sorokin - Phys.Rev. 110, 865 (1959)
Nuclear Magnetic Resonance in the Cesium Halides

58Bl59 J.Blaise - Ann.phys. 3, 1019 (1958)
Recherches sur le Deplacement Isotopique dans les Spectres Atomiques des Elements Lourdes

58Br87 W.Brouwer, H.E.Petch - Can.J.Phys. 36, 632 (1958)
58Bu05 H.Bucka - Z.Physik 151, 328 (1958)
Doppelresonanz durch Anregung mit Hyperfeinstrukturkomponenten und Nachweis durch Selbstabsorption
58Co68 E.D.Commins, P.Kusch - Phys.Rev.Letters 1, 208 (1958)
Upper Limit to the Magnetic Moment of He^6
58Da12 J.M.Daniels, J.L.G.Lemarche, M.A.R.LeBlanc - Can.J.Phys. 36, 997 (1958)
Nuclear Orientation Experiments with Pr^{142} and Yb^{175} Nuclei
58Da20 T.P.Das, E.L.Hahn - Solid State Physics, Suppl. 1, Academic Press, Inc. New York, N.Y. (1958)
Nuclear Quadrupole Resonance Spectroscopy
58Da21 J.W.T.Dabbs, L.D.Roberts, G.W.Parker - Physica 24, S69(1958)
Alpha-Particle and Fission Anisotropies from Oriented Actinide Nuclei
58Dr05 R.L.Driscoll, P.L.Bender - Phys.Rev. Letters 1, 413 (1958)
Proton Gyromagnetic Ratio
58Ei03 J.Eisinger, G.Feher - Phys.Rev. 109, 1172 (1958)
Hfs Anomaly of Sb^{121} and Sb^{123} Determined by the Electron Nuclear Double Resonance Technique
58Ew84 W.B.Ewbank, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Phys.Rev. 110, 595 (1958)
Spins of Silver-105, Silver-106, and Silver-110m
58Ew85 W.B.Ewbank, L.L.Marino, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Bull.Am.Phys.Soc. 3, No.7, 370 M2 (1958)
Nuclear Spin of Silver-103
58Fl39 P.C.Fletcher, E.Amble - Phys.Rev. 110, 536 (1958)
Spin and Quadrupole Moment of I^{125} and the Magnetic Moment of I^{131}
58Ga16 H.L.Garvin, T.M.Green, E.Lipworth, W.A.Nierenberg - Phys.Rev.Letters 1, 74 (1958)
Nuclear Spin of Astatine-211
58Ga18 H.L.Garvin, T.M.Green, E.Lipworth - Phys.Rev. 111, 534 (1958)
Spins of Some Radioactive Iodine Isotopes
58Ga20 H.L.Garvin, T.M.Green, E.Lipworth - Phys.Rev.Letters 1, 292 (1958)
Nuclear Spin of 12.6-Hour Iodine-130
58Go72 G.Goldring, R.P.Scharenberg - Phys.Rev. 110, 701 (1958)
Gyromagnetic Ratio of 2^+ Rotational States
58Gr65 G.M.Grosof, P.Buck, W.Lichten, I.I.Rabi - Phys.Rev.Letters 1, 214 (1958)
Quadrupole Moment of Ne^{21}
58Gr92 M.A.Grace, C.E.Johnson, R.G.Scurlock, R.T.Taylor - Phil.Mag. 3, 456 (1958)
Nuclear Orientation of Praseodymium 142
58Hu11 J.C.Hubbs, R.Marrus - Phys.Rev. 110, 287 (1958)
Hyperfine Structure Measurements on Neptunium-239
58Hu14 J.C.Hubbs, R.Marrus, J.L.Worcester - Phys.Rev. 110, 534 (1958)
Nuclear Spin of Gallium-68
58Hu15 J.C.Hubbs, J.Winocur - Bull.Am.Phys.Soc. 3, No.5, 319, E8 (1958)
Hyperfine-Structure Investigations of Protactinium-233
58Hu17 C.A.Hutchison,Jr., E.Wong - J.Chem.Phys. 29, 754 (1958)
58Hu70 J.C.Hubbs, R.Marrus, W.A.Nierenberg, J.L.Worcester - Phys.Rev. 109, 390 (1958)
Hyperfine Structure Measurements on Plutonium-239
58Ke25 F.M.Kelly - Handbuch der Physik 38/1, S.Flugge, Ed., Springer Verlag, Gottingen, p.59 (1958)
Determination of Nuclear Spins and Magnetic Moments by Atomic Spectroscopy
58Ko90 H.Kopfermann - Nuclear Moments, English Version Prepared from the Second German Edition by E.E.Schneider, Academic Press,Inc., New York, N.Y. (1958)
58Kr69 H.Kruger, K.Scheffler - J.phys.radium 19, 854 (1958)
Experiences de Double Resonance dans l'Etat Excite 4 $^2P_{3/2}$ de l'Atome ^{23}Na
58Ku77 A.G.Kucheriaev, I.K.Szhenov, S.M.Gogichaishvili, I.N.Leonteva, L.V.Vasilev - Zhur.Eksptl.i Teoret.Fiz. 34, 774 (1958); Soviet Phys. JETP 7, 533 (1958)
Nuclear Magnetic Moments of Sr^{87} and Mg^{25}
58La04 G.Laukien - Handbuch der Physik 38/1, S.Flugge, Ed., Springer Verlag, Gottingen, p.120 (1958)
Kernmagnetische Hochfrequency-Skeptroskopie
58Li45 I.Lindgren, C.M.Johansson, S.Axensten - Phys.Rev.Letters 1, 473 (1958)
Nuclear Ground-State Spins of Thallium-198 and -201
58Lo62 W.Low, P.M.Llewellyn - Phys.Rev. 110, 842 (1958)
Hyperfine Structure of Technetium-99 from Paramagnetic Resonance
58Lu64 G.W.Ludwig, H.H.Woodbury, R.O.Carlson - Phys.Rev.Letters 1, 295 (1958)
Spin of Fe^{57}
58Ma18 W.Markowitz, R.Glenn Hall, L.Essen, J.V.L.Parry - Phys.Rev.Letters 1, 105 (1958); See Also 57Es32
Frequency of Cesium in Terms of Ephemeris Time

58Ma20 I.Mannari, T.Arai - J.Chem.Phys. 28, 28 (1958)
58Ma21 L.L.Marino, G.O.Brink, W.B.Ewbank, H.A.Shugart, H.B.Silsbee - Bull.Am.Phys.Soc. 3, No.3, 186 J6 (1958)
Nuclear Spins of Tl^{200} and Tl^{201}
58Ma35 L.L.Marino, W.B.Ewbank, H.A.Shugart, H.B.Silsbee - Bull.Am.Phys.Soc. 3, No.5, 319 E10 (1958)
Nuclear Spin of Tl^{202}
58Ma43 L.L.Marino, W.B.Ewbank, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Phys.Rev. 111, 286 (1958)
Spins of Indium-109, Indium-110m and Indium-111
58Mu04 K.Murakawa - J.Phys.Soc.Japan 13, 101 (1958)
Quadrupole Moment of Nb^{93} and Test of the Hyperfine Structure Formulas
58Mu08 K.Murakawa - Phys.Rev. 110, 393 (1958)
Quadrupole Moments of As^{75}, La^{139}, and Hg^{201}
58Mu10 K.Murakawa - J.Phys.Soc.Japan 13, 484 (1958)
The Arc Spectrum of Iodine and the Quadrupole Moment of I^{127}
58Ni27 W.A.Nierenberg, H.A.Shugart, H.B.Silsbee, R.J.Sunderland - Phys.Rev. 112, 186 (1958)
Hyperfine-Structure Separations and Magnetic Moments of Cs^{127}, Cs^{129}, Cs^{130}, and Cs^{132}
58No39 R.Novick, E.D.Commins - Phys.Rev. 111, 822 (1958)
Hyperfine Structure of the Metastable State of Singly Ionized Helium-3
58Pa11 J.G.Park - Proc.Roy.Soc.(London) 245A, 118 (1958)
The Magnetic Dipole and Electric Quadrupole Moments of Dysprosium 161 and 163
58Pi43 F.M.Pipkin, J.W.Culvahouse - Phys.Rev. 109, 1423 (1958)
Radio-Frequency Orientation of As^{76}
58Pi45 F.M.Pipkin - Phys.Rev. 112, 935 (1958)
Radio-Frequency Orientation of Sb^{122}
58Pi48 L.H.Piette, H.E.Weaver - J.Chem.Phys. 28, 735 (1958)
NMR Chemical Shifts of Pb^{207} in a Few Compounds
58Qu02 W.E.Quinn, J.M.Baker, J.T.LaTourrette, N.F.Ramsey - Phys.Rev. 112, 1929 (1958)
Radio-Frequency Spectra of Hydrogen Deuteride in Strong Magnetic Fields
58Ra16 S.Raboy, V.E.Krohn - Phys.Rev. 111, 579 (1958)
Gyromagnetic Ratio of the 3.5 X 10^{-9} sec State and Other Angular Correlation Measurements of Tc^{99}
58Re10 J.B.Reynolds, R.L.Christensen, D.R.Hamilton, W.M.Hooke, H.H.Stroke - Phys.Rev. 109, 465 (1958)
Spins of Certain Short-Lived Cu and Ag Isotopes
58Ro54 H.R.Rottmann - Z.Physik 153, 158 (1958)
Das Kernquadrupolmoment des Mn^{55}
58Sa40 P.L.Sagalyn, A.C.Melissinos, F.Bitter - Phys.Rev. 109, 375 (1958)
Separation and Identification of Overlapping Hyperfine Structure Components: Application to Mercury Resonance Radiation
58St34 A.Steudel - Z.Physik 152, 599 (1958)
Uber die Hyperfeinstruktur im Spektrum des Lutetiums und die Kernmomente von Lu^{175} und Lu^{176}
58Su55 K.Sugimoto - J.Phys.Soc.Japan 13, 240 (1958)
Magnetic Moment of the First Excited State of Sm^{152}
58To34 C.H.Townes - Handbuch der Physik 38/1 S.Flugge, Ed., Springer Verlag, Gottingen, p.377 (1958)
Determination of Nuclear Quadrupole Moments
58Wi44 J.Winocur, R.Marrus, J.C.Hubbs, A.Cabezas - Bull.Am.Phys.Soc. 3, No.8, 415 L6 (1958)
Hyperfine-Structure Splitting of Thallium-204
58Wo52 H.H.Woodbury, G.W.Ludwig - Phys.Rev.Letters 1, 16 (1958)
Spin of Ni^{61}
59An34 L.W.Anderson, F.M.Pipkin, J.C.Baird,Jr. - Phys.Rev. 116, 87 (1959)
N^{14}-N^{15} Hyperfine Anomaly
59Ax98 S.Axensten, C.M.Johansson, I.Lindgren - Arkiv Fysik 15, 463 (1959)
Nuclear Spins of the Bismuth Isotopes Bi^{199}, Bi^{200}, Bi^{201}, and Bi^{202}
59Ba08 F.Bayer-Helms - Z.Physik 154, 175 (1959)
Hyperfeinstruktur von ^{83}Kr
59Bo43 E.Bodenstedt, E.Matthias, H.J.Korner - Z.Physik 153, 423 (1959)
Das magnetische Momente des 181 keV-Niveaus von Technetium 99
59Bo56 E.Bodenstedt, H.J.Korner, E.Matthias - Nuclear Phys. 11, 584 (1959)
Angular Correlation Measurements on Cs^{133} and the Magnetic Moment of the 81 keV-Level
59Br23 G.Breit, R.L.Gluckstern - Handbuch der Physik 41/1, S.Flugge, Ed., Springer-Verlag, Gottingen, p.496 (1959)
Coulomb Excitation

59Bu18 G.Burns - Phys.Rev. 115, 357 (1959)
Antishielding and Polarizabilities in Alkali Halide Gases
59Bu93 H.Bucka, H.Kopfermann, E.W.Otten - Ann.Physik 4, 39 (1959)
Bestimmung der Kernquadrupolmomente der radioaktiven Isotopes Cs^{135} und Cs^{137}
59Ch24 W.J.Childs, L.S.Goodman, L.J.Kieffer - Bull.Am.Phys.Soc. 4, No.3, 151 H6 (1959)
Nuclear Spin of Cr^{51}
59Ch34 H.Chantrel - Ann.phys. 4, 965 (1959)
59Co52 V.W.Cohen, J.Schwartz, R.Novick - Phys.Rev.Letters 2, 305 (1959)
Nuclear Magnetic Moment and Spin of Europium-152m
59Co68 D.Connor - Phys.Rev.Letters 3, 429 (1959)
Measurement of the Nuclear g Factor of Li^8
59Co83 V.W.Cohen - Recent Research in Molecular Beams, I.Estermann, Ed., Academic Press, Inc., New York, N.Y., p.121 (1959)
Comparison of Methods for the Determination of Nuclear Spins as Applied to Radioactive Nuclei
59Co92 F.D.Colegrove, P.A.Franken, R.R.Lewis, R.H.Sands - Phys.Rev.Letters 3, 420 (1959)
Novel Method of Spectroscopy with Applications to Precision Fine Structure Measurements
59Du80 W.Duffy,Jr. - Phys.Rev. 115, 1012 (1959)
Magnetic Moment of the Triton in Units of the Magnetic Moment of the Proton
59Ew88 W.B.Ewbank - Thesis, Univ.California (1959); UCRL-8756 (1959)
The Nuclear Spins and Magnetic Moments of Certain Gold and Silver Isotopes
59Ew89 W.B.Ewbank, L.L.Marino, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Phys.Rev. 115, 614 (1959)
Nuclear Spins of Silver-104 and Silver-106
59Fa10 P.G.Favero, A.M.Mirri, W.Gordy - Phys.Rev. 114, 1534 (1959)
Millimeter-Wave Rotational Spectrum of NO in the $^2\pi_{3/2}$ State
59Fl39 C.P.Flynn, E.F.W.Seymour - Proc.Phys.Soc.(London) 73, 945 (1959)
Nuclear Magnetic Resonance in Bismuth
59Fr53 G.Fricke, H.Kopfermann, S.Penselin, K.Schlupmann - Z.Physik 156, 416 (1959)
Bestimmung der Hyperfeinstrukturaufspaltungen der Scandium-Grundzustande $^2D_{3/2}$ und $^2D_{5/2}$ und des Quadrupolmomentes des Sc^{45}-Kernes
59Fr58 G.Fricke, H.Kopfermann, S.Penselin - Z.Physik 154, 218 (1959); See Also 57Eh40
59Ga12 H.L.Garvin, T.M.Green, E.Lipworth, W.A.Nierenberg - Phys.Rev. 116, 393 (1959)
Hyperfine Structure and Nuclear Moments of Bromine-82
59Gr92 T.M.Green, H.Garvin, E.Lipworth, K.Smith - Bull.Am.Phys.Soc. 4, No.4, 250 K6 (1959)
Nuclear Spin of Br^{77}
59Ha32 W.A.Hardy, E.M.Purcell - Quoted by 65Co20
59Hu15 J.C.Hubbs, R.Marrus, J.O.Winocur - Phys.Rev. 114, 586 (1959)
Zeeman Investigations of Curium-242
59Ka10 N.I.Kaliteevskii, M.P.Chaika, I.Kh.Pacheva, E.E.Fradkin - Zhur.Eksptl. i Teoret.Fiz. 37, 882 (1959); Soviet Phys.JETP 10, 629 (1960)
Nuclear Moments of Odd Gadolinium Isotopes
59Ka97 N.I.Kaliteevskii, M.P.Chaika - Vestnik Leningrad Univ. 14, No.16, Ser.Fiz.i Khim. No.3, 51 (1959); Nucl.Sci.Abstr. 15, 287, Abstr.2217 (1961)
Lu^{176} Spin Determination by Photoelectric Measurements
59Kl39 M.P.Klein, J.S.Waugh - Phys.Rev. 116, 960 (1959)
Cd^{111}-Cd^{113} Nuclear Moment Ratio and Hyperfine Anomaly
59Ku82 A.G.Kucheryaev, Yu.K.Szhenov, Sh.M.Gogichaishvili - Zhur.Eksptl.i Teoret.Fiz. 37, 582 (1959); Soviet Phys.JETP 10, 412 (1960); See Also 58Ku77 (Sr^{87})
59Ku94 P.Kusch, V.W.Hughes - Handbuch der Physik 37/1, S.Flugge, Ed., Springer Verlag, Gottingen, p.1 (1959)
Atomic and Molecular Beam Spectroscopy
59La15 E.B.D.Lambe - Thesis, Princeton University (1959); Dissertation Abstr. 21, 2330 (1961)
A Measurement of the g-Value of the Electron in the Ground State of the Hydrogen Atom
59Li41 E.Lipworth, H.L.Garvin, T.M.Green - Bull.Am.Phys.Soc. 4, No.1, 11 CA4 (1959)
Nuclear Spins of $Br^{80}m$ and Br^{80}
59Li50 I.Lindgren, C.M.Johansson - Arkiv Fysik 15, 445 (1959)
Nuclear Magnetic Dipole and Electric Quadrupole Moments of Radioactive Bismuth Isotopes
59Li54 S.Liebes,Jr., P.Franken - Phys.Rev. 116, 633 (1959)
Magnetic Moment of the Proton in Units of the Bohr Magneton; the Magnetic Moment of the Electron

59Lo63 W.Low, D.Shaltiel - Phys.Rev. 115, 424 (1959)
Ratios of Relative Abundance, Magnetic Moments, and Capture Cross Sections of Gadolinium Isotopes from Paramagnetic Resonance Spectrum
59Ma19 L.L.Marino - Thesis, Univ.California (1959); UCRL-8721; See Also 58Ma43
Some Nuclear Properties of Bi^{206}, Tl^{200}, Tl^{201}, Tl^{202}, In^{109}, $In^{110}m$, and In^{111}
59Mc70 M.N.McDermott, G.Gould - Unpublished Data, Quoted by 59Ku94
59Me81 A.C.Melissinos - Phys.Rev. 115, 126 (1959)
Determination of the Dipole Moment and Isotope Shift of Radioactive Hg^{197} by 'Double Resonance'
59Me82 A.C.Melissinos, S.P.Davis - Phys.Rev. 115, 130 (1959)
Dipole and Quadrupole Moments of the Isomeric Hg^{197}* Nucleus; Isomeric Isotope Shift
59Or36 J.W.Orton - Repts.Progr. In Phys. 22, 204 (1959)
59Pe26 F.R.Petersen, V.J.Ehlers, W.B.Ewbank, L.L.Marino, H.A.Shugart - Phys.Rev. 116, 734 (1959)
Nuclear Spin, Hyperfine-Structure Separation, and Magnetic Moment of 22-Hour Potassium-43
59Pe33 J.C.Pebay-Peyroula - J.phys.radium 20, 721 (1959)
Resonance Magnetique de Niveaux Atomiques Excites par Bombardement Electronique
59Po62 H.Postma, A.R.Miedema, M.C.Eversdijk Smulders - Physica 25, 671 (1959)
Angular Distribution and Linear Polarization of Gamma Rays from Aligned ^{166}m-Ho Nuclei
59Ro45 J.M.Rocard, M.Bloom, L.B.Robinson - Can.J.Phys. 37, 522 (1959)
Nuclear Magnetic Resonance in Lead-Containing Compounds
59Sh63 J.E.Sherwood, S.J.Ovenshine - Phys.Rev. 114, 858 (1959)
Nuclear Spins of I^{128} and I^{130}
59Sh64 J.E.Sherwood, S.J.Ovenshine, G.W.Parker - Bull.Am.Phys.Soc. 4, No.6, 386, B10 (1959)
Nuclear Spin of I^{132}
59St46 H.Stroke - Priv.Comm. (December 28, 1959)
59Wh56 J.White, C.Drake, V.W.Hughes - Unpublished Data, Quoted by 59Ku94
60Al01 S.S.Alpert, E.Lipworth, M.B.White - Bull.Am.Phys.Soc. 5, No.4, 273, R3 (1960)
Nuclear Moments of I^{133}
60Al23 K.Alder, A.Winther - Kgl.Danske Videnskab.Selskab, Mat.-fys.Medd. 32, No.8 (1960)
On the Theory of Multiple Coulomb Excitation with Heavy Ions
60An13 L.W.Anderson, F.M.Pipkin, J.C.Baird,Jr. - Phys.Rev. 120, 1279 (1960)
Hyperfine Structure of Hydrogen, Deuterium, and Tritium
60Ar09 Y.Archambault, J.P.Descoubes, M.Priou, A.Omont, J.C.Pebay-Peyroula - J.phys.radium 21, 677 (1960)
Etude par Bombardement Electronique de la Duree de Vie et de la Structure Hyperfine des Niveau D du Sodium et du Cesium
60Ba06 R.W.Bauer, M.Deutsch - Phys.Rev. 117, 519 (1960)
Nuclear Orientation of Mn^{56}
60Ba20 R.W.Bauer, M.Deutsch - Nuclear Phys. 16, 264 (1960)
Nuclear Polarization of Co^{55}
60Ba42 R.W.Bauer, M.Deutsch, G.S.Mutchler, D.G.Simons - Phys.Rev. 120, 946 (1960)
Nuclear Orientation of Mn^{54} and Mn^{52}m
60Be12 R.Bersohn - Phys.Rev.Letters 4, 609 (1960)
Quadrupole Moment of Fe^{57}m
60Be23 L.H.Bennett, J.I.Budnick - Phys.Rev. 120, 1812 (1960)
Magnetic Resonance Determination of the Nuclear Moment of Tantalum-181 in $KTaO_3$
60Be34 R.E.Bernheim, H.Gutowsky - J.Chem.Phys. 32, 1072 (1960)
60Bl15 A.L.Bloom, J.B.Carr - Phys.Rev. 119, 1946 (1960)
Pressure Shifts in the Hyperfine Structure Constant of Potassium
60Bo17 E.Bodenstedt, H.J.Korner, F.Frisius, D.Hovestadt, E.Gerdau - Z.Physik 160, 33 (1960)
Der g-Faktor des 93 keV-Niveaus und andere Winkelkorrelationsmessungen an Pm^{147}
60Bu13 A.Bussiere de Nercy, M.Langevin, M.Spighel - J.phys.radium 21, 288 (1960)
Absorption Resonnante du Rayonnement γ Sans Recul du Noyau de ^{166}Ho et ^{190}Os
60Ca03 A.Cabezas, I.Lindgren, E.Lipworth, R.Marrus, M.Rubinstein - Nuclear Phys. 20, 509 (1960)
Nuclear Spins of Neodymium-147 and Promethium-147
60Ca05 A.Cabezas, E.Lipworth, R.Marrus, J.Winocur - Phys.Rev. 118, 233 (1960)
Nuclear Spin of Samarium-153

60Ca15 A.Y.Cabezas, I.Lindgren - Phys.Rev. 120, 920 (1960)
Atomic Beam Study of the Hyperfine Structure of Thulium-170
60Ch08 W.J.Childs, L.S.Goodman - Phys.Rev. 118, 1578 (1960)
Nuclear Spin and Hyperfine Interaction of In^{113m}
60Ch09 R.J.Champeau, S.Gerstenkorn - Compt.rend. 251, 352 (1960)
60Ch13 W.J.Childs, L.S.Goodman, L.J.Kieffer - Phys.Rev. 120, 2138 (1960)
Nuclear Spin and Moments of 14-hr Ga^{72}
60Ch15 C.J.S.Chapman, M.A.Grace, J.M.Gregory, C.V.Sowter - Proc.Roy.Soc.(London) 259A, 377 (1960)
The Nuclear Alinement of Promethium Isotopes and the Decay Scheme of ^{149}Pm
60De16 P.Debrunner, W.Kundig - Helv.Phys.Acta 33, 395 (1960)
γ-γ-Korrelationsmessung an ^{152}Sm, ^{152}Gd und ^{154}Gd: Spinzuordnung, Mischungsverhaltnis und g-Faktor
60Do01 J.N.Dodd, R.W.N.Kinnear - Proc.Phys.Soc.(London) 75, 51 (1960)
The Hyperfine Structure of the $3^2P_{3/2}$ State of Sodium and the Quadrupole Moment of ^{23}Na
60Ew06 W.B.Ewbank, L.L.Marino, W.A.Nierenberg, H.A.Shugart, H.B.Silsbee - Phys.Rev. 120, 1406 (1960)
Nuclear Spins of Six Neutron-Deficient Gold Isotopes
60Fa08 W.Faust, M.McDermott, W.Lichten - Phys.Rev. 120, 469 (1960)
Hyperfine Structure of the Metastable $^3P_2$ State of Cd^{111} and Cd^{113}
60Fe07 P.C.B.Fernando, G.K.Rochester, I.J.Spalding, K.F.Smith - Phil.Mag. 5, 1291 (1960)
The Hyperfine Structure of ^{121}Sb and ^{123}Sb
60Fe08 P.C.B.Fernando, G.K.Rochester, K.F.Smith - Phil.Mag. 5, 1309 (1960)
The Spin of ^{124}Sb and the Spin and Moments of ^{122}Sb
60Fl03 C.P.Flynn, E.F.W.Seymour - Proc.Phys.Soc.(London) 76, 301 (1960)
Knight Shift of the Nuclear Magnetic Resonance in Liquid Indium
60Ga12 H.L.Garvin, E.Lipworth - Nuclear Phys. 19, 140 (1960)
The Nuclear Spins of I^{126}, I^{132}, I^{133}, and I^{135}
60Ha05 S.S.Hanna, J.Heberle, C.Littlejohn, G.J.Perlow, R.S.Preston, D.H.Vincent - Phys.Rev.Letters 4, 177 (1960)
Polarized Spectra and Hyperfine Structure in Fe^{57}
60Ha33 S.S.Hanna, L.Meyer-Schutzmeister, R.S.Preston, D.H.Vincent - Phys.Rev. 120, 2211 (1960)
Nuclear Zeeman Effect in Sn^{119}
60He17 C.F.Hempstead, K.D.Bowers - Phys.Rev. 118, 131 (1960)
Paramagnetic Resonance of Impurities in $CaWO_4$. I. Two S-State Ions
60Hu14 C.A.Hutchison,Jr., B.Weinstock - J.Chem.Phys. 32, 56 (1960)
Paramagnetic Resonance Absorption in Neptunium Hexafluoride
60Jo12 C.E.Johnson, J.F.Schooley, D.A.Shirley - Phys.Rev. 120, 2108 (1960)
Nuclear Orientation of Tb^{160}
60Ka24 N.I.Kaliteevskii, E.E.Fradkin, M.P.Chaika - Zhur.Eksptl.i Teoret.Fiz. 39, 954 (1960); Soviet Phys.JETP 12, 661 (1961)
60Ki03 O.C.Kistner, A.W.Sunyar - Phys.Rev.Letters 4, 412 (1960)
Evidence for Quadrupole Interaction of $Fe^{57}m$, and Influence of Chemical Binding on Nuclear Gamma-Ray Energy
60Kl02 P.F.A.Klinkenberg, F.S.Tomkins - Physica 26, 103 (1960)
Optical Hyperfine Structure and Nuclear Moments of Promethium 147
60Ko20 H.Kopfermann - Sitzber.Heidelberg.Akad.Wiss.Math.Naturw.Kl. p.69 (1960)
60Kr07 K.Krebs, R.Winkler - Z.Physik 160, 320 (1960)
Zur Hyperfeinstruktur des Eu-II
60Kr08 K.Krebs, R.Winkler - Naturwissenschaften 47, 490 (1960)
Zum Quadrupolmoment des Europiums
60Ky01 R.-T.Kyi - Thesis, Univ.California (1960); UCRL-9109 (1960)
Paramagnetic Resonance of Tetravalent Pa^{231}
60Le05 H.Lew, R.S.Title - Can.J.Phys. 38, 868 (1960)
60Li10 C.C.Lin - Phys.Rev. 119, 1027 (1960); Calculated Using Data of 56Ga77 and 59Fa10
Hyperfine Structure of the Microwave Spectra of the NO Molecule and the Nuclear Quadrupole Moment of Nitrogen
60Li11 E.Lipworth, T.M.Green, H.L.Garvin, W.A.Nierenberg - Phys.Rev. 119, 1053 (1960)
The Hyperfine Structure and Nuclear Moments of 17-hr Bromine-76
60Li13 E.Lipworth, H.L.Garvin, T.M.Green - Phys.Rev. 119, 2022 (1960)
Atomic-Beam Measurement of the Hyperfine Structure and Nuclear Moments Of Iodine-131
60Lo01 W.Low - Phys.Rev. 118, 1608 (1960)
Paramagnetic and Optical Spectra of Ytterbium in the Cubic Field of Calcium Fluoride

60Lo05 W.Low - Solid State Physics, Suppl.2, Academic Press, Inc., New York,N.Y., (1960)
Paramagnetic Resonance in Solids
60Lu02 G.W.Ludwig, H.H.Woodbury - Phys.Rev. 117, 1286 (1960)
60Lu06 A.Lurio, G.Weinreich, C.W.Drake, V.W.Hughes, J.A.White - Phys.Rev. 120, 153 (1960)
Atomic g(J) Values for Neon and Argon in their Metastable $^3P_2$ States; Evidence for Zero Spin of Ne^{20}
60Ma03 G.Manning, J.D.Rogers - Nuclear Phys. 15, 166 (1960); J.D.Rogers - Priv.Comm. (April 1972)
Measurement of g-Factors of Several Short Lived Nuclear States in Odd-Mass Nuclei
60Ma30 R.Marrus, W.A.Nierenberg, J.Winocur - Phys.Rev. 120, 1429 (1960)
Hyperfine Structure of Americium-241
60Ma38 G.Manning, J.Rogers - Nuclear Phys. 19, 675 (1960)
Measurement of the Rotational g-Factor (g(R)) for Several Nuclei
60Mc11 M.N.McDermott, W.L.Lichten - Phys.Rev. 119, 134 (1960)
Hyperfine Structure of the 6^3P_2 State of Hg^{199} and Hg^{201}. Properties of Metastable States of Mercury
60Mu11 K.Murakawa - J.Phys.Soc.Japan 15, 2306 (1960)
Hyperfine Structure of the Spectra of Pr I and Pr II
60Od02 A.I.Odintsov - Optika i Spektroskopiya 9, 142 (1960); Opt.Spectry.USSR(English Transl.) 9, 75 (1960)
Hyperfine Structure and Isotopic Shift in the Spectrum of Tl I
60Or01 J.W.Orton, P.Auzins, J.E.Wertz - Phys.Rev. 119, 1691 (1960)
Estimate of the Nuclear Moment of Ni^{61} from Electron Spin Resonance
60Pe09 F.R.Petersen, H.A.Shugart - Bull.Am.Phys.Soc. 5, No.5, 343, D7 (1960)
The Nuclear Spin of Lanthanum-140
60Po09 M.Pomerantz, T.P.Das - Phys.Rev. 119, 70 (1960)
Theory of Nuclear Quadrupole Interaction in Beryllium Metal
60Ra27 D.H.Rank, G.Skorinko, D.P.Eastman, G.D.Saksena, T.K.McCubbin,Jr., T.A.Wiggins - J.Opt.Soc.Am. 50, 1045 (1960)
Hyperfine Structure of Some Hg I Lines
60Ro27 L.D.Roberts, F.J.Walter, J.W.T.Dabbs, G.W.Parker, J.O.Thomson - Proc.Intern.Conf.Nucl.Struct., Kingston, Canada, D.A.Bromley, E.W.Vogt, Eds., Univ.Toronto Press, p.884 (1960)
Fission Fragments from Oriented U^{233} and U^{235}
60Sa23 P.G.H.Sandars, G.K.Woodgate - Proc.Roy.Soc.(London) 257A, 269 (1960)
Hyperfine Structure in the Ground State of the Stable Isotopes of Europium
60Sc17 D.S.Schonland - Proc.Roy.Soc.(London) 254A, 111 (1960)
60Ti01 R.S.Title, K.F.Smith - Phil.Mag. 5, 1281 (1960)
The Hyperfine Structure of ^{209}Bi
60Wo02 H.H.Woodbury, G.W.Ludwig - Phys.Rev. 117, 1287 (1960)
Magnetic Moment of Au^{197}
61Ab01 A.Abragam, F.Boutron - Compt.rend. 252, 2404 (1961)
61Ab08 A.Abragam - The Principles of Nuclear Magnetism, Oxford University Press, Great Britain (1961)
61Ag03 I.I.Agarbiceanu, L.Blanaru, V.Draganescu, N.J.Ionesco-Pallas, N.Komanichu, V.Tatu - Optika i Spektroskopiya 10, 297 (1961); Opt.Spectry. USSR (English Transl.) 10, 151 (1961)
Determination of the Nuclear Magnetic Moment of the Isotope Hg^{199} from the Hyperfine Structure of the Line HgI 5461 A
61Al20 S.S.Alpert - Thesis, Univ.California (1961); UCRL-9850 (1961); See Also 60Al01 I^{133}
The Moments, Spins, and Hyperfine Structures of the Radioactive Isotopes: I^{133} (21-hr), Nd^{141} (2.5-hr), Eu^{152} (13-hr, and Bi^{210} (5-Day)
61Am02 O.Ames, A.M.Bernstein, M.H.Brennan, D.R.Hamilton - Phys.Rev. 123, 1793 (1961)
Magnetic Moments of 69-min Ag^{104} and 27-min $Ag^{104}m$
61An17 D.H.Anderson - J.Chem.Phys. 35, 1353 (1961)
61Au01 J.P.Auffray - Phys.Rev.Letters 6, 120 (1961); Calculated Q Using Data of 40Ke10 and 52Ko22
Deuteron Electric Quadrupole Moment
61Ax01 J.D.Axe, H.J.Stapleton, C.D.Jeffries - Phys.Rev. 121, 1630 (1961)
Paramagnetic Resonance Hyperfine Structure of Tetravalent Pa^{231} in Cs_2ZrCl_6
61Ax02 S.Axensten, C.M.Olsmats - Arkiv Fysik 19, 461 (1961)
Nuclear Spins of Neutron-Deficient Polonium Isotopes
61Ax04 S.Axensten, G.Liljegren, I.Lindgren - Arkiv Fysik 20, 473 (1961)
Nuclear Spin Measurements on Neutron-Deficient Tellurium Isotopes
61Ba49 R.Bauminger, S.G.Cohen, A.Marinov, S.Ofer - Phys.Rev.Letters 6, 467 (1961)
Hyperfine Interactions in the Ground State and First Excited State of Dy^{161} in Dysprosium Iron Garnet

61Bl07 J.Blaise, J.Bauche, S.Gerstenkorn, F.S.Tomkins - J.phys.radium 22, 417 (1961)
Spectroscopic Determination of the Spin of Lu^{176} and of the Nuclear Magnetic and Quadrupole Moment of Lu^{175} and Lu^{176}
61Bl08 W.E.Blumberg, J.Eisinger, M.P.Klein - Phys.Rev. 124, 206 (1961)
Isotope Effect in the Nuclear Magnetic Resonance in Rubidium
61Bo05 E.Bodenstedt, H.J.Korner, C.Gunther, J.Radeloff - Nuclear Phys. 22, 145 (1961)
The Gyromagnetic Ratio of the 80 keV Rotational State of Erbium 166
61Bo08 E.Bodenstedt, H.-J.Korner, G.Strube, C.Gunther, J.Radeloff, E.Gerdau - Z.Physik 163, 1 (1961)
Das gyromagnetische Verhaltnis des 137 keV Rotationsniveaus von Os^{186}
61Bo09 A.J.F.Boyle, D.St.P.Dunbury, C.Edwards - Proc.Phys.Soc.(London) 77, 1062 (1961)
The Nuclear Zeeman Effect, and Quadrupole Splitting in ^{119}Sn
61Bo11 H.S.Boyne, P.A.Franken - Phys.Rev. 123, 242 (1961)
Magnetic Moment of the Proton in Units of the Nuclear Magneton
61Bo25 E.Bodenstedt, H.J.Korner, E.Gerdau, J.Radeloff, G.Gunther, G.Strube - Z.Physik 165, 57 (1961)
Winkelkorrelationsmessungen an Hf^{180} und Bestimmung der g(R)-Factoren des 2^+- und des 4^+-Rotationsniveaus
61Br13 H.R.Brooker, P.J.Haigh, T.A.Scott - Phys.Rev. 123, 2143 (1961)
Nuclear Magnetic Moment Ratio and Linewidths of N^{14} and N^{15}
61Br16 N.Braslau, G.O.Brink, J.M.Khan - Phys.Rev. 123, 1801 (1961)
Rb^{85}-Rb^{86} Hyperfine-Structure Anomaly
61Br17 C.Brot - J.phys.radium 22, 412 (1961)
Mesure Directe de la Structure Hyperfine du Niveau 6 $^3P_1$ de l'Isomere Nucleaire $^{197}Hg^*$
61Bu02 H.Bucka, H.Kopfermann, A.Minor - Z.Physik 161, 123 (1961)
Prazisionsmessung der Hyperfeinstruktur des 6 $^2P_{3/2}$-Terms des Rb I-Spektrums
61Bu10 G.Burns - Phys.Rev. 124, 524 (1961)
Nuclear Quadrupole Moment of Fe^{57m}
61Ca07 A.Y.Cabezas, I.Lindgren, R.Marrus - Phys.Rev. 122, 1796 (1961)
Atomic-Beam Investigations of Electronic and Nuclear Ground States in the Rare Earth Region
61Ca20 H.Capptuller - Z.Instrumentenk. 69, 191 (1961); Phys.Abstr. 64, 1831, Abstr. 19191 (1961)
61Ca21 B.Cagnac - Ann.phys. 6, 467 (1961)
Orientation Nucleaire par Pumpage Optique des Isotopes Impaires du Mercure
61Ca22 T.R.Carver - Quoted by 61Bu02
61Ch05 W.J.Childs, L.S.Goodman, L.J.Kieffer - Phys.Rev. 122, 891 (1961)
Nuclear Spin and Magnetic Moment of 2.6-hr Mn^{56}
61Ch06 W.J.Childs, L.S.Goodman - Phys.Rev. 122, 591 (1961)
Nuclear Spin of Ho^{166}
61Ch10 R.L.Christensen, D.R.Hamilton, H.G.Bennewitz, J.B.Reynolds, H.H.Stroke - Phys.Rev. 122, 1302 (1961)
Spin and Hyperfine Structure of Arsenic-76
61Ch12 C.J.S.Chapman, J.M.Gregory, R.W.Hill, M.W.Johns - Proc.Roy.Soc.(London) 262A, 541 (1961)
Nuclear Alinement of Cobalt and the Decay of Cobalt-55
61De07 S.DeBenedetti, G.Lang, R.Ingalls - Phys.Rev.Letters 6, 60 (1961)
Electric Quadrupole Splitting and the Nuclear Volume Effect in the Ions of Fe^{57}
61Do10 J.N.Dodd, G.W.Series - Proc.Roy.Soc.(London) 263A, 353 (1961)
61Eh01 D.von Ehrenstein - Ann.Physik 7, 342 (1961)
Messung der Hyperfeinstrukturaufspaltung des $^4F_{9/2}$- Grundzustandes im Co^{59}-I-Spektrum und Bestimmung des Quadrupolmomentes des Co^{59}-Kernes
61Ei03 J.Eisinger, W.E.Blumberg, S.Geschwind - Bull.Am.Phys. 6, No.2, 117, E2 (1961)
Electron-Nuclear Interactions of Cu^{3+} in Sapphire
61Es03 L.Essen, E.G.Hope, D.Sutcliffe - Nature 189, 298 (1961)
61Fa05 W.L.Faust, M.N.McDermott - Phys.Rev. 123, 198 (1961)
Hyperfine Structure of the $(5p)^5(6s)$ $^3P_2$ State of Xe^{129} and Xe^{131}
61Fi01 W.Fischer - Z.Physik 161, 89 (1961); Addendum Z.Physik 162, 400 (1961)
Die Quadrupolmomente der Kupferisotope und die Hyperfeinstruktur der Ubergange $3d^9\ 4s^2\ m^2D$-$3d^{10}\ 4p\ ^2P$ im Kupfer I-Spektrum
61Fo11 W.N.Fox, G.W.Series - Proc.Phys.Soc.(London) 77, 1141 (1961)
Hyperfine Structure of the Level $5^2P_{1/2}$ of Potassium 39
61Fr07 R.M.Freeman - Nuclear Phys. 26, 446 (1961)
The Magnetic Moment of the Second Excited State of F^{19}

61Fr11 P.A.Franken - Phys.Rev. 121, 508 (1961)
Interference Effects in the Resonance Fluorescence of 'Crossed' Excited Atomic States
61Ga16 N.S.Garifyanov, E.I.Semenova - Zhur.Eksptl.I Teoret.Fiz. 41, 337 (1961); Soviet Phys.JETP 14, 243 (1962)
Hyperfine Structure of Electron Paramagnetic Resonance Lines in Supercooled Solutions of Salts of Ti
61Ga17 J.Gastebois - Proc.Intern.Conf.Mossbauer Effect, 2nd, Saclay, France, (1961), D.M.J.Compton, A.H.Schoen, Ed., John Wiley and Sons, Inc., New York, p.160 (1962)
Quadrupole Moment of Fe^{57m}
61Gr29 L.Grodzins, R.W.Bauer, H.H.Wilson - Phys.Rev. 124, 1897 (1961)
Nuclear Magnetic Moment of the 158-keV 5/2$^-$ State of Hg^{199}
61Gu08 G.Guthohrlein, H.Kopfermann, G.Noldeke, A.Steudel - Z.Physik 165, 356 (1961)
Die Kernmomente und die relative Isotopenlage des Os^{187}
61Ha34 S.H.Hanauer, J.W.T.Dabbs, L.D.Roberts, G.W.Parker - Phys.Rev. 124, 1512 (1961)
Angular Distribution of Alpha Particles Emitted by Oriented Np^{237} Nuclei
61Ha37 W.Hayes, J.W.Twidell - J.Chem.Phys. 35, 1521 (1961)
61Hi16 H.R.Hirsch - J.Opt.Soc.Am. 51, 1192 (1961)
Hyperfine Structure in the $^3p_4$ Level of the Twenty-Four-Hour Isomer Of Mercury 197
61Hu04 R.J.Hull, H.H.Stroke - Phys.Rev. 122, 1574 (1961)
Nuclear Moments and Isotope Shifts of Tl^{199}, Tl^{200}, Tl^{201}, Tl^{202}, and Tl^{204}-Isotope Shifts in Odd-Odd Nuclei
61Hu20 R.P.Hudson - Progress in Cryogenics, Vol.3, K.Mendelssohn, Ed., Heywood and Co., Ltd., London, p.99 (1961)
Paramagnetic Substances for Nuclear Orientation
61Je04 C.D.Jeffries - Prog.Cryog. 3, K.Mendelssohn, Ed., Academic Press, Inc., New York,N.Y., p.129 (1961)
Dynamic Nuclear Orientation
61Ka09 E.Karlsson, C.-A.Lerjefors, E.Matthias - Nuclear Phys. 25, 385 (1961)
The Gyromagnetic Ratio of the 155 keV-Rotational Level in Os^{188}
61Ka31 Y.Kato - J.Phys.Soc.Japan 16, 122 (1961)
Vibrational Effect on the Nuclear Quadrupole Coupling in ND_3
61Ki02 H.J.King, J.A.Cameron, H.K.Eastwood, R.G.Summers-Gill - Can.J.Phys. 39, 230 (1961)
The Nuclear Spin of Indium-115m
61Ki06 O.C.Kistner, A.W.Sunyar, J.B.Swan - Phys.Rev. 123, 179 (1961)
Hyperfine Structure of the 24-keV Transition in Sn^{119}
61Ki10 P.Kienle, M.Kalvius, F.Stanek, F.Wagner, H.Eicher, W.Wiedemann - Proc.Intern.Conf.Mossbauer Effect, 2nd, Saclay, France, (1961), D.M.J.Compton, A.H.Schoen, Ed., John Wiley and Sons, Inc., New York, p.185 (1962)
Hyperfine Splitting of Gamma Rays from Rare Earth Nuclides
61Kl01 M.P.Klein, J.Happe - Bull.Am.Phys.Soc. 6, No.2, 104, A11 (1961)
Nuclear Moment and Knight Shift of W^{183}
61Kn02 A.Knipper - Ann.phys. 6, 211 (1961)
Contribution a l'Etude Experimentale de Niveaux Excites de Quelques Noyaux Radioactifs par la Mesure de Leur Periode, par la Methode des Correlations Angulaires et par la Methode d'Orientation Nucleaire Aux Basses Temperatures
61Ko05 R.H.Kohler - Phys.Rev. 121, 1104 (1961)
Detection of Double Resonance by Frequency Change: Application to Hg^{201}
61Ku03 W.Kundig - Helv.Phys.Acta 34, 125 (1961)
Einfluss des Paramagnetismus auf die Richtungskorrelation (Messung magnetischer Kernmoments von Dy^{160} und Er^{166})
61Ku07 H.Kuiper - Z.Physik 165, 402 (1961)
Messung der Hyperfeinstruktur-Aufspaltung des metastabilen $^3P_2$-Zustandes des Kr^{83} nach der Atomstrahl-Resonanzmethode
61La21 L.G.Lang, S.De Benedetti, R.I.Ingalls - Proc.Intern.Conf.Mossbauer Effect, 2nd, Saclay, France, (1961), D.M.J.Compton, A.H.Schoen, Ed., John Wiley and Sons, Inc., New York, p.168 (1962)
Interaction Between Fe-57 and its Crystalline Surroundings
61Le06 C.A.Lerjefors, E.Matthias, E.Karlsson - Nuclear Phys. 25, 404 (1961)
The Gyromagnetic Ratio of the 137 keV Rotational Level in Os^{186}
61Le13 F.Les - Acta Phys. Polon. 20, 775 (1961)
Nuclear Electric Quadrupole Moments of ^{121}Sb and ^{123}Sb
61Ma27 R.Marrus, J.Winocur - Phys.Rev. 124, 1904 (1961)
Hyperfine Structure and Nuclear Moments of Americium-242

61Ma42 R.Marrus, W.A.Nierenberg, J.Winocur - Nuclear Phys. 23, 90 (1961)
Hyperfine Structure and Nuclear Moments of Protactinium-233
61Me11 F.R.Metzger - Nuclear Phys. 27, 612 (1961)
Lifetime and g-Factor of the First Excited State in Fe^{56}
61Na04 Q.O.Navarro, D.A.Shirley - Phys.Rev. 123, 186 (1961)
Nuclear Orientation of Dy^{155} and Dy^{157}
61Ol01 C.M.Olsmats, S.Axensten, G.Liljegren - Arkiv.Fysik 19, 469 (1961)
Hyperfine Structure Investigation of Po^{205} and Po^{207}
61Ra14 H.E.Radford, V.W.Hughes, V.Beltran-Lopez - Phys.Rev. 123, 153 (1961)
Microwave Zeeman Spectrum of Atomic Fluorine
61Ri06 E.W.T.Richards, A.Ridgeley, N.J.Atherton, H.S.Wise - Nature 192, 444 (1961)
Nuclear Spin of Protactinium-231 from Hyperfine Splitting
61Ro32 M.E.Rose, R.L.Carovillano - Phys.Rev. 122, 1185 (1961)
Coherence Effects in Resonance Fluorescence
61Ry05 A.Rytz, H.H.Staub, H.Winkler - Helv.Phys.Acta 34, 960 (1961)
Absolute Precision Determination of Several Resonance and Threshold Energies and the α Particle Energy of Po^{210}
61Sh02 D.A.Shirley, J.F.Schooley, J.O.Rasmussen - Phys.Rev. 121, 558 (1961)
Gamma-Ray Anisotropies from Oriented Pm^{144}
61Sk02 V.V.Sklyarevskii, B.N.Samoilov, E.P.Stepanov - Zhur.Eksptl.i Teoret.Fiz. 40, 1874 (1961); Soviet Phys.JETP 13, 1316 (1961)
61Sk03 G.V.Skrotskii, T.G.Izyumova - Usp.Fiz.Nauk 73, 423 (1961); Soviet Phys.Uspekhi 4, 177 (1961)
Optical Orientation of Atoms and its Application
61Sn01 J.L.Snider, M.Posner, A.M.Bernstein, D.R.Hamilton - Bull.Am.Phys.Soc. 6, No.3, 224, A1 (1961)
Nuclear Spins of N^{13} and C^{11}
61St04 R.Stiening, M.Deutsch - Phys.Rev. 121, 1484 (1961)
Magnetic Moment and Hyperfine Structure Coupling of the First 2+ State In Gd^{154}
61St18 H.J.Stapleton, C.D.Jeffries, D.A.Shirley - Phys.Rev. 124, 1455 (1961)
Paramagnetic Resonance of Trivalent Pm^{147} in Lanthanum Ethyl Sulfate
61Te01 R.W.Terhune, J.Lambe, C.Kikuchi, J.Baker - Phys.Rev. 123, 1265 (1961)
Hyperfine Spectrum of Chromium-53 in Al_2O_3
61Wa04 J.C.Walker, D.L.Harris - Phys.Rev. 121, 224 (1961)
61We05 G.K.Wertheim - Bull.Am.Phys.Soc. 6, No.1, 8 A9 (1961)
Mossbauer Effect of Fe^{57} in Al_2O_3
61We06 H.H.F.Wegener, F.E.Obenshain - Z.Physik 163, 17 (1961)
Mossbauer Effect for Ni^{61} with Applied Magnetic Fields
61We13 G.K.Wertheim, D.N.E.Buchanan - Proc.Intern.Conf.Mossbauer Effect, 2nd, Saclay, France, (1961), D.M.J.Compton, A.H.Schoen, Ed., John Wiley and Sons, Inc., New York, p.130 (1962)
The Hyperfine Structure of Fe-57 in Various Oxides
62Al02 S.S.Alpert, E.Lipworth, M.B.White, K.F.Smith - Phys.Rev. 125, 256 (1962)
Hyperfine Structure and Nuclear Moments of RaE (Bi^{210})
62Al04 S.S.Alpert, B.Budick, E.Lipworth, R.Marrus - Bull.Am.Phys.Soc. 7, No.3, 239, YB9 (1962); See Also 61Al20
Nuclear Spin of Neodymium-141
62Ax02 S.Axensten, G.Liljegren, I.Lindgren, C.M.Olsmats - Arkiv Fysik 22, 392 (1962)
Nuclear Spin Measurements on Tl, Po, and Te Isotopes
62Ba12 J.M.Baker, F.I.B.Williams - Proc.Roy.Soc.(London) 267A, 283 (1962)
62Ba38 R.W.Bauer, M.Deutsch - Phys.Rev. 128, 751 (1962)
Magnetic Moments of the First Excited 2+ States in Sm^{152}, Gd^{154}, and Gd^{156}
62Ba63 J.D.Baldeschweiler - J.Chem.Phys. 36, 152 (1962)
62Be12 H.J.Behrend, D.Budnick - Z.Physik 168, 155 (1962)
Die Bestimmung des Kern-Quadrupolmomentes des 247 keV-Niveaus des Cadmium-111 durch Messung der zirkularen Polarisation der γ-Strahlung
62Be15 L.H.Bennett, R.L.Streever,Jr. - Phys.Rev. 126, 2141 (1962)
Nuclear Moment of Ni^{61}
62Be19 I.Bergstrom, P.Thiebarger - Arkiv Fysik 22, 307 (1962)
Determination of the Magnetic Moment of the First Excited State in Sc^{44}
62Bi21 F.Bitter - Appl.Opt. 1, 1 (1962)
62Bo09 E.Bozek, A.Z.Hrynkiewicz, J.Styczen - Phys.Letters, 1, 126 (1962)
g-Factor of 482 keV State of ^{181}Ta Measured with the Differential Method
62Bo13 E.Bodenstedt, H.J.Korner, E.Gerdau, J.Radeloff, K.Auerbach, L.Mayer, A.Roggenbuck - Z.Physik 168, 103 (1962)
Das gyromagnetische Verhaltnis des 2+-Rotationsniveaus von Hf^{178} und weitere Untersuchungen zum Zerfall von W^{178}
62Bo14 A.J.F.Boyle, D.St.P.Bunbury, C.Edwards - Proc.Phys.Soc.(London) 79, 416 (1962)
The Isomer Shift in ^{119}Sn and the Quadrupole Moment of the First Excited State

62Bo16 E.Bodenstedt, H.J.Korner, E.Gerdau, J.Radeloff, K.Auerbach, L.Mayer, A.Roggenbuck - Z.Physik 168, 370 (1962)
Die magnetischen Momente der 5--Niveaus von Sn^{118} und Sn^{120}
62Bo18 E.Bodenstedt, H.J.Korner, E.Gerdau, J.Radeloff, L.Mayer, K.Auerbach, J.Braunsfurth, G.Mielken - Z.Physik 170, 355 (1962)
Der g(R)-Faktor des 2^+-Rotationsniveaus von Er^{168}
62Bo27 E.Bozek, A.Z.Hrynkiewicz, Z.Konieczny, M.Rybicka, S.Szymczyk - Acta Phys.Polon. 21, 307 (1962)
Nuclear g-Factor of the 113 keV Rotational Level in Hf^{177}
62Br30 E.Brun, J.J.Kraushaar, W.L.Pierce, W.J.Veigele - Phys.Rev.Letters 9, 166 (1962)
Nuclear Magnetic Dipole Moment of Ca^{41}
62Br32 V.A.Bryukhanov, N.N.Delyagin, V.S.Shpinel - Zhur.Eksptl.i Teoret.Fiz. 42, 1183 (1962); Soviet Phys.JETP 15, 818 (1962)
62Br46 R.Bramley, B.N.Figgis, R.S.Nyholm - Trans.Faraday Soc. 58, 1893 (1962)
^{13}C and ^{17}O N.M.R. Spectra of Metal Carbonyl Compounds
62Bu08 J.I.Budnick - Bull.Am.Phys.Soc. 7, No.4, 295, H15 (1962); Oral Report
Nuclear-Magnetic-Resonance Determination of the Sign of the Hyperfine Field in Nickel Metal
62Bu10 H.Bucka, H.Kopfermann, J.Ney - Z.Physik 167, 375 (1962)
Doppelresonanzuntersuchung der Hyperfeinstruktur des 5 $^2P_{3/2}$-Terms im K I-Spektrum zur Bestimmung des elektrischen Kernquadrupolemoments des K^{40}
62Bu19 J.Button, B.Maglic - Phys.Rev. 127, 1297 (1962)
Experimental Study of the Polarization and Magnetic Moment of the Antiproton
62Bu30 H.Bucka, G.von Oppen - Ann.Physik 10, 119 (1962)
Hyperfeinstruktur und Lebensdauer des $8\,^2P_{3/2}$-Terms im Cs I-Spektrum
62Ca10 A.Y.Cabezas, I.P.K.Lindgren, R.Marrus, W.A.Nierenberg - Phys.Rev. 126, 1004 (1962)
Hyperfine Structure of Praseodymium-142
62Ca14 J.A.Cameron, H.J.King, H.K.Eastwood, R.G.Summers-Gill - Can.J.Phys. 40, 931 (1962)
The Magnetic Moment of Indium-115m
62Ch13 Y.W.Chan, W.B.Ewbank, W.Nierenberg, H.A.Shugart - Phys.Rev. 127, 572 (1962)
Nuclear Spin of 9.5-hr $Au^{196}m$
62Ch18 Y.W.Chan - Thesis, Univ.California (1962); UCRL-10334 (1962)
The Nuclear Spins and Magnetic Moments of Ag^{112}, Ag^{113}, Au^{195}, Au^{196}, and $Au^{196}m$
62Co08 D.Connor, Tung Tsang - Phys.Rev. 126, 1506 (1962)
Sign of the Li^8 Magnetic Moment
62Co14 V.W.Cohen, T.Moran, S.Penselin - Phys.Rev. 127, 517 (1962)
Hyperfine Structure of $Cs^{134}m$
62Co28 S.G.Cohen, G.Gilat - Nuclear Phys. 38, 1 (1962)
Hyperfine Interactions of the 2^+ State in Dy^{160}
62Eh01 V.J.Ehlers, W.A.Nierenberg, H.A.Shugart - Phys.Rev. 125, 2008 (1962)
Nuclear Spin of Gallium-70
62Eh02 V.J.Ehlers, H.A.Shugart - Phys.Rev. 127, 529 (1962)
Hyperfine-Structure Separations and Nuclear Moments of Gallium-68
62Fa04 J.D.Faust - Bull.Am.Phys.Soc. 7, No.7, 476, MA8 (1962)
Hyperfine Structure of Rb^{81} and Rb^{82}
62Fr10 R.B.Frankel, P.H.Barrett, D.A.Shirley - Bull.Am.Phys.Soc. 7, No.9, 600, C6 (1962)
Quadrupole Coupling in Tellurium
62Fr14 A.J.Freeman, R.E.Watson - Phys.Rev. 127, 2058 (1962)
Theoretical Investigation of Some Magnetic and Spectroscopic Properties of Rare-Earth Ions
62Ge11 S.Gerstenkorn - Ann.phys. 7, 405 (1962)
Determination du Moment Magnetique du Plutonium-239
62Go17 G.Goldring, Z.Vager - Phys.Rev. 127, 929 (1962); G.Goldring - Priv.Comm. (April 1972)
Gyromagnetic Ratios of the 2^+ States in Even Tungsten Isotopes
62Go20 L.S.Goodman, H.Kopfermann, K.Schlupmann - Naturwissenschaften 49, 101 (1962)
62Go25 A.C.Gossard, V.Jaccarino - Bull.Am.Phys.Soc. 7, No.8, 556, Y2 (1962)
Pd^{105} NMR: Absence of Antiferromagnetism in Palladium
62Gr17 M.A.Grace, C.E.Johnson, R.G.Scurlock, R.T.Taylor - Phil.Mag. 7, 1087 (1962)
Nuclear Alignment of Cerium Isotopes
62Ha29 D.Halford - Phys.Rev. 127, 1940 (1962)
Electron-Nuclear Double Resonance, Nuclear Moments, and $[r^{-3}]$ of Neodymium-143 (III) and Neodymium-145 (III) in Lanthanum Trichloride
62Ho17 W.W.Holloway, Jr., E.Luscher, R.Novick - Phys.Rev. 126, 2109 (1962)
Hyperfine Structure of Atomic Nitrogen

62Ju06 B.R.Judd, C.A.Lovejoy, D.A.Shirley - Phys.Rev. 128, 1733 (1962)
Anomalous Quadrupole Coupling in Europium Ethylsulfate
62Ka14 E.Karlsson, E.Matthias, S.Ogaza - Arkiv Fysik 22, 257 (1962)
The Gyromagnetic Ratio of the First Rotational State in Hf^{178}
62Ka22 M.Kalvius, U.Zahn, P.Kienle, H.Eicher - Z.Naturforsch. 17a, 494 (1962)
Hyperfeinstruktur des 14,4 keV-Zustandes von Fe^{57}, gebunden in verschiedenen Eisencarbonylen
62Kh03 J.M.Khan, N.Braslau, G.O.Brink - Bull.Am.Phys.Soc. 7, No.7, 476, MA10 (1962)
Hyperfine-Structure Separation in Rb^{84}, Cs^{127}, and Cs^{129}
62Ko08 L.A.Korostyleva - Opt.I Spektroskopiya 12, 671 (1962); Opt.Spectry.USSR (English Transl.) 12, 380 (1962)
Hyperfine Structure and the Magnetic Moment of Plutonium 239
62Ko16 A.V.Kogan, V.D.Kulkov, L.P.Nikitin, N.M.Reinov, M.F.Stelmakh, M.Schott - Zhur.Eksptl.i Teorot.Fiz. 43, 828 (1962); Soviet Phys.JETP 16, 586 (1963)
Asymmetry of Beta Radiation from Nuclei Polarized in an Alloy
62Ko22 V.S.Korolkov, A.G.Makhanek - Opt.i Spektroskopiya 12, 163 (1962); Opt.Spectry.USSR (English Transl.) 12, 87 (1962)
Gradients of Electric Fields Set up by Electrons at the Sites of Atomic Nuclei
62La01 R.H.Lambert, F.M.Pipkin - Bull.Am.Phys.Soc. 7, No.1, 26, FA8 (1962)
N^{15} Pressure Shifts
62La24 R.F.Lacey - Quoted by 62Th15
62La26 R.H.Lambert, F.M.Pipkin - Phys.Rev. 128, 198 (1962)
Hyperfine Structure of Atomic Phosphorus
62Li06 I.Lindgren - Nuclear Phys. 32, 151 (1962); Recalculation of Earlier Data
Nuclear Magnetic Moments in the Rare Earth Region
62Lo01 C.A.Lovejoy, D.A.Shirley - Nuclear Phys. 30, 452 (1962)
Nuclear Orientation of Tb^{156}
62Lo12 O.V.Lounasmaa, P.R.Roach - Phys.Rev. 128, 622 (1962)
Specific Heat of Terbium Metal between 0.37 and 4.2°K
62Lu04 A.Lurio - Phys.Rev. 126, 1768 (1962); Priv.Comm. (March 1963)
Hyperfine Structure of the ^3P States of Zn^{67} and Mg^{25}
62Ma42 E.Matthias, E.Karlsson, C.A.Lejefors - Arkiv Fysik 22, 139 (1962)
Nuclear g-Factor of the 113 keV Rotational State in the Odd A Nucleus Hf^{177}
62Mc05 B.R.McGarvey - Bull.Am.Phys.Soc. 7, No.1, 30, GA9 (1962)
Paramagnetic Resonance of Ti^{3+} in Aluminum Acetylacetonate
62Me09 C.Menoud, J.Racine - Helv.Phys.Acta 35, 562 (1962)
Maser a Hydrogene Atomique, Description et Resultats Preliminaires
62Mu04 K.Murakawa - J.Phys.Soc.Japan 17, 891 (1962)
Quadrupole Coupling in the Hyperfine Structure of the Spectra of Ta I and Os I
62Na14 Q.O.Navarro, J.O.Rasmussen, D.A.Shirley - Phys.Letters 2, 353 (1962)
Preferential Polar Emission in the Alpha Decay of Deformed Cf^{249} and E^{253}
62On02 K.Ono, A.Ito - J.Phys.Soc.Japan 17, 1012 (1962)
A Mossbauer Study of the Internal Field at Fe^{57} in α-Fe_2O_3
62Pe01 F.R.Peterson, H.A.Shugart - Phys.Rev. 125, 284 (1962)
Nuclear Spin, Hyperfine Structure, and Nuclear Moments of 64-Hour Yttrium-90
62Pe07 F.R.Petersen, H.A.Shugart - Phys.Rev. 126, 252 (1962)
Nuclear Spin, Hyperfine Structure, and Nuclear Moments of 6.8-Day Lutetium-177
62Pe14 S.Penselin, T.Moran, V.W.Cohen, G.Winkler - Phys.Rev. 127, 524 (1962)
Hyperfine Structure of the Electronic Ground States of Rb^{85} and Rb^{87}
62Pe21 F.R.Petersen, H.A.Shugart - Phys.Rev. 128, 1740 (1962)
Nuclear Spins, Hyperfine Structures, and Nuclear Moments of Scandium-46 and Yttrium-91
62Ph01 E.A.Phillips, L.Grodzins - Bull.Am.Phys.Soc. 7, No.4, 359, ZA3 (1962)
Quadrupole Moments of the First 2+ States of W^{182}, W^{184}, and W^{186}
62Pi04 F.M.Pipkin, R.H.Lambert - Phys.Rev. 127, 787 (1962)
Hyperfine Splittings of Hydrogen and Tritium. II
62Pr10 R.S.Preston, S.S.Hanna, J.Heberle - Phys.Rev. 128, 2207 (1962)
Mossbauer Effect in Metallic Iron
62Re02 A.H.Reddoch, G.J.Ritter - Phys.Rev. 126, 1493 (1962)
Nuclear Magnetic Resonance of Lu^{175}
62Ri04 G.J.Ritter - Phys.Rev. 126, 240 (1962)
Hyperfine Structure and Nuclear Moments of Lu^{175}
62Ri11 G.J.Ritter - Phys.Rev. 128, 2238 (1962)
Ground-State Hyperfine Structure and Nuclear Magnetic Moment of Thulium-169
62Ro26 J.S.Ross, K.Murakawa - Phys.Rev. 128, 1159 (1962); See Also 64Ro11
Nuclear Quadrupole Moment of Yb^{173}
62Ry01 A.Rytz, H.H.Staub, H.Winkler, W.Zych - Helv.Phys.Acta 35, 341 (1962)
Absolute Precision Determination of Several Resonance and Threshold Energies and the α-Particle Energy of Po^{210}

62Sp03 I.J.Spalding, K.F.Smith - Proc.Phys.Soc.(London) 79, 787 (1962)
Some Rare Earth Spins, and the Hyperfine Structure of ^{176}Lu
62Th15 P.Thaddeus, R.Novick - Phys.Rev. 126, 1774 (1962)
Optical Detection of Level Crossing in the (5s5p) $^3P_1$ State of Cd^{111} and Cd^{113}
62Wa03 E.L.Waters, A.H.Maki - Phys.Rev. 125, 233 (1962)
Ti^{47} and Ti^{49} Hyperfine Structure in the Electron Spin Resonance of Titanium (III) Complexes
62Wa07 W.T.Walter - Bull.Am.Phys.Soc. 7, No.4, 295 H16 (1962)
Nuclear Orientation and Magnetic Moment of Hg^{197}
62Wa27 J.C.Walker - Phys.Rev. 127, 1739 (1962)
Hyperfine Structure and Nuclear Moments of Thulium-166
62Wa30 H.Walther - Z.Physik 170, 507 (1962)
Das Kernquadrupolmoment des Mn^{55}
62Wh11 M.B.White - Thesis, Univ.California (1962); UCRL-10321; Priv.Comm. (April 1963)
Hyperfine Structure and Nuclear Moments of Lu^{176m}, Br^{80}, Br^{80m}, and I^{132}
62Wi10 R.M.Williams, J.W.McGrath - Phys.Rev. 127, 184 (1962)
Ratio of the Electric Quadrupole Moments of Ba^{137} and Ba^{135}
62Wy04 B.G.Wybourne - J.Chem.Phys. 37, 1807 (1962); Recalculation of Data of 53Le22(Pr^{141}) and 62Go20(Ho^{165})
62Ya06 H.K.Yahola, Ye.Ye.Bohatyrov - Ukrain.Fiz.Zhur.(USSR) 7, 145 (1962); Phys.Abstr. 65, 1700, No.17489 (1962)
63Al06 S.S.Alpert - Phys.Rev. 129, 1344 (1963)
Nuclear Moments and Hyperfine Structure of 13-Year Eu^{152}
63Ap01 H.Appel, W.Mayer - Nucl.Phys. 43, 393 (1963)
g-Factor Measurement on the First Excited State of Fe^{56} Using Internal Magnetic Fields
63Ba23 E.B.Baker, L.W.Burd - Rev.Sci.Instr. 34, 238 (1963)
Frequency-Swept and Proton-Stabilized NMR Spectrometer for All Nuclei Using a Frequency Synthesizer
63Ba39 P.H.Barrett, D.A.Shirley - Phys.Rev. 131, 123 (1963)
Hyperfine Structure in Europium Metal
63Be16 C.Berthelot - J.Phys. 24, 69 (1963)
Moments Magnetiques Nucleaires du Plutonium 239 et 241
63Be46 H.J.Behrend, D.Budnick, K.Huber - Ann.Physik 11, 372 (1963)
Bestimmung von Quadrupolkopplungskonstanten des Kerns Tantal-181 im $d_{5/2}$-Zustand in Einkristallfeldern durch Messung der Gestorten γ-γ Winkelkorrelation und der Zirkularen Polarisation
63Bl24 B.Bleaney - J.Appl.Phys. 34, 1024 (1963)
Hyperfine Interactions in Rare-Earth Metals
63Bl25 B.Bleaney - Proc.Intern.Congr. Quantum Electronics, 3rd, Paris, France, (1963); P.Grivet, N.Bloembergen, Ed., Columbia University Press, New York, Vol.I, p.595 (1964)
Nuclear Moments of the Lanthanons
63Bl27 W.E.Blumberg, J.Eisinger, S.Geschwind, J.P.Remeika - Proc.Intern.Conf.Paramagnetic Resonance, 1st, Jerusalem (1962), W.Low, Ed., Academic Press, New York, Vol.1, p.125 (1963)
Paramagnetic and Endor Spectrum of Cu^{3+} in Al_2O_3
63Bo09 E.C.O.Bonacalza, G.B.Holm - Phys.Letters 4, 343 (1963)
Measurement of the g-Factor of the 247 keV State in Cd^{111} with the Differential Method
63Bo26 E.Bodenstedt, G.Strube, W.Engels, H.Blumberg, R.-M.Lieder, E.Gerdau - Phys.Letters 6, 290 (1963)
The Magnetic Moment of the 66 keV State of As^{73} and the Angular Correlation of the 359 keV-66 keV $\gamma\gamma$-Cascade
63Bu13 H.Bucka, H.Kopfermann, M.Rasiwala, H.Schussler - Z.Physik 176, 45 (1963)
Zum Kernquadrupolmoment von Rb^{87}
63Bu14 B.Budick, R.Marrus - Phys.Rev. 132, 723 (1963)
Hyperfine Structure and Nuclear Moments of Promethium-147 and Promethium-151
63By02 F.W.Byron,Jr., M.N.McDermott, R.Novick - Phys.Rev. 132, 1181 (1963)
Spin and Nuclear Moments of 6.7-Hour Cd^{107}
63Ca05 J.A.Cameron, R.G.Summers-Gill - Can.J.Phys. 41, 823 (1963)
The Spin of Indium 117
63Ch12 W.J.Childs, L.S.Goodman - Phys.Rev. 131, 245 (1963)
Nuclear Spin and Magnetic Hyperfine Interaction of 12-Day Ge^{71}
63Ch17 W.J.Childs, L.S.Goodman, D.von Ehrenstein - Phys.Rev. 132, 2128 (1963)
Magnetic Hyperfine Interaction of Cr^{53}
63Ch18 R.J.Champeau, M.Fred, S.Gerstenkorn, F.S.Tomkins - Compt.Rend. 257, 1238 (1963)
Determination Spectroscopique du Moment Magnetique Nucleaire du Plutonium-241

63Ch24 J.Chappert, P.Imbert - J.Phys. 24, 412 (1963)
Effect Mossbauer dans les Composes de Type Perovskite $HoFeO_3$ et $ErFeO_3$
63Co08 R.L.Cohen - Bull.Am.Phys.Soc. 8, No.4, 351, MB9 (1963); Oral Report
Mossbauer Effect in Tb^{169} in Tm Iron Garnet
63Co17 E.D.Commins, H.R.Feldman - Phys.Rev. 131, 700 (1963)
Spin, Hyperfine Structure, and Nuclear Magnetic Dipole Moment of O^{15}
63Co22 E.D.Commins, D.A.Dobson - Phys.Rev.Letters 10, 347 (1963); See Also 63Do15
Beta-Decay Asymmetry and Nuclear Magnetic Moment of Neon-19
63Co37 E.R.Cohen, J.W.M.DuMond - Proc.Intern.Conf.Nuclidic Masses, 2nd, Vienna, Austria, (1963), W.H.Johnson,Jr., Ed., Springer-Verlag, Vienna, p.152 (1964)
Present Status of Our Knowledge of the Numerical Values of the Fundamental Physical Constants
63Cr12 S.B.Crampton, D.Kleppner, N.F.Ramsey - Phys.Rev.Letters 11, 338 (1963)
Hyperfine Separation of Ground-State Atomic Hydrogen
63De15 H.de Waard, G.De Pasquali, D.Hafemeister - Phys.Letters 5, 217 (1963)
Mossbauer Determinations of Isomeric Shift and Quadrupole Splitting in Some I^{129} Compounds
63Do09 W.M.Doyle, R.Marrus - Phys.Rev. 131, 1586 (1963)
Hyperfine Structure of Erbium-169
63Do13 W.M.Doyle, R.Marrus - Nucl.Phys. 49, 449 (1963)
Atomic Beam Studies of Some Radioactive Isotopes of Refractory Group Elements
63Do15 D.A.Dobson - Thesis, Univ.California (1963); UCRL-11169 (1963)
The Beta-Decay Asymmetry and Nuclear Magnetic Moment of Neon-19
63Dr05 L.E.Drain - J.Phys.Chem.Solids 24, 379 (1963)
Nuclear Magnetic Resonance in Platinum
63Ei02 H.Eicher - Z.Physik 171, 582 (1963)
Das Elektrische Quadrupolmoment des 14,4 Kev-Niveaus von Fe^{57}
63Ei11 H.Eicher, P.Kienle - Quoted by 63Ei02
63Ew02 W.B.Ewbank, H.A.Shugart - Phys.Rev. 129, 1617 (1963)
Hyperfine-Structure Measurements on Silver-105
63Fa01 W.L.Faust, L.Y.Chow Chiu - Phys.Rev. 129, 1214 (1963)
Hyperfine Structure of the Metastable $(4p)^5$ $(5s)$ $^3P_2$ State of Kr^{83}
63Fr08 A.J.Freeman, R.E.Watson - Phys.Rev. 131, 2566 (1963)
Antishielding of Magnetic and Electric Hyperfine Interactions in Open Shell Ions
63Ge09 E.Gerdau, W.Krull, L.Mayer, J.Braunsfurth, J.Heisenberg, P.Steiner, E.Bodenstedt - Z.Physik 174, 389 (1963)
Winkelkorrelationsmessungen an > 30 y Holmium 166 und Bestimmung des g(R) Faktors des 4^+ Rotationsniveaus von Erbium 166
63Go05 G.Goldring, D.Kedem, Z.Vager - Phys.Rev. 129, 337 (1963); G.Goldring - Priv.Comm. (April 1972)
Gyromagnetic Ratio of the 2^+ State of Os^{188}
63Gr10 R.W.Grant, D.A.Shirley - Phys.Rev. 130, 1100 (1963)
Pseudoquadrupole Coupling Constants and Nuclear Moments of Several Promethium Isotopes
63Ha07 J.N.Haag, D.A.Shirley, D.H.Templeton - Phys.Rev. 129, 1601 (1963)
Nuclear Alignment of Ce^{137m}, Ce^{137}, Ce^{139}, Ce^{141}, and Ce^{143}
63He02 R.R.Hewitt, B.F.Williams - Phys.Rev. 129, 1188 (1963)
Nuclear Quadrupole Interaction of Sb^{121} and Sb^{123} in Antimony Metal
63Hu08 S.Hufner, M.Kalvius, P.Kienle, W.Wiedemann, H.Eicher - Z.Physik 175, 416 (1963)
Das Quadrupolmoment des 8,42 keV Niveaus von Tm^{169}
63Ja15 D.A.Jackson, D.H.Tuan - Phys.Rev.Letters 11, 209 (1963)
Hyperfine Structure of the Resonance Line of the Arc Spectra of the Isotopes 135 and 137 of Barium
63Ka03 N.Kaplan, S.Ofer, B.Rosner - Phys.Letters 3, 291 (1963)
The g-Factor of the 2.083 MeV 4^+ State of Ce^{140}
63Ka12 M.Kalvius, P.Kienle, H.Eicher, W.Wiedemann, C.Schuler - Z.Physik 172, 231 (1963)
Magnetisches Moment und Quadrupolmoment des 8,42 keV-Zustandes von Tm^{169} aus der Hyperfeinstrukturaufspaltung in Tm-Metall
63Ka31 D.L.Kaminskii, K.M.Novik, N.I.Alekseev, L.S.Varshalovich - Opt.i Spektroskopiya 15, 441 (1963); Opt.Spectry.USSR (English Transl.) 15, 239 (1963)
The Hyperfine Splitting of the Ground State of Tm^{169}
63Ka32 S.L.Kahalas, R.K.Nesbet - J.Chem.Phys. 39, 529 (1963)
Electronic Structure of LiH and Quadrupole Moment of Li^7
63Kl02 A.Kleine-Tebbe, H.Spehl - Z.Physik 174, 546 (1963)
Der mittlere g-Faktor der ersten angeregten Rotationszustande der geraden Wolframisotope in naturlichem Wolfram

63Kl03 H.Kleiman, S.P.Davis - J.Opt.Soc.Am. 53, 822 (1963)
Hyperfine Structures, Isotope Shifts, and Nuclear Moments of Hg^{195}, $Hg^{195}m$, and Hg^{194}

63Kl04 V.A.Klyucharev, A.K.Valter, I.I.Zalyubovskii, D.V.Afanasev - Zh.Eksperim.i Teor.Fiz. 44, 1136 (1963); Soviet Phys.JETP 17, 766 (1963)
Measurement of the Gyromagnetic Ratio of the W^{182} Nucleus in the First Excited State

63Ko02 H.J.Korner, J.Radeloff, E.Bodenstedt - Z.Physik 172, 279 (1963)
Bestimmung des gR-Faktors des 2^+-Rotationsniveaus von W^{182} durch differentielle $\gamma\gamma$-Winkelkorrelationsmessungen in einem ausseren Magnetfeld

63Ko07 H.J.Korner, E.Gerdau, C.Gunther, K.Auerbach, G.Mielken, G.Strube, E.Bodenstedt - Z.Physik 173, 203 (1963)
Das magnetische Moment des 2,803 MeV Zwei-Protonen-Niveaus des gerade-gerade-Kerns Ce^{140}

63Ko19 S.Koicki, A.Koicki, G.T.Wood - Nucl.Phys. 49, 161 (1963)
Gyromagnetic Ratio of 206 keV Level in Re^{187}

63Ko21 A.V.Kogan, V.D.Julkov, L.P.Nikitin, N.M.Reinov, M.F.Stelmakh - Zh.Eksptl.i Teor.Fiz. 45, 1 (1963); Soviet Phys.JETP 18, 1 (1964)
Measurement of the Nuclear Specific Heats of Iridium and Rhenium

63Kr02 I.Y.Krause - Phys.Rev. 129, 1330 (1963)
Nuclear g Factor of the First Excited State in V^{51}

63La12 R.F.Lacey - Quoted by 63Mc11

63La16 N.Laurance, J.Lambe - Phys.Rev. 132, 1029 (1963)
Quadrupole Interactions of Vanadium and Manganese in Corundum

63Le18 J.-C.Lehmann, R.Barbe - Compt.Rend. 257, 3152 (1963)
Mesure du Rapport des Moments Magnetiques Nucleaires de ^{199}Hg et ^{201}Hg

63Lo05 P.R.Locher, S.Geschwind - Phys.Rev.Letters 11, 333 (1963)
Electron-Nuclear Double Resonance of Ni^{61} in Al_2O_3 and Variation of hfs Through an Inhomogeneous Line Due to Random Crystal Fields

63Lo07 W.Low, U.Ranon - Proc.Intern.Conf.Paramagnetic Resonance, 1st, Jerusalem (1962), W.Low, Ed., Academic Press, New York, Vol.1, p.167 (1963)
ESR of Rare Earth Ions in Irradiated and Thermally Treated CaF_2

63Ma10 E.Matthias, L.Bostrom, A.Maciel, M.Salomon, T.Lindqvist - Nucl.Phys. 40, 656 (1963)
Magnetic Dipole Interaction Studied by the Differential Angular Correlation Method

63Ma31 W.Markowitz, R.G.Hall, H.F.Hastings, R.R.Stone, R.F.C.Vessot, H.E.Peters - Frequency 1, 46 (1963)
Report on the Frequency of Hydrogen

63Mc11 M.N.McDermott, R.Novick - Phys.Rev. 131, 707 (1963)
Optical Double Resonance in Radioactive Atoms: Spin and Nuclear Moments of the Ground State of Cd^{109}

63Na11 S.Nakamura, H.Enokiya - J.Phys.Soc.Japan 18, 183 (1963)
Detection of Nuclear Quadrupole Resonances by Means of the Crossing Technique

63Ni11 V.I.Nikolaev, Y.I.Shcherbina, S.S.Yakimov - Zh.Eksperim.i Teor.Fiz. 45, 1277 (1963); Soviet Phys.JETP 18, 878 (1964)
Studies of Temperature Dependence of Mossbauer Spectra of Fe^{57} and Sn^{119} in Antiferromagnetic $FeSn_2$

63No01 I.Nowik, S.Ofer - Phys.Letters 3, 192 (1963)
Hyperfine Interactions in the Ground State and First Excited State of Tm^{169} in Thulium Iron Garnet

63No06 I.Nowik, S.Ofer - Phys.Rev. 132, 241 (1963)
Hyperfine Interactions in the Ground State and 21.7 keV State of Eu^{151} in Europium Iron Garnet

63Or03 J.W.Orton, J.E.Wertz, P.Auzins - Phys.Letters 6, 339 (1963)
On the Nuclear Moment of Ni^{61}

63Ra24 U.Ramon, W.Low - Phys.Rev. 132, 1609 (1963)
Electron Spin Resonance of Er^{3+} in CaF_2

63Ro33 M.E.Rose, Ed. - Nuclear Orientation, Gordon and Breach, New York (1963)

63Sa04 J.H.Sanders, K.C.Tuberfield - Proc.Roy.Soc.(London) 272A, 79 (1963)
The Magnetic Moment of the Proton. I. The Value in Nuclear Magnetons

63Sa05 J.H.Sanders, K.F.Tittel, J.F.Ward - Proc.Roy.Soc.(London) 272A, 103 (1963)
The Magnetic Moment of the Proton. II. The Value in Bohr Magnetons

63Sa19 M.Salomon, L.Bostrom, T.Lindqvist, E.Matthias, M.Perez - Nucl.Phys. 46, 377 (1963)
Measurement of g-Factors of Excited States in Cd^{111}, Pb^{204}

63Sc34 W.G.Schweitzer,Jr. - J.Opt.Soc.Amer. 53, 1055 (1963)
Hyperfine Structure and Isotope Shifts in the 2537-A Line of Mercury by a New Interferometric Method

63Sh11 N.Shikazono - J.Phys.Soc.Japan 18, 925 (1963)
Recoil-Free Resonant Absorption of 35.3 keV Gamma Rays cf Te^{125} and Hyperfine Structure of Absorption Spectrum
63Sl03 C.P.Slichter - Principles of Magnetic Resonance, Harper and Row Publishers, New York (1963)
63Sp08 I.J.Spalding - Proc.Phys.Soc.(London) 81, 156 (1963)
The Hyperfine Structure and Nuclear Moments of ^{143}Nd and ^{145}Nd
63St05 J.A.Stone - Bull.Am.Phys.Soc. 8, No.4, 351, MB8 (1963)
Influence of High Pressures on the Mossbauer Effect in Dy^{161}
63St08 R.L.Streever,Jr. - Phys.Rev.Letters 10, 232 (1963)
Nuclear Moment of Ni^{61} from Nuclear Resonance Studies in Steady External Magnetic Field
63St15 C.V.Stager - Phys.Rev. 132, 275 (1963)
Hyperfine Structure of Hg^{197} and Hg^{199}
63St17 R.M.Sternheimer - Phys.Rev. 130, 1423 (1963)
Quadrupole Antishielding Factors of Ions
63St22 R.M.Sternheimer - Phys.Rev. 132, 1637 (1963)
Quadrupole Antishielding Factors of Ions
63Th06 P.Thaddeus, M.N.McDermott - Phys.Rev. 132, 1186 (1963)
Level Crossings in the $(5s5p)\,^3P_1$ State of Radioactive Cd^{107} and Cd^{109}
63Ts01 T.Tsang, D.Connor - Phys.Rev. 132, 1141 (1963)
Nuclear Magnetic Resonance of F^{20} by Polarized Neutron Capture and β-Decay Anisotropy
63Vi03 C.E.Violet, R.Booth, F.Wooten - Phys.Letters 5, 230 (1963)
The Electric Quadrupole Moment of the 35 keV State of Te^{125}
63Vi04 P.Vigoureux - Nature 198, 1188 (1963)
Gyromagnetic Ratio of the Proton
63Wa16 H.R.Walter, A.Weitsch, P.Kienle - Z.Physik 175, 520 (1963)
Bestimmung des magnetischen Moments des 206 keV Niveaus von Re^{187}
63Yu02 L.C.L.Yuan, C.-S.Wu, Ed. - Nuclear Physics (Methods in Experimental Physics, Vol.5), Academic Press, New York, Part B, Sec. 2.4 (1963)
Determination of Spin, Parity and Nuclear Moments
63Zu04 G.zu Putlitz - Z.Physik 175, 543 (1963)
Bestimmung des Elektrischen Kernquadrupolmomentes des Ungeraden Stabilen Strontium-87-Kerns
63Zu05 G.zu Putlitz - Ann.Physik 11, 248 (1963)
Bestimmung der Elektrischen Kernquadrupolmomente der Beiden Ungeraden Stabilen Bariumisotope Ba^{135} und Ba^{137}
64Ag02 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee - Nucl.Phys. 58, 651 (1964); Y.K.Agarwal - Priv.Comm. (April 1972)
Measurement of Magnetic Moments of Excited States in Ta^{181} and Cs^{133}
64Al32 K.Alder, R.M.Steffen - Ann.Rev.Nucl.Sci. 14, 403 (1964)
Electromagnetic Moments of Excited Nuclear States
64Ar23 J.O.Artman, J.C.Murphy - Phys. Rev. 135, A1622 (1964)
Lattice Sum Evaluations of Ruby Spectral Parameters
64At01 U.Atzmony, A.Mualem, S.Ofer - Phys. Rev. 136, B1237 (1964)
Mossbauer Effect Studies of the 103-keV Level on Eu^{153}
64Ba06 E.R.Bauminger, L.Grodzins, A.Freeman - Bull. Am. Phys. Soc. 9, No. 4, 451, FF8 (1964)
Hyperfine Interactions in Dy in CaF_2 and MgO
64Ba10 J.Bauche, B.R.Judd - Proc. Phys. Soc. (London) 83, 145 (1964)
Hyperfine Structure of Pu I
64Ba11 M.R.Baker, C.H.Anderson, N.F.Ramsey - Phys. Rev. 133, A1533 (1964)
Nuclear Magnetic Antishielding of Nuclei in Molecules. Magnetic Moments of F^{19}, N^{14}, and N^{15}
64Ba18 E.Bauminger, L.Grodzins, A.J.Freeman - Rev. Mod. Phys. 36, 392 (1964)
Hyperfine Fields Acting on Dy^{161} in $DyFe_2$
64Be24 A.M.Bernstein, R.A.Haberstroh, D.R.Hamilton, M.Posner, J.L.Snider - Phys. Rev. 136, B27 (1964)
Spin and Magnetic Moment of N^{13}
64Be42 N.Bessis, H.Lefebvre-Brion, C.M.Moser, A.J.Freeman, R.K.Nesbet, R.E.Watson - Phys. Rev. 135, A588 (1964)
Calculation of Magnetic Hyperfine Constant of P^{31}
64Bo07 P.A.Bonczyk, V.W.Hughes - Bull. Am. Phys. Soc. 9, No. 4, 452, FF10 (1964)
Hyperfine Structure of the J=1, v=0 State in $^{85}Rb^{19}F$
64Bo09 E.L.Boyd, R.J.Gambino - Phys. Rev. Letters 12, 20 (1964)
Nuclear Magnetic Resonance of Gd^{155} and Gd^{157} in the Cubic Ferromagnet GdN
64Bo16 E.Bozek, A.Z.Hrynkiewicz, S.Ogaza, J.Styczen - Phys. Letters 11, 63 (1964)
HFS-Interaction of the Gd^{155} Nucleus in the 87 keV Excited State
64Bo28 E.Bodenstedt, C.Gunther, J.Radeloff, W.Engels, W.Delang, M.Forker, H.Luig - Phys. Letters 13, 330 (1964); Erratum Phys. Letters 15, 296 (1965)
Measurement of the g-Factor of the 90 keV State of Ru^{99} by the Spin Rotation Method

64Bo37 R.v.Boeckh, G.Graff, R.Ley - Z.Physik 179, 285 (1964)
Die Abhangigkeit innerer und ausserer Wechselwirkungen des TlF-Molekuls von der Schwingung, Rotation und Isotopie
64Bo38 R.A.Bonham, T.G.Strand - J. Chem. Phys. 40, 3447 (1964)
Diamagnetic Nuclear Shielding Constants for Neutral Atoms
64Bo40 E.Bodenstedt, J.D.Rogers - Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Eds., North-Holland Publishing Co., Amsterdam, p.91 (1964)
Magnetic Moments of Nuclear Excited States
64Br20 D.E.Brandao, H.J.Korner, A.Maciel, C.S.Muller, F.C.Zawislak - Nucl. Phys. 56, 65 (1964)
g-Factor Measurement of the 133 keV Level in ^{131}Cs
64Br36 J.C.Browne, F.A.Matsen - Phys. Rev. 135, A1227 (1964)
Quantum-Mechanical Calculations for the Electric Field Gradients and Other Electronic Properties of Lithium Hydride: The Use of Mixed Orbital Sets
64Br37 R.A.Brooks - Bull. Am. Phys. Soc. 9, No. 6, 682, B2 (1964)
Zero-Field Nuclear Resonance in Li_2 and Na_2
64Bu09 B.Budick, I.Maleh, R.Marrus - Phys. Rev. 135, B1281 (1964)
Atomic-Beam Studies of Nuclear Properties of Some Rare-Earth Isotopes
64By01 F.W.Byron, Jr., M.N.McDermott, R.Novick, B.W.Perry, E.B.Saloman - Phys. Rev. 134, A47 (1964)
Spin and Nuclear Moments of 245-Day Zn^{65}; Redetermination of the hfs of Zn^{67} and $t(^3P_1)$ of Zinc
64By03 F.W.Byron,Jr., M.N.McDermott, R.Novick, B.W.Perry, E.B.Saloman - Phys. Rev. 136, B1654 (1964)
Quadrupole Moments of Odd-Neutron Nuclei; Spin and Moments of 14-Year Cd^{113m}
64Ca11 J.A.Cameron, I.A.Campbell, J.P.Compton, R.A.G.Lines - Phys. Letters 10, 24 (1964); Erratum Phys.Letters 10, 291(1964)
Nuclear Orientation of Ir^{191m} in Iron
64Ca15 J.A.Cameron, I.A.Campbell, J.P.Compton, R.A.G.Lines, N.J.Stone - Nucl. Phys. 59, 475 (1964)
Nuclear Polarization of Ir^{192} in Iron
64Ch06 Y.W.Chan, W.B.Ewbank, W.A.Nierenberg, H.A.Shugart - Phys.Rev. 133, B1138 (1964)
Nuclear Spins and Hyperfine-Structure Separations of Silver-112 and Silver-113
64Ch10 R.-J.Champeau - J. Phys. (Paris) 25, 825 (1964)
Determination Spectroscopique du Moment Quadrupolaire du Noyau de ^{241}Pu
64Ch26 S.H.Charap, E.L.Boyd - Phys.Rev. 133, A811 (1964)
Application of Spin-Wave Theory to EuS
64Ch27 E.L.Church, A.Schwarzschild, J.Weneser - Phys.Rev. 133, B35 (1964)
Sign of the Interference Particle Parameter in Conversicn-Electron Directional Correlation
64Co08 R.L.Cohen - Phys. Rev. 134, A94 (1964)
Mossbauer Effect Studies of Nuclear Hyperfine Structure in Tm^{169} in Fe_2Tm
64Co09 R.L.Cohen, J.H.Wernick - Phys. Rev. 134, B503 (1964)
Nuclear Hyperfine Structure in Er^{166}
64Co10 M.Cordey-Hayes - J. Inorg. Nucl. Chem. 26, 915 (1964)
An Interpretation of the Mossbauer Spectra of Some Inorganic Tin Compounds in Terms of the Oxidation State of the Tin Atom
64Co32 S.G.Cohen, I.Nowik, S.Ofer - Rev. Mod. Phys. 36, 378 (1964)
Recent Developments in Rare-Earth Mossbauer Studies. II
64De08 H.de Waard, J.Heberle - Phys.Rev. 136, B1615(1964)
Magnetic Moment of the 26.8-keV State of ^{129}I Measured with the Aid of Superconducting Magnets
64De19 M.Deutsch, A.Buyrn, L.Grodzins - Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Ed., North-Holland Publishing Co., Amsterdam, p.186 (1964)
Magnetic Moments of 5$^-$ States in Sn^{118} and Sn^{120}
64Do07 H.Dobler, G.Petrich, S.Hufner, P.Kienle, W.Wiedemann, H.Eicher - Phys.Letters 10, 319(1964)
Hyperfine Splitting and g-Factor of the 80.6 keV State of Er^{166}
64Dr02 L.E.Drain - Phys.Letters 11, 114(1964)
The Magnetic Moment of Ni^{61}
64Ea02 W.Easley, J.Huntzicker, E.Matthias, S.S.Rosenblum, D.A.Shirley - Bull.Am.Phys.Soc. 9, No.4, 435, ED8(1964)
Nuclear Zeeman Effect in ^{193}Ir
64Eg01 V.N.Egorov - Opt.i Spektroskopiya 16, 549(1964); Opt.Spectry.(USSR) 16, 301(1964)
Hyperfine Structure of the Atomic Spectrum and Nuclear Moments of the Thorium Isotope ^{229}Th

64En01 W.Engels, W.Delang, U.Wehmann, E.Bodenstedt - Phys.Letters 11, 57(1964)
The g-Factor of the 248 keV State of Se^{77}
64Ew02 W.B.Ewbank, H.A.Shugart - Phys.Rev. 135, A358(1964)
Hyperfine-Structure Separations of Au^{191} and Au^{193}
64Fa11 A.Faist, E.Geneux, S.Koide - J.Phys.Soc.Japan 19, 2299(1964)
Frequency Shift in Magnetic Transitions Between Hyperfine Levels of $^2P_{3/2}$ States of Cs^{133}
64Ga12 L.Gabla - Acta Phys.Polon. 25, 617(1964); Nucl.Sci.Abstr. 18, 4126, Abstr. 30743(1964)
Nuclear Electric Quadrupole Moment of Radioactive Nuclide ^{152}Eu Obtained by the Isotope Shift Effect in the Atomic Spectrum
64Go06 A.C.Gossard, V.Jaccarino, J.H.Wernick - Phys.Rev. 133, A881(1964)
Ytterbium NMR: Yb^{171} Nuclear Moment and Yb Metal Knight Shift
64Go09 L.S.Goodman, K.Schlupmann - Z.Physik 178, 235(1964)
Bestimmung der Kernmomente des Ho^{165} Aus der Hyperfeinstruktur des Grundzustandes im Ho I-Spektrum
64Gr03 L.Grodzins, E.R.Bauminger - Bull.Am.Phys.Soc. 9, No.4, 497, KA4(1964); Erratum Bull.Am.Phys.Soc. 9, No.5, 606(1964)
Magnetic Moment of the 1st Excited State of ^{149}Sm
64Gr05 R.W.Grant, M.Kaplan, D.A.Keller, D.A.Shirley - Phys.Rev. 133, A1062(1964)
Nuclear Zeeman Effect in Gold Atoms Dissolved in Iron, Cobalt, and Nickel
64Gr12 L.Grodzins - Priv.Comm.(August 1964)
64Gr27 L.Grodzins, N.Blum - Rev.Mod.Phys. 36, 470(1964)
The Distribution of Nuclear Magnetism in the Ground and 14.4-keV States of Fe^{57}
64Gu01 C.Gunther, W.Engels, E.Bodenstedt - Phys.Letters 10, 77(1964)
The g(R)-Factor of the 2+ Rotational State of Ytterbium 172
64Gu03 S.Gustafsson, K.Johansson, E.Karlsson, A.G.Svensson - Phys.Letters 10, 191 (1964)
On the Possible Core-Polarization Effects in the Magnetic Moments of States in Pb^{207}
64Gu07 C.Gunther, I.Lindgren - Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Eds., North-Holland Publishing Co., p.357(1964)
Paramagnetic Effects
64Ha22 D.W.Hafemeister, G.DePasquali, H.deWaard - Phys.Rev. 135, B1089(1964)
Solid State and Nuclear Results from Mossbauer Studies with I^{129}
64Ha46 R.A.Haberstroh, W.J.Kossler, O.Ames, D.R.Hamilton - Phys.Rev. 136, B932(1964)
Hyperfine Structure and Nuclear Moments of 20.4-min C^{11}
64He21 J.Heberle, M.Schulhof, S.S.Hanna - Rev.Mod.Phys. 36, 407(1964)
Mossbauer Effect in Fe^{57} and Sn^{119} Metals in Large External Magnetic Fields
64Ho20 O.W.Howarth, R.E.Richards - Proc.Phys.Soc.(London) 84, 326(1964)
The Nuclear Electric Quadrupole Moment of ^{50}V
64Ho22 K.Horai - J.Phys.Soc.Japan 19, 2241(1964)
Electron Spin Resonance of Eu^{2+} and Gd^{3+} in CaF_2
64Hu05 J.J.Huntzicker, R.B.Frankel, N.J.Stone, D.A.Shirley - Bull.Am.Phys.Soc.9, No.7, 741, Y2(1964)
Mossbauer Effect in Te^{125}
64In01 R.Ingalls - Phys.Rev. 133, A787(1964)
Electric-Field Gradient Tensor in Ferrous Compounds
64Ja11 D.A.Jackson, D.H.Tuan - Proc.Roy.Soc.(London) 280A, 323(1964)
Hyperfine Structures of the Resonance Line of the Arc Spectra and Nuclear Quadrupole Moments of the Isotopes 135 and 137 of Barium
64Ke02 L.Keszthelyi, I.Berkes, I.Dezsi, B.Molnar, L.Pocs - Phys.Letters 8, 195(1964)
Measurement of the g-Factor of the 412 keV State in Hg^{198}
64Kh01 J.M.Khan, N.Braslau, G.O.Brink - Phys.Rev. 134, A45(1964)
Hyperfine Structure Separation and Magnetic Moment of K^{42}
64Ki03 P.Kienle - Rev.Mod.Phys. 36, 372(1964)
Recent Developments in Rare-Earth Mossbauer Studies. I
64Kl01 H.Kleiman, S.P.Davis, T.Aung - Phys.Letters 13, 212(1964); Erratum Phys.Letters 15, 296(1965)
The Spin and Moments of Hg^{193}
64Ko13 H.J.Korner, E.Gerdau, J.Heisenberg, J.Braunsfurth - Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Ed., North-Holland Publishing Co., p.200(1964)
Measurement of the g(R)-Factor of the Rotational Level in W^{184}
64Ko15 H.J.Korner, K.Auerbach, J.Braunsfurth, U.Ortabasi, J.Heisenberg - Compt.Rend.Congr.Intern.Phys.Nucl., Paris, P.Gugenberger, Ed., Centre National de la Recherche Scientifique, Paris, Vol.II, p.481(1964)
g-Factor Measurements on the First Excited States of Pd^{106}, Pr^{143}, Hg^{198} and Pb^{207}

64Ko16 H.J.Korner, J.Braunsfurth, H.F.Nesemann, S.J.Skorka, B.Zeitnitz - Compt.Rend.Congr.Intern.Phys.Nucl., Paris, P.Gugenberger, Ed., Centre National de la Recherche Scientifique, Paris, Vol.II, p.487 (1964)
g-Factor of the 136 keV 5/2⁻ State of Iron-57

64La08 A.Landman, R.Novick - Phys.Rev. 134, A56 (1964)
Level Crossing Determination of $\tau(^1P_1)$ and g(J) $(^3P_1)$ in Zinc and the hfs of Zn^{65} and Zn^{67}

64Li06 G.Liljegren, I.Lindgren, L.Sanner, K.E.Adelroth - Arkiv Fysik 25, 107(1964)
Nuclear Ground-State Spin and Magnetic Moment of Au^{190}

64Lu04 A.Lurio, R.Novick - Phys.Rev. 134, A608(1964)
Lifetime and hfs of the (5s5p) $^1P_1$ State of Cadmium

64Lu09 A.Lurio - Phys.Rev. 136, A376(1964)
Lifetime of the First Excited $^1P_1$ State of Mg and Ba; hfs of Ba^{137}

64Mc06 M.N.McDermott, R.Novick, B.W.Perry, E.B.Saloman - Phys.Rev. 134, B25(1964)
Spin and Nuclear Moments of 2.3-Day Cd^{115} and 43-Day Cd^{115m}

64Mu11 K.Murakawa - J.Phys.Soc.Japan 19, 1539(1964)
Quadrupole Coupling in the Hyperfine Structure of the Spectrum of I II

64Na05 H.Nagasawa, S.K.Takeshita, Y.Tomono - J.Phys.Soc.Japan 19, 764(1964)
Nuclear Quadrupole Moment of Vanadium

64On02 K.Ono, A.Ito, T.Fujita - J.Phys.Soc.Japan 19, 2119 (1964); See Also 62On02
The Mossbauer Study of the Ferrous Ion in $FeCl_2$

64Pe06 G.J.Perlow - Phys.Rev. 135, B1102(1964)
Ratio of the Quadrupole Moment of the First Excited State of Xe^{129} to That of the Ground State of Xe^{131}

64Pe11 J.M.Pendlebury, K.F.Smith - Proc.Phys.Soc.(London) 84, 849(1964)
Hyperfine Structure Measurements in ^{75}As, ^{31}P and ^{53}Cr

64Pe15 G.J.Perlow, S.L.Ruby - Phys.Letters 13, 198(1964)
Quadrupole Moment of the First Excited State in I^{127} by the Mossbauer Effect

64Po04 H.Pollak - Nuovo Cimento 33, 1067(1964)
The Ground-State Wave Function of ^{210}Bi

64Re03 O.Redi, H.H.Stroke - Phys.Letters 8, 257(1964)
Spin and Nuclear Moments of Hg^{203}

64Ro04 G.K.Rochester, K.F.Smith - Phys.Letters 8, 266(1964)
The Spins and Moments of Ag^{108} and Cu^{66}

64Ro11 J.S.Ross, K.Murakawa - J.Phys.Soc.Japan 19, 249(1964)
Nuclear Moments of Yb^{173}

64Ru07 M.Rubenstein, G.H.Stauss, J.J.Krebs - Phys.Letters 12, 302(1964)
Nuclear Magnetic Resonance of Cr^{53} in Antiferromagnetic Cr_2O_3

64Sc16 M.Schmorak, H.Wilson, P.Gatti, L.Grodzins - Phys.Rev. 134, B718(1964)
Gyromagnetic Ratio of the 4⁺ State of Ce^{140}

64Sc21 R.P.Scharenberg, J.D.Kurfess, G.Schilling, J.W.Tippie, P.J.Wolfe - Nucl.Phys. 58, 658 (1964); R.P.Scharenberg - Priv.Comm. (April 1972)
Pulsed Beam Measurement of the Gyromagnetic Ratio of the 100 keV 2⁺ State in Tungsten 182

64Se13 J.A.Seitchik, A.C.Gossard, V.Jaccarino - Phys.Rev. 136, A1119(1964)
Knight Shifts and Susceptibilities of Transition Metals: Palladium

64Sh29 R.R.Sharma, T.P.Das - J.Chem.Phys. 41, 3581(1964)
Crystalline Fields in Corundum-Type Lattices

64Sp02 H.Spehl, T.Schmidt, H.Rieseberg, G.Busch - Nucl.Phys. 52, 315 (1964); H.Spehl - Priv.Comm. (April 1972)
Der g-Faktor des 155 keV-2+ Niveaus von Os^{188}

64Sp09 H.Spehl - Z.Physik 179, 482 (1964)
Die relativen Quadrupolmomente der ersten angeregten 2⁺-Zustande von Os^{188}, Os^{190} und Os^{192}

64St20 N.J.Stone, R.B.Frankel, J.J.Huntzicker, D.A.Shirley - Bull.Am.Phys.Soc. 9, No.7, 718, K7(1964)
Nuclear Polarization of Sb^{125}, Using Ge(Li) γ-Ray Detectors

64St29 R.M.Steffen, H.Frauenfelder - Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Eds., North-Holland Publishing Co., Amsterdam, p.1 (1964)
The Influence of Extranuclear Fields on Angular Correlations

64Su01 K.Sugimoto, A.Mizobuchi, K.Nakai - Phys.Rev. 134, B539(1964)
Quadrupole Moment of the Second Excited State of F^{19}

64Su02 R.G.Summers-Gill - Priv.Comm.(July 1964)

64To02 F.S.Tomkins - Priv.Comm.(August 1964)

64To05 W.J.Tomlinson III, H.H.Stroke - Nucl.Phys. 60, 614(1964)
Nuclear Moments and Isotope and Isomer Shifts of Neutron-Deficient Mercury Isotopes 195, 195m, 194, 193, 193m and 192

64Va27 H.Van Kempen, A.R.Miedema, W.J.Huiskamp - Physica 30, 229 (1964)
Heat Capacities of the Metals Terbium and Holmium below 1°K

64Wa01 W.T.Walter, M.J.Stavn - Bull.Am.Phys.Soc. 9, No.1, 10, AC3(1964)
Nuclear Orientation and Magnetic Moment of Hg^{195}
64We10 G.K.Wertheim - Mossbauer Effect: Principles and Application, Academic Press, New York (1964)
64Wh01 L.Wharton, L.P.Gold, W.Klemperer - Phys.Rev. 133, B270(1964)
Quadrupole Moment of Li^{6}
64Wh05 M.B.White, E.Lipworth, S.Alpert - Phys.Rev. 136, B584(1964)
Hyperfine Structure and Nuclear Moments of Br^{80} and Br^{80m}
64Wi09 R.Winkler - Naturwissenschaften 51, 236(1964)
Hyperfeinstruktur des Rhenium-Grundzustandes und Magnetisches Kernmoment von ^{186}Re and ^{188}Re
65Ab01 M.Abraham, R.A.Weeks, G.W.Clark, C.B.Finch - Phys.Rev. 137, A138 (1965)
Electron Spin Resonance of Rare-Earth Ions in Thorium Oxide: Yb^{3+} and Er^{3+}
65Ad03 K.E.Adelroth, I.Lindgren, M.Olsmats, L.Sanner - Arkiv Fysik 30, 111 (1965)
The Hyperfine Structure of the 16 Hour State in Te^{119}
65Ag01 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee - Nucl.Phys. 63, 685 (1965); Y.K.Agarwal - Priv.Comm. (April 1972)
Magnetic Moment of the 160 keV State in Cs^{133}
65Ag02 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee - Phys.Letters 14, 214 (1965); Y.K.Agarwal - Priv.Comm. (April 1972)
Magnetic Properties of K = 1/2 Rotational Band in Tm^{171}
65Ag03 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee, D.C.Ephraim - Phys.Letters 19, 578 (1965); Y.K.Agarwal - Priv.Comm. (April 1972)
Magnetic Moment of the 405 keV $(7/2^-)$ Level in ^{211}Bi
65Al10 D.Ali, I.Maleh, R.Marrus - Phys.Rev. 138, B1356 (1965)
Hyperfine Structure and Nuclear Moments of Promethium-148 and Erbium-165
65Al16 D.Ali - Nucl.Phys. 71, 441 (1965)
Spins of Gd^{153}, Dy^{159} and Pm^{148}
65Am01 O.Ames, E.A.Phillips, S.S.Glickstein - Phys.Rev. 137, B1157 (1965)
Spin, Hyperfine Structure, and Nuclear Magnetic Dipole Moment of 23-sec Na^{21}
65An02 P.Da R.Andrade, A.Maciel, C.S.Muller, J.Wirth, F.C.Zawislak - Nucl.Phys. 66, 545 (1965)
Angular Correlation Measurements in ^{99}Tc
65Ar01 L.Armstrong,Jr., R.Marrus - Phys.Rev. 138, B310 (1965)
Magnetic Moments of Rhenium-186 and Rhenium-188 and Analysis of the Rhenium Hyperfine Structure
65Ar05 C.Arnould, S.Gerstenkorn - Compt.Rend. 261, 1488 (1965)
Structures Hyperfines des Niveaux Fondamentaux du Terbium. Signe et Moment Quadrupolaire Nucleaire du Terbium 159
65Ba42 R.G.Barnes, F.Borsa, S.L.Segel, D.R.Torgeson - Phys.Rev. 137, A1828 (1965)
Knight Shift Anisotropy in Scandium and Yttrium and Nuclear Quadrupole Coupling in Scandium
65Ba49 J.M.Baker, J.R.Chadwick, G.Garton, J.P.Hurrell - Proc.Roy.Soc.(London) 286A, 352 (1965)
E.p.r. And Endor of Tb^{4+} in Thoria
65Be25 N.Benczer-Koller, J.R.Harris, G.M.Rothberg - Phys.Rev. 140, B547 (1965)
Magnetic Moment of the 99-keV First Excited State of Pt^{195}
65Be34 R.G.Bessent, W.Hayes - Proc.Roy.Soc.(London) 285A, 430 (1965)
Electron Nuclear Double Resonance of Divalent Thulium in Calcium Fluoride
65Bi14 L.C.Biedenharn, P.J.Brussaard - Coulomb Excitation, Clarendon Press, Oxford (1965)
65Bo08 J.D.Bowman, J.De Boer, F.Boehm - Nucl.Phys. 61, 682 (1965)
The Electromagnetic Properties of Tm^{169}
65Bu14 J.I.Budnick, R.E.Gegenwarth, J.H.Wernick - Bull.Am.Phys.Soc. 10, No.3, 317, BB15 (1965)
Nuclear Magnetic Resonance of Gd^{155}, Gd^{157}, and Al^{27} in Ferromagnetic $GdAl_2$
65Ca04 F.P.Calaprice, E.D.Commins, D.A.Dobson - Phys.Rev. 137, B1453 (1965)
Beta-Decay Asymmetry and Nuclear Magnetic Moment of Argon-35
65Ca12 I.A.Campbell, N.J.Stone, B.G.Turrell - Proc.Roy.Soc.(London) 283A, 379 (1965)
The Polarization of Radioactive Gold Nuclei in Iron
65Ch06 W.J.Childs, L.S.Goodman - Phys.Rev. 137, A35 (1965)
Magnetic Hyperfine Structure of the $^3P_1$ and $^3P_2$ Metastable States of $Sn^{115,117,119}$
65Ch08 Y.W.Chan, W.B.Ewbank, W.A.Nierenberg, H.A.Shugart - Phys.Rev. 137, B1129 (1965)
Hyperfine-Structure Separations and Magnetic Moments of Gold-194, 195, And 196
65Ch14 Y.W.Chow, L.Grodzins, P.H.Barrett - Phys.Rev.Letters 15, 369 (1965)
Mossbauer Scattering: The Gyromagnetic Moments of First 2^+ States in W^{182} and W^{186} and Os^{186} and Os^{188}

65Ch19 K.H.Channappa, J.M.Pendlebury - Proc.Phys.Soc.(London) 86, 1145 (1965)
Hyperfine Structure Measurements in Some Low-Lying Multiplets of ^{47}Ti, ^{49}Ti, ^{59}Co and ^{105}Pd

65Co05 R.L.Cohen - Phys.Rev. 137, A1809 (1965)
Mossbauer Effect in Dy^{160}

65Co20 E.R.Cohen, J.W.M.DuMond - Rev.Mod.Phys. 37, 537 (1965)
Our Knowledge of the Fundamental Constants of Physics and Chemistry in 1965

65Cu05 J.W.Culvahouse, L.V.Holroyd, J.L.Kolopus - Phys.Rev. 140, A1181 (1965); Erratum Phys.Rev. 151, 734 (1966)
F Centers in SrO and the Quadrupole Moment of Sr^{87}

65Da10 J.M.Daniels - Oriented Nuclei: Polarized Targets and Beams, Academic Press, New York (1965)

65De31 S.R.de Groot, H.A.Tolhoek, W.J.Huiskamp - Alpha-, Beta- and Gamma-Ray Spectroscopy, Vol.II, K.Siegbahn, Ed., North-Holland Publishing Co., Amsterdam, p.1199 (1965)
Orientation of Nuclei at Low Temperatures

65Do11 B.M.Dodsworth, H.A.Shugart - Bull.Am.Phys.Soc. 10, No.4, 445, BC11 (1965)
Nuclear Spin of 45d iron-59

65Dr03 L.E.Drain, G.W.West - Phil.Mag. 12, 1061 (1965)
Nuclear Magnetic Resonance of Nickel and Titanium in Some Intermetallic Compounds

65Eb03 W.Ebert, O.Klepper, H.Spehl - Nucl.Phys. 73, 217 (1965); H.Spehl - Priv.Comm. (April 1972)
The Gyromagnetic Ratio of the First Excited 2$^+$ State of ^{182}W and ^{184}W

65Ei05 J.C.Eisenstein, M.H.L.Pryce - J.Res.Natl.Bur.Std. 69A, 217 (1965)
Electronic Structure and Magnetic Properties of the Neptunyl Ion

65Ev07 L.Evans, P.G.H.Sandars, G.K.Woodgate - Proc.Roy.Soc.(London) 289A, 108 (1965)
Relativistic Effects in Many Electron Hyperfine Structure II. Relativistic Quadrupole Interaction in Manganese

65Ev08 L.Evans, P.G.H.Sandars, G.K.Woodgate - Proc.Roy.Soc.(London) 289A, 114 (1965)
Relativistic Effects in Many Electron Hyperfine Structure. III. Relativistic Dipole and Quadrupole Interaction in Europium and Remeasurement of the Nuclear Magnetic Dipole Moments of ^{151}Eu and ^{153}Eu

65Ev09 A.G.Every, D.S.Schonland - Solid State Commun. 3, 205 (1965)
A Donor Electron Orbital for Nitrogen in Diamond

65Fa02 J.Faust, R.Marrus, W.A.Nierenberg - Phys.Letters 16, 71 (1965)
Direct Measurement of the Magnetic Moment of Plutonium-239

65Fr19 R.B.Frankel, D.A.Shirley, N.J.Stone - Phys.Rev. 140, A1020 (1965); Erratum Phys.Rev. 143, 334 (1966)
Cerium Magnesium Nitrate Temperature Scale from Nuclear Orientation

65Fr20 H.Frauenfelder, R.M.Steffen - Alpha-, Beta- and Gamma-Ray Spectroscopy, Vol.II, K.Siegbahn, Ed., North-Holland Publishing Co., Amsterdam, p.997 (1965)
Angular Correlations

65Gl08 G.Gluck - Ann.Phys.(Paris) 10, 673 (1965)
Etude du Deplacement Isotopique du Tungstene, de l'Osmium, du Neodyme

65Go06 G.Goldring, U.Smilansky - Phys.Letters 16, 151 (1965)
The Quadrupole Moment of the 2$^+$ State at 122 keV in ^{152}Sm

65Go14 V.I.Goldanskii, V.A.Trukhtanov, M.N.Devisheva, V.F.Belov - Phys.Letters 15, 317 (1965)
The Superexchange Inducing of Magnetic Fields on the Nuclei of Diamagnetic Atoms

65Gr18 T.A.Griffy, D.U.L.Yu - Phys.Rev. 139, B880 (1965)
Electron Scattering from Nuclear Magnetic Moments

65Gu01 C.Gunther, H.Blumberg, W.Engels, G.Strube, J.Voss, R.-M.Lieder, H.Luig, E.Bodenstedt - Nucl.Phys. 61, 65 (1965)
Observation of Dipole-Octupole Mixture in the Gamma-Decay of the 1174 keV Isomeric State of Yb^{172} and its Magnetic Moment

65Gu02 C.Gunther, G.Strube, U.Wehmann, W.Engels, H.Blumberg, H.Luig, R.M.Lieder, E.Bodenstedt, H.J.Korner - Z.Physik 183, 472 (1965)
Messung des g(R)-Faktors des 2$^+$-Rotationsniveaus von Dy^{160} nach der Spinrotationsmethode und Bestimmung der Multipolmischungen mehrerer γ-Ubergange im Zerfall des Tb^{160}

65Ha35 J.S.M.Harvey - Proc.Roy.Soc. (London) 285A, 581 (1965)
Hyperfine Structure in Ground Multiplets of ^{17}O and ^{19}F

65He10 H.Heuser - Z.Naturforsch. 20a, 490 (1965)
Magnetisches Moment des 0,57 Mev-Niveaus von Pb 207

65Ho06 G.Hohberg, K.Krebs, B.Schulz, R.Winkler - Z.Physik 186, 380 (1965)
Hyperfeinstruktur-Untersuchungen im Rhenium-I-Spektrum

65Hu01 S.Hufner, P.Kienle, W.Wiedemann, H.Eicher - Z.Physik 182, 499 (1965)
Hyperfine Fields in Erbium Metal
65Hu03 A.Huller, W.Wiedemann, P.Kienle, S.Hufner - Phys.letters 15, 269 (1965)
Hyperfine Splitting and g Factor of the 84-keV State in Yb^{170}
65Hu13 R.W.Huggins, J.H.Sanders - Proc.Phys.Soc. (London) 86, 53 (1965)
Nuclear Magnetic Moment Ratios Measured in High and Low Fields
65Hu14 J.P.Hurrell - Brit.J.Appl.Phys. 16, 755 (1965)
Electron Nuclear Double Resonance of Trivalent Gadolinium in Thoria
65Ik01 H.Ikushima, S.Hayakawa - J.Phys.Soc.Japan 20, 1517 (1965)
'Forbidden' Transitions in the Electron Spin Resonance of Mn^{2+} in the $BaTiO_3$ Single Crystal
65Jo12 K.Johansson, S.Gustafsson, A.G.Svensson, R.Wappling - Phys.Letters 17, 277 (1965)
Nuclear g-Factor of the 3.2 MeV 5- State in the Double-Closed Shell Nucleus ^{208}Pb
65Ka02 E.Karlsson, E.Matthias, S.Gustafsson, K.Johansson, A.G.Svensson, S.Ogaza, P.da Rocha Andrade - Nucl.Phys. 61, 582(1965)
The Magnetic Moment of the 3/2+ State in Tl^{203} and the Question of Core Excitations
65Ka03 J.Kaufmann - Z.Physik 182, 217(1964)
Zum Verhaltnis der Kernquadrupolmomente der Beiden Molybdanisotope Mo^{95} und Mo^{97}
65Ka04 G.M.Kalvius - Phys.Rev. 137, B1441(1965)
Mossbauer Effect in Yb^{171}
65Ka05 E.Karlsson, E.Matthias, A.G.Svensson, K.Johansson - Nucl.Phys. 64, 8 (1965); E.Karlsson - Priv.Comm. (April 1972)
The Magnetic Moment of the 9/2+ Rotational State in Lu^{175}
65Ke11 L.Keszthelyi, I.Berkes, I.Dezsi, L.Pocs - Nucl.Phys. 71, 662(1965)
The g Factors of the Excited States in ^{192}Os, ^{192}Pt and ^{194}Pt
65Ko12 H.J.Korner, U.Ortabasi - Nucl.Phys. 70, 28(1965)
Measurement of the g-Factor of the First Excited State in Pd^{106}
65Ko22 C.W.Kocher - Phys.Letters 14, 287(1965)
The Iron-57 Mossbauer Effect in Some Stainless Steels
65Le16 R.M.Levy, D.A.Shirley - Phys.Rev. 140, B811(1965)
Hyperfine Structure in the 2084-keV State of Ce^{140}
65Li12 I.Lindgren - Arkiv Fysik 29, 553(1965)
Analysis of Nuclear Dipole Moments Determined with Nuclear Magnetic Resonance
65Lo11 P.R.Locher, S.Geschwind - Phys.Rev. 139, A991(1965)
Electron-Nuclear Double Resonance of Fe^{57} in MgO
65Lo12 J.H.N.Loubser, L.du Preez - Brit.J.Appl.Phys. 16, 457(1965)
New Lines in the Electron Spin Resonance Spectrum of Substitutional Nitrogen Donors in Diamond
65Lu02 J.Lubbers, A.R.Miedema, W.J.Huiskamp - Physica 31, 153(1965)
Cooling by Means of Anisotropic Hyperfine Structure Coupling; Orientation and Relaxation of Nuclear Spin Systems in Strong Magnetic Fields
65Lu06 G.W.Ludwig - Phys.Rev. 137, A1520(1965)
Paramagnetic Resonance Study of a Deep Donor in Silicon
65Ma19 I.Maleh - Phys.Rev. 138, B766(1965)
Electronic Angular Moments of Some Low-Lying States of Cerium; Nuclear Spin of Cerium-143
65Ma25 B.A.Mamyrin, A.A.Frantsuzov - Zh.Eksperim.i Teor.Fiz. 48, 416(1965); Soviet Phys.JETP 21, 274(1965)
Measurement of the Magnetic Moment of the Proton in Units of the Nuclear Magneton
65Ma27 E.Matthias, S.S.Rosenblum, D.A.Shirley - Phys.Rev. 139, B532(1965)
g Factor of the 90-keV Level in Ru^{99} and the Paramagnetic Correction in Transition Atoms
65Ma34 E.Matthias, D.A.Shirley, J.S.Evans, R.A.Naumann - Phys.Rev. 140, B264(1965)
Half-Life and g Factor of the 75-keV Level of Rh^{100}
65Mu07 W.Muller, A.Steudel, H.Walther - Z.Physik 183, 303(1965)
Die Hyperfeinstruktur in den $4f^7$ 6s 6p-Termen des Eu I und die Elektrischen Kernquadrupolmomente von Eu^{151} und Eu^{153}
65Mu15 K.Murakawa - J.Phys.Soc.Japan 20, 1094(1965)
Quadrupole Coupling in the Hyperfine Structure of Hg I
65No04 I.Nowik, H.H.Wickman - Phys.Rev. 140, A869(1965)
Magnetic Hyperfine Interactions in Dysprosium Aluminum Garnet
650f01 S.Ofer, E.Segal, I.Nowik, E.R.Bauminger, L.Grodzins, A.J.Freeman, M.Schieber - Phys.Rev. 137, A627(1965)
Hyperfine Interactions in the Ground State and 22-keV State of Sm^{149} in Ferrimagnetic Compounds of Samarium

65Of02 S.Ofer, M.Rakavy, E.Segal, B.Khurgin - Phys.Rev. 138, A241(1965)
Mossbauer Effect in Dy^{161} in Metallic Dysprosium, $DyFe_2$, and $DyAl_2$
65Of03 S.Ofer, M.Rakavy, E.Segal - Nucl.Phys. 69, 173(1965)
The Magnetic Moment of the 86.7 keV Level of Dy^{160}
65Pa15 M.Pasternak, A.Simpoulos, Y.Hazony - Phys.Rev. 140, A1892(1965)
Mossbauer Effect in Molecular Iodine Crystals
65Pe15 G.J.Perlow, C.E.Johnson, W.Marshall - Phys.Rev. 140, A875(1965)
Mossbauer Effect of Fe^{57} in a Cobalt Single Crystal
65Ph02 E.A.Phillips, O.Ames, S.S.Glickstein - Phys.Rev. 138, B773(1965)
Spin, Hyperfine Structure, and Nuclear Magnetic Dipole Moment of 7.7-min K^{38}
65Ph04 E.A.Phillips, W.Happer, J.D.McCullen - Phys.Rev. 140, B555(1965)
Spin, Hyperfine Structure, and New Magnetic Moment of 21-min $Mn^{52}m$
65Re03 J.Reader, J.Sugar - Phys.Rev. 137, B784(1965); Erratum Phys.Rev. 140, AB3(1965)
Nuclear Magnetic Moment of Pr^{141} from the Hyperfine Structure of Doubly Ionized Praseodymium
65Re18 O.Redi, H.H.Stroke - Bull.Am.Phys.Soc. 10, No.4, 456, BH13(1965)
Hyperfine Structure of Hg^{193} and $Hg^{193}m$ by the Level-Crossing Method
65Ri03 G.J.Ritter - Can.J.Phys. 43, 770(1965)
Hyperfine Structure of the Level 2 $^2P_{1/2}$ of Lithium-6 and Lithium-7
65Ro13 M.M.Robertson, J.E.Mack, V.W.Cohen - Phys.Rev. 140, B820(1965)
Nuclear Spin and Magnetic Moment of Ar^{37}
65Sa22 L.Sanner, R.Djay, J.O.Jonsson, I.Lindgren, M.Olsmats, A.Rosen, B.Wannberg, K.E.Adelroth - Arkiv Fysik 30, 540(1965)
Atomic Beam Resonance on Radioactive Nuclei
65Sc05 R.P.Scharenberg, J.D.Kurfess, G.Schilling, J.W.Tippie, P.J.Wolfe - Phys.Rev. 137, B26 (1972); R.P.Scharenberg - Priv.Comm. (April 1972)
Pulsed-Beam Measurements of the Gyromagnetic Ratio of the 111-keV 2^+ State in Tungsten-184
65Sc08 H.A.Schussler - Z.Physik 182, 289(1965)
Prazisionsmessung der Hyperfeinstruktur des $5\,^2P_{3/2}$-Terms und des $6\,^2P_{3/2}$-Terms von Rb^{85} und Rb^{87}
65Sc13 R.G.Schlecht, M.B.White, D.W.McColm - Phys.Rev. 138, B306(1965)
Hyperfine Structures of Re^{186} and Re^{188}
65Se11 J.A.Seitchik, V.Jaccarino, J.H.Wernick - Phys.Rev. 138, A148(1965)
Knight Shift Studies of Transition Metals: Rhodium and Rhodium Intermetallic Compounds
65Se12 D.Seyboth, F.E.Obenshain, L.D.Roberts, J.O.Thomson - Bull.Am.Phys.Soc. 10, No.4, 444, BC7(1965)
Magnetic Moment of the 77.3-keV First Excited State of ^{197}Au
65Sm01 W.W.Smith - Phys.Rev. 137, A330(1965)
Hyperfine Structure of Hg^{193}*, Hg^{195}, and Hg^{195}* by Zeeman-Level Crossings
65Sm04 K.F.Smith, P.J.Unsworth - Proc.Phys.Soc.(London) 86, 1249(1965)
The Hyperfine Structure of ^{167}Er and Magnetic Moments of $^{143,145}Nd$ and ^{167}Er by Atomic Beam Triple Magnetic Resonance
65Sp03 H.Spehl, O.Klepper, H.Ropke - Nucl.Phys. 63, 477 (1972); H.Spehl - Priv.Comm. (April 1972)
The Gyromagnetic Ratio of the First Excited 2^+ State of Pt^{194}
65St18 G.M.Stinson, R.G.Summers-Gill - Phys.Can. 21, No.2, 42, Abstr. 12.7(1965)
The Nuclear Spin of Ag-109m
65Ta14 P.N.Tandon, H.G.Devare - Proc.Nucl.Phys. And Solid State Phys.Symp., Nucl.Phys., Calcutta, p.13 (1965)
The Magnetic Moments of the First Excited States of I^{127}, I^{131} and Pm^{149}
65Ti02 J.W.Tippie, R.P.Scharenberg - Phys.Letters 16, 154 (1965); R.P.Scharenberg - Priv.Comm. (April 1972)
Measurement of the Gyromagnetic Ratio of the 84 keV 2^+ State in Ytterbium 170
65We02 G.A.Westenbarger, D.A.Shirley - Phys.Rev. 138, A161(1965)
Polarization of Silver Nuclei in Metallic Iron and Nickel
65Wh03 M.B.White, S.S.Alpert, S.Penselin, T.I.Moran, V.W.Cohen, E.Lipworth - Phys.Rev. 137, B477(1965)
Hyperfine Structure of $Lu^{176}m$ by the Method of Atomic Beams
65Wi09 R.Winkler - Phys.Letters 16, 156(1965)
Hyperfeinstruktur-Anomalie und Quadrupolmomente von $^{151,153}Eu$
65Wi14 A.Winther, J.de Boer - Cal.Inst.Tech.Technical Report (1965); Reprinted in 66A122
A Computer Program for Multiple Coulomb Excitation
65Wo05 R.D.Worley, V.J.Ehlers, W.A.Nierenberg, H.A.Shugart - Phys.Rev. 140, B1483(1965)
Hyperfine-Structure Separation, Nuclear Magnetic Moment, and Hyperfine-Structure Anomaly of Cesium-131

65Zu01 G.zu Putlitz, A.Schenck - Z.Physik 183, 428(1965)
Zur Hyperfeinstruktur des 6 $^2P_{3/2}$-Terms von Rb^{87}
66Ac01 H.Ackermann - Z.Physik 194, 253(1966)
Die Hyperfeinstruktur des $3^2P_{3/2}$-Zustands von Natrium im Starken Magnetfeld
66Ac02 H.L.Acker, G.Backenstoss, C.Daum, J.C.Sens, S.A.De Wit - Nucl.Phys. 87, 1(1966)
Measurement and Analysis of Muonic X-Ray Spectra in Spherical Nuclei
66Ad03 K.E.Adelroth, I.Lindgren, R.Djay, A.Rosen - Arkiv Fysik 31, 549(1966)
Nuclear Spin and Magnetic Moment of the Ground State of Mn^{52}
66Ag01 Y.K.Agarwal, C.V.K.Baba - Proc.Nucl.Phys. and Solid State Phys.Symp., Nucl.Phys., Bombay, p.181 (1966); CONF-660221; Y.K.Agarwal - Priv.Comm. (April 1972)
Magnetic Moment of the 280 keV (5/2$^-$) Level in As^{75}
66Ag02 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee - Nucl.Phys. 79, 437 (1966); Y.K.Agarwal - Priv.Comm. (April 1972)
Measurement of the g-Factors of 2$^+$ States in Even Nuclei Utilizing Hyperfine Fields in Iron Lattice (I). The 316 keV State in ^{192}Pt and 328 and 622 keV States in ^{194}Pt
66Al22 K.Alder, A.Winther - Coulomb Excitation (A Collection of Reprints with an Introductory Review), Academic Press, New York (1966)
66An02 P.Da R.Andrade, A.Maciel, J.D.Rogers, J.Wirth, F.C.Zawislak - Nucl.Phys. 77, 298(1966)
Measurement of the g-Factor of the 204 keV Level of ^{95}Mo
66Ar04 L.Armstrong, Jr., R.Marrus - Phys.Rev. 144, 994(1966)
Nuclear Moments of Americium-241 and 16-h Americium-242 and Analysis of the Hyperfine Fields
66Ar11 J.O.Artman - Phys.Rev. 143, 541(1966)
Electric-Field-Gradient Calculations in Transition-Metal Sesquioxides
66Ar18 C.Arnoult, S.Gerstenkorn - J.Opt.Soc.Am. 56, 177 (1966)
Experimental and Theoretical Hyperfine Structure of Low-Lying Levels of Terbium $4f^85d6s^2$ Configuration; Quadrupole Moment of ^{159}Tb
66At01 U.Atzmony, S.Ofer - Phys.Rev. 145, 915(1966)
Mossbauer-Effect Studies of the 97-keV Level of Eu^{153}
66At03 M.Atac, P.Debrunner, H.Frauenfelder - Phys.Letters 21, 699(1966)
Mossbauer Scattering in ^{195}Pt
66At05 U.Atzmony, E.R.Bauminger, S.Ofer - Nucl.Phys. 89, 433(1966)
Mossbauer Effect Studies of the 58 keV Level of ^{159}Tb
66Au05 K.Auerbach, B.Harms, K.Siepe, G.Wittkemper, H.J.Korner - Phys.Letters 22, 299(1966)
Gyromagnetic Ratio of the 564 keV State in ^{122}Te
66Au06 K.Auerbach, K.Siepe, J.Wittkemper, H.J.Korner - Phys.Letters 23, 367(1966)
Gyromagnetic Ratios of the First Excited States in ^{100}Ru, ^{102}Ru and ^{106}Pd
66Ba20 M.Baumann, W.Hartmann, H.Kruger, A.Oed - Z.Physik 194, 270(1966)
Die Hyperfeinstruktur des Angeregten $3^2P_{3/2}$-Zustandes von Natrium
66Be25 E.Belorizky, Y.Ayant, D.Descamps, Y.M.D'Aubigne - J.Phys.(Paris) 27, 313(1966)
Etude de la Structure Hyperfine de l'Ion Er^{3+} dans un Monocristal de MgO
66Be50 H.Benoit, R.Ribotta - Compt.Rend. 262B, 780(1966)
Determination Directe du Signe et de la Valeur du Rapport Gyromagnetique du Proton. Application a la Mesure de Faibles Vitesses de Rotation
66Bl05 J.Blok, D.A.Shirley - Phys.Rev. 143, 911(1966)
Nuclear Orientation of La^{140}, Eu^{154}, Gd^{159}, Lu^{177} and Lu^{177m} by Sternheimer Antishielding
66Bl11 A.G.Blachman, D.A.Landman, A.Lurio - Phys.Rev. 150, 59(1966)
Hyperfine Structure $^2D_{5/2}$ and $^4F_{9/2}$ States of Ag^{107} and Ag^{109}
66Bl17 J.Blok, D.A.Shirley, N.J.Stone - Phys.Rev. 143, 78 (1966)
Temperature Scale for Neodumium Ethylsulfate below 1^{0}K
66Bo11 D.Bosch, F.Pobell, P.Kienle - Phys.Letters 22, 262(1966)
Magnetic Fields at ^{119}Sn in Rare Earth Metals
66Br03 H.H.Brown, J.G.King - Phys.Rev. 142, 53(1966)
Hyperfine Structure and Octopole Interaction in Stable Bromine Isotopes
66Bu01 H.Bucka, B.Budick, R.J.Goshen, S.Marcus - Phys.Rev. 144, 96(1966)
Lifetimes and g(J) Factors in Excited States of Chromium. Hyperfine Structure of Cr^{53}
66Bu14 B.Budick, L.A.Levin - Bull.Am.Phys.Soc. 11, No.2, 168, AB14(1966)
Hyperfine Structure in the $^2P_{3/2}$ State of the Stable Isotopes of Copper
66Bu15 B.Budick - Bull.Am.Phys.Soc. 11, No.4, 456, BB6(1966)
Lifetime and Hyperfine Structure of the $3^2D_{5/2}$ State in Aluminum
66Bu17 H.Bucka, B.Grosswendt, H.A.Schussler - Z.Physik 194, 193(1966)
Level Crossing-Experiment im $6^2P_{3/2}$-Term des Rb I-Spektrums

66Bu18 B.Budick, L.A.Levin - Bull.Am.Phys.Soc. 11, No.3, 328, BG14(1966)
Hyperfine Structure of the $^2P_{3/2}$ State of Silver
66Ca04 J.A.Cameron, J.P.Compton, R.A.G.Lines, G.V.H.Wilson - Proc.Phys.Soc.(London) 87, 927(1966)
Nuclear Orientation of ^{48}V Nuclei in Iron and Cobalt
66Ca15 E.H.Carlson - Bull.Am.Phys.Soc. 11, No.3, 377, GH3(1966)
NMR of Chlorine in Ferromagnetic $GdCl_3$
66Ch02 W.J.Childs, L.S.Goodman - Phys.Rev. 141, 15(1966); Erratum Phys.Rev. C1, 750 (1970)
Hyperfine Structure of Ge^{73} in the $^3P_1$ and $^3P_2$ Atomic States and the Nuclear Magnetic Dipole Moment of Ge^{71}
66Ch03 W.J.Childs, L.S.Goodman - Phys.Rev. 141, 176(1966)
Hyperfine Structure of the 9161 cm^{-1} $^2D_{5/2}$ State of Au^{197} and the Nuclear Electric-Quadrupole Moment
66Ch05 Y.W.Chan, V.J.Ehlers, W.A.Nierenberg - Phys.Rev. 144, 1020(1966)
Nuclear Spin and Magnetic Dipole Moment of 39-min Gold-190
66Ch15 Y.W.Chan, V.W.Cohen, M.Lipsicas, H.B.Silsbee - Phys.Rev. 150, 933(1966)
Nuclear Magnetic Moment and Hyperfine-Structure Anomaly of Na^{24}
66Ch16 W.J.Childs, L.S.Goodman - Phys.Rev. 148, 74(1966)
Hyperfine Interactions and the Magnetic Fields Due to Core Polarization in Fe^{57}
66Ch27 G.W.Charles - J.Opt.Soc.Am. 56, 1292(1966)
Spectra of ^{208}Po and the Hyperfine Structure of ^{209}Po
66Co13 R.G.Cornwell, W.Happer, Jr., J.D.McCullen - Phys.Rev. 141, 1106(1966)
Nuclear Moments of Sc^{43} and Sc^{47}
66Co18 N.Comaniciu, V.Draganescu, V.Tatu - Rev.Roumaine Phys. 11, 399(1966)
Hyperfine Structure in BaII 4934 A and 4554 A Lines and Nuclear Magnetic Moments of Ba^{137} and Ba^{135}
66Co19 R.G.Cornwell, J.D.McCullen - Phys.Rev. 148, 1157(1966)
Nuclear Spin and Moments of Ti^{45}
66Co26 N.Comaniciu, V.Draganescu, N.Ionescu-Pallas, V.Tatu - Compt.Rend. 262B, 1355(1966)
Determination des Moments Quadrupolaires Intrinsegues du Baryum par des Mesures de Deplacements Isotopiques
66Co32 N.Comaniciu, V.Draganescu, V.Tatu - Compt.Rend. 262B, 915(1966)
Les Moments Magnetiques de ^{135}Ba et ^{137}Ba a Partir de la Structure Hyperfine de la Raie Ba II, 4934 A
66Co36 E.R.Cohen - Nuovo Cimento Suppl. 4, 839(1966)
A Review of Recent Work in the Determination of Fundamental Physical Constants
66Co42 C.Cohen-Tannoudji, A.Kastler - Progress in Optics, Vol.V, E.Wolf, Ed., North-Holland Publ.Co., Amsterdam, p.1 (1966)
Optical Pumping
66Cr08 S.B.Crampton, H.G.Robinson, D.Kleppner, N.F.Ramsey - Phys.Rev. 141, 55(1966)
Hyperfine Separation of Deuterium
66Da07 S.P.Davis, T.Aung, H.Kleiman - Phys.Rev. 147, 861(1966)
Isotope Shifts of Neutron-Deficient Mercury Isotopes
66Da15 S.P.Davis, H.Kleiman, D.Goorvitch, T.Aung - J.Opt.Soc,am. 56, 1604(1966)
Hyperfine Structure, Nuclear Moments, and Isotope Shifts of ^{197}Tl and ^{198}Tl
66De08 B.I.Deutch, P.Hornshoj, K.B.Nielsen, F.Boehm - Phys.Letters 21, 659(1966)
Internal Magnetic Field of Lutecium in Iron and g Factor in ^{175}Lu
66De17 H.W.de Wijn, J.L.de Wildt - Phys.Rev. 150, 200 (1966)
Temperature Dependence of Nuclear Quadrupole Resonance in Cuprous Oxide
66De23 N.N.Delyagin, H.El Sayes, V.S.Shpinel - Zh.Eksperim.i Teor.Fiz. 51, 95 (1966); Soviet Phys.JETP 24, 64 (1967)
Magnetic Hyperfine Structure of the Gd^{155} Levels in Metallic Gadolinium and in the Intermetallic Compound $GdAl_2$
66Do01 B.M.Dodsworth, H.A.Shugart - Phys.Rev. 142, 638(1966)
Nuclear-Spin, Hyperfine-Structure, and Magnetic-Moment Investigations on ^{61}Cu, ^{62}Cu, and ^{64}Cu
66Ea01 W.Easley, N.Edelstein, M.P.Klein, D.A.Shirley, H.H.Wickman - Phys.Rev. 141, 1132(1966)
Nuclear Spin and Moment of $Ag^{110}m$ by Paramagnetic Resonance
66Ec04 J.Eck, Y.K.Lee, E.T.Ritter, R.R.Stevens, Jr., J.C.Walker - Phys.Rev.Letters 17, 120(1966)
Observation of New Mossbauer Effects in Rare-Earth Isotopes Following Coulomb Excitation
66En03 T.C.English, J.C.Zorn - Bull.Am.Phys.Soc. 11, No.1, 41, BG2(1966)
Hyperfine Structure of $Cs^{133}F^{19}$
66Er08 L.E.Erickson - Phys.Rev. 143, 295 (1966)
Electron-Paramagnetic-Resonance Absorption by Trivalent Neodymium Ions In Single Crystals of Lanthanum Trichloride and Lanthanum Ethyl Sulphate in Zero Magnetic Field

66Fo14 E.N.Fortson, R.G.Major, H.G.Dehmelt - Phys.Rev.Letters 16, 221 (1966)
Ultrahigh-Resolution Δ F = 0,±1 (He3)+ Hfs Spectra by an Ion-Storage Collision Technique
66Ge06 K.R.German - Bull.Am.Phys.Soc. 11, No.1, 61, CH7(1966)
Level-Crossover Spectroscopy of He^3 in the (1s) (2p) ^3P Configuration
66Ge08 E.Gerdau, H.J.Korner, J.Lerch, P.Steiner - Z.Naturforsch. 21a, 941(1966)
Mossbauer-Untersuchungen an Den 2+-Rotationsniveaus von Hf^{176} und Hf^{180}
66Go06 G.Goldring, R.Kalish, H.Spehl - Nucl.Phys. 80, 33 (1966); G.Goldring - Priv.Comm. (April 1972)
Gyromagnetic Ratios of the First Excited 2+ States in Even Os Isotopes
66Gu07 C.Gunther, K.Kankeleit - Phys.Letters 22, 443(1966)
Magnetic Moment of the First Excited State in ^{171}Yb
66Ha43 C.K.Hargrove, E.P.Hincks, H.L.Anderson, R.J.McKee - Phys.Can. 22, No.2, 15, 3.12(1966)
Hyperfine Structure of Mu-Atomic Transitions in Au
66He06 G.Heinzelmann, G.zu Putlitz, A.Schenck - Phys.Letters 21, 162(1966)
Nuclear Electric Quadrupole Moment of Odd-Odd ^{134}Cs
66He09 W.Henning, P.Kienle, E.Steichele, F.Wagner - Phys.Letters 22, 446(1966)
Magnetic Properties of the K = 1/2 Rotational Band of ^{171}Yb
66He12 H.Heuser, H.Schneider - Atomkernenergie 11, 137 (1966)
Bestimmung magnetischer Momente von angeregten Kernen aus der im Magnetfeld gestorten γ-γ-Winkelkorrelation
66He13 J.Heisenberg - Thesis, Univ.Hamburg (1966)
Untersuchungen am Np^{237} mit magnetisch gestorter α-γ Winkelkorrelation
66Hr02 A.Z.Hrynkiewicz, S.Ogaza, J.Styczen, B.Hrastnik, E.Pudlowska, R.Kulessa - Nucl.Phys. 80, 608(1966)
The g-Factor of the 87 keV Excited State in ^{155}Gd
66Je02 W.Jentschke, H.J.Korner, S.J.Skorka - Acta Phys.Austriaca 21, 43(1966)
Kernspektroskopische Untersuchungen mit g-Faktor-und Lebensdauerbestimmungen Angeregter Kernniveaus
66Jo06 K.Johansson, E.Karlsson, R.W.Sommerfeldt - Phys.Letters 22, 297 (1972); E.Karlsson - Priv.Comm. (April 1972)
Magnetic Moment of the Lowest 2+ Vibrational State in ^{122}Te
66Ka12 G.M.Kalvius, J.K.Tison - Phys.Rev. 152, 829(1966)
Mossbauer Effect in Two Excited States of a Rotational Band in Yb^{171}
66Ki02 O.C.Kistner - Phys.Rev. 144, 1022(1966); Erratum Phys.Rev. 149, 990(1966)
Recoil-Free Absorption Hyperfine Spectra of the 90-keV Mixed Transition in Ru^{99}
66Ko01 S.Koicki, A.Koicki, G.T.Wood, M.E,Caspari - Phys.Rev. 143, 148(1966)
Gamma-Gamma Angular-Correlation Study of Tm^{169} in Lutetium Iron Garnet
66Ko14 S.Kobayashi, N.Sano, J.Itoh - J.Phys.Soc.Japan 21, 1456(1966)
NMR Measurement of Internal Field and Electric Quadrupole Interaction in Ferromagnetic Dy Metal
66Ko16 H.J.Korner, K.Auerbach, J.Braunsfurth, E.Gerdau - Nucl.Phys. 86, 395(1966)
Effective Nuclear Moments in ^{207}Pb
66Ko24 L.A.Korostyleva - Opt.i Spektroskopiya 20, 194(1966); Opt.Spectry.(USSR) 20, 105(1966)
Determination of the Magnetic Moment of Pu-239
66Ko25 E.Konig - Landolt-Bornstein, New Series II/2, A.M.Hellwege, K.H.Hellwege, Eds., Springer-Verlag, Sections 3 and 4(1966)
Electron Paramagnetic Resonance
66Ku07 J.Kuhl, A.Steudel, H.Walther - Z.Physik 196, 365(1966)
Hyperfeinstrukturuntersuchungen im Re I-Spektrum mit digital registrierendem Doppel-Fabry-Perot-Spektrometer. Die Quadrupolmomente von Re^{185}, Re^{187}, Re^{186} und Re^{188}
66Ku10 R.N.Kuzmin, N.S.Ibraimov, G.S.Zhdanov - Zh.Eksperim.i Teor.Fiz. 50, 330(1966); Soviet Phys.JETP 23, 219(1966)
Mossbauer Effect in Heusler Alloys
66Le20 M.Leduc, J.-C.Lehmann - Compt.Rend. 262B, 736(1966)
Mesure Precise du Rapport des Moments Magnetiques Nucleaires des Isotopes 111 et 113 du Cadmium
66Le21 M.Leduc, J.Brossel, J.-C.Lehmann - Compt.Rend. 263B, 740(1966)
Mesure du Rapport des Frequences de Resonance Magnetique Nucleaire de ^{199}Hg et de ^{111}Cd en Phase Vapeur
66Lu07 I.I.Lukashevich, V.V.Sklyarevskii, K.P.Aleshin, B.N.Samoilov, E.P.Stepanov, N.I.Fillippov - ZhETF Pisma v Redaktsiyu 3, 81 (1966): JETP Letters 3, 50 (1966)
The Mossbauer Effect on Dy^{161} Impurity Nuclei in Metallic Gadolinium
66Ma54 E.Matthias, D.A.Shirley - Nucl.Instr.Methods 45, 309(1966)
Digital Analysis of Perturbed Angular Correlations

66Ma55 R.J.Mahler, L.W.James, W.H.Tanttila - Phys.Rev.Letters 16, 259(1966)
Possible Observation of In^{115} Nuclear Electric Hexadecapole Transitions
66Mc16 M.N.McDermott, R.L.Chaney, P.W.Spence - Bull.Am.Phys.Soc. 11, No.3, 354, EB16(1966)
Optical Pumping of the Stable Isotopes of Cadmium
66Mc17 M.N.McDermott, R.L.Chaney, P.W.Spence - Bull.Am.Phys.Soc. 11, No.4, 483, FG13(1966)
Optical Pumping of 6.7-h Cd^{107} and 470-day Cd^{109}
66Mu13 A.H.Muir, Jr., K.J.Ando, H.M.Coogan - Mossbauer Effect Data Index 1958-1965, Interscience Publishers, New York(1966)
66My01 T.Myint, D.Kleppner, N.F.Ramsey, H.G.Robinson - Phys.Rev.Letters 17, 405(1966)
Absolute Value of the Proton g Factor
66Na04 A.Narath, D.W.Alderman - Phys.Rev. 143, 328(1966)
Nuclear Spin Relaxation in Molybdenum Metal
66Na06 H.Narumi, T.Watanabe - Progr.Theoret.Phys.(Kyoto) 35, 1154(1966); Erratum Progr.Theoret.Phys.(Kyoto) 36, 1313(1966)
On the Value of the Electric Quadrupole Moment of the Deuteron
66Ne05 J.Ney - Z.Physik 196, 53 (1966)
Level-crossing-Untersuchung der Hyperfeinstruktur des $3d^{10}4p^2P_{3/2}$-Terms von Cu^{63} und Cu^{65}
66Ol02 L.Olschewski, E.-W.Otten - Z.Physik 196, 77(1966)
Prazisionsmessung der Kerndipolmomente von Ba^{135} und Ba^{137} mit Optischem Pumpen
66Ra17 H.Rauch - Z.Physik 197, 389(1966)
Anisotroper β-Zerfall nach Absorption Polarisierter Neutronen an Indium
66Ra29 R.E.Rand, R.Frosch, M.R.Yearian - Phys.Rev. 144, 859 (1966)
Elastic Electron Scattering from the Magnetic Multipole Distributions of Li^6, Li^7, Be^9, B^{10}, B^{11}, and N^{14}
66Re04 J.Reader - Phys.Rev. 141, 1123(1966)
Nuclear Moments of Pm^{147}
66Re06 O.Redi - Bull.Am.Phys.Soc. 11, No.1, 82, EA14(1966)
Spin of V^{48}
66RG02 Research Groups, Cooperation of the Angular Correlation Groups of Bonn and Hamburg - Nucl.Phys.89, 305 (1966)
The Magnetic Moment of the 5- State of ^{116}Sn and Other Spectroscopic Investigations in the Decay of ^{116}Sb and ^{116}In
66Ro09 M.L.Roush, L.A.West, J.V.Mullendore, H.L.Pann, J.B.Marion - Phys.Letters 23, 355(1966)
Precision Measurements of Nuclear Reaction Calibration Energies
66Ru02 S.L.Ruby, H.Selig - Phys.Rev. 147, 348(1966)
Mossbauer Study of Kr^{83} in the Compound KrF_2
66Ru03 S.L.Ruby, G.M.Kalvius, R.E.Snyder, G.B.Beard - Phys.Rev. 148, 176(1966)
Quadrupole Interaction in Sb^{121} by Mossbauer Techniques
66Sa09 E.B.Saloman, W.Happer - Phys.Rev. 144, 7 (1966)
Lifetime, Coherence Narrowing, and Hyperfine Structure of the $(6s^26p7s)\,^3P_1{}^o$ State in Lead
66Sc29 R.G.Schlecht, D.W.McColm - Phys.Rev. 142, 11(1966)
Hyperfine Structure of the Stable Lithium Isotopes. I
66Sh07 N.Shikazono, H.Takekoshi, T.Shoji - J.Phys.Soc.Japan 21, 829(1966)
Mossbauer Effect Studies of the 46.48-keV Level of W^{183}
66St22 G.M.Stinson, R.G.Summers-Gill - Phys.Can. 22, No.2, 43, 10.3(1966)
The Magnetic Moment of Ag-109m
66St23 R.M.Sternheimer - Phys.Rev. 146, 140(1966)
Shielding and Antishielding Effects for Various Ions and Atomic Systems
66Su01 K.Sugimoto, A.Mizobuchi, K.Nakai, K.Matuda - J.Phys.Soc. Japan 21, 213(1966)
Magnetic Moment of F^{17} - Nuclear Magnetic Resonance by Polarization Following $O^{16}(d,n)F^{17}$ Reaction
66Su07 A.W.Sunyar, P.Thieberger - Phys.Rev. 151, 910(1966)
Measurement of the g Factor of the 1+ 583-keV State in Na^{22} Using the $F^{19}(Po^{210}\alpha,n)Na^{22*}$ Reaction
66Sv01 A.G.Svensson, L.Bostrom, M.C.Joshi - Nucl.Phys. 89, 348(1966)
The 114 keV Level in ^{149}Pm
66Ti01 J.W.Tippie, R.P.Scharenberg - Phys.Rev. 141, 1062 (1966); R.P.Scharenberg - Priv.Comm. (April 1972)
Pulsed-Beam Measurement of the Gyromagnetic Ratio of the First Excited Rotational States in Ytterbium 172, 174, and 176
66Ti04 R.S.Title - Bull.Am.Phys.Soc. 11, No.1, 14, AC9(1966)
Electron Paramagnetic Resonance of Yb^{3+} in ZnTe
66Wo05 G.K.Woodgate - Proc.Roy.Soc.(London) 293A, 117(1966)
Hyperfine Structure and Nuclear Moments of Samarium

66Ya07 G.K.Yagola, V.I.Zingerman, V.N.Sepetyi - Izmeritel.Tekhn. No.7, 44 (1966); Meas.Tech.(USSR) No.7, 914 (1967)
Determination of the Precise Value of the Proton Gyromagnetic Ratio in Strong Magnetic Fields
66Zm01 H.Zmora, S.Ofer, M.Rakavy - Nucl.Phys. 89, 225 (1966); H.Zmora - Priv.Comm. (May 1972)
The Magnetic Moment of the First Excited State of ^{143}Pr
67Ag01 D.Agresti, E.Kankeleit, B.Persson - Phys.Rev. 155, 1339(1967)
Hyperfine Interactions and Isomeric Shift in Pt^{195}
67Ag02 D.Agresti, E.Kankeleit, B.Persson - Phys.Rev. 155, 1342(1967)
Hyperfine Interactions and Lifetimes of Low-Energy States in W^{182} and W^{183}
67Ag03 Y.K.Agarwal, C.V.K.Baba, S.K.Bhattacherjee - Nucl.Phys. A99, 457 (1967); Y.K.Agarwal - Priv.Comm. (April 1972)
Properties of Low-Lying Levels in ^{59}Co
67At03 U.Atzmony, E.R.Bauminger, D.Lebenbaum, A.Mustachi, S.Ofer, J.H.Wernick - Phys.Rev. 163, 314(1967)
Mossbauer Effect in Ir^{193} in Intermetallic Compounds and Salts of Iridium
67At04 U.Atzmony, E.R.Bauminger, D.Froindlich, S.Ofer - Phys.Letters 26B, 81(1967)
The Magnetic Moment of the First Excited 2+ State of ^{152}Sm
67Au02 K.Auerbach, J.Braunsfurth, M.Maier, E.Bodenstedt, H.W.Flender - Nucl. Phys. A94, 427(1967)
The g-Factor of the 305 keV State of ^{48}V
67Ba47 L.C.Balling - Phys.Rev. 163, 114 (1967)
g(I)/g(J) Ratios of Rb^{85} and Rb^{87}
67Ba64 W.E.Baylis - Thesis, Max Planck Inst.Phys.Astrophys., Munich (1967); Quoted by 68Sc09
67Be08 I.Ben Zvi, P.Gilad, G.Goldring, R.Herber, R.Kalish - Nucl.Phys. A96, 138 (1967); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions (IV). Gyromagnetic Ratios and Internal Fields in Even Nd Isotopes
67Be17 R.Beraud, I.Berkes, G.Marest, R.Rougny - Nucl.Phys. A98, 154(1967)
Duree de Vie et Facteur g du Premier Etat Excite du ^{57}Co
67Be45 I.Ben-Zvi, P.Gilad, G.Goldring, P.Hillman, A.Schwarzschild, Z.Vager - Phys.Rev.Letters 19, 373(1967)
Critique of the Method of Measurement of Magnetic Moments of Nuclei Embedded in Ferromagnetic Foils
67Bh03 S.K.Bhattacherjee, J.D.Bowman, E.N.Kaufmann - Phys.Rev.Letters 18, 223(1967)
Magnetic Moment of the First Excited State of ^{114}Cd
67Bh06 S.K.Bhattacherjee, J.D.Bowman, E.N.Kaufmann - Phys.Letters 24B, 651(1967)
Gyromagnetic Ratios of the First Excited States of ^{122}Te and ^{124}Te
67Bl09 A.G.Blachman, A.Lurio - Phys.Rev. 153, 164(1967)
Hyperfine Structure of the Metastable $(1s^2 2s2p)\ ^3P$ States of $_4Be^9$ and the Nuclear Electric Quadrupole Moment
67Bl16 A.G.Blachman, D.A.Landman, A.Lurio - Phys.Rev. 161, 60(1967)
Hyperfine Structure and gJ Value of the $^2D_{3/2}$ and of the $^4F_{9/2}$ States of Au^{197}
67Bo15 G.J.Bowden, D.S.P.Bunbury, J.M.Williams - Proc.Phys.Soc.(London) 91, 612(1967)
A Mossbauer Study of Hyperfine Interactions in Dysprosium Metal
67Bo32 F.Boehm, G.B.Hagemann - Izv.Akad.Nauk SSSR, Ser.Fiz. 31, 55(1967); Bull.Acad.Sci.USSR, Phys.Ser. 31, 61(1968)
Magnetic Moments of the 4+ Rotational States in Deformed Nuclei
67Bo40 P.A.Bonczyk, V.W.Hughes - Phys.Rev. 161, 15(1967)
Hyperfine Structure of the $\nu = 0$, $J = 1$ State in $Rb^{85}F$, $Rb^{87}F$, $K^{39}F$, and $K^{41}F$ by the Molecular-Beam Electric-Resonance Method
67Br05 K.C.Brog, T.G.Eck, H.Wieder - Phys.Rev. 153, 91(1967)
Fine and Hyperfine Structure of the $2\ ^2P$ Term of Li^6 and Li^7
67Br14 J.Braunsfurth, J.Morgenstern, H.Schmidt, H.J.Korner - Z.Physik 202, 321(1967)
Untersuchung Gestorter Winkelverteilungen an F^{19} in Ferromagnetischen Gittern
67Br24 M.Brieger, P.Zimmermann - Z.Naturforsch. 22a, 2001(1967)
Level-Crossing-Untersuchung der Hyperfeinstruktur von Sn^{117} und Sn^{119} im $(5p6s)\ ^3P_1{}^0$-Term des Sn I-Spektrums
67Bu06 B.Budick, J.Snir - Phys.Letters 24B, 276(1967)
Hyperfine Structure Anomaly of the Stable Ytterbium Isotopes
67Bu10 H.Bucka, J.Ney, K.P.Wirtnik - Z.Physik 202, 22(1967)
Hyperfeinstrukturanomalie und Kernquadrupolwechselwirkungskonstanten des Angeregten $3d^9 4s4p\ ^4P_{3/2}$-Terms im Cu I-Spektrum von Cu^{63} und Cu^{65}
67Bu20 A.Buyrn, L.Grodzins, N.A.Blum, J.Wulff - Phys.Rev. 163, 286(1967)
Internal Magnetic Fields at Pt Nuclei in Pt-Fe Alloys

67Bu26 B.Budick - Advances in Atomic and Molecular Physics, D.R.Bates, I.Estermann, Eds., Academic Press, New York, Vol.3, p.73 (1967)
Optical Pumping Methods in Atomic Spectroscopy
67Ca07 J.A.Cameron, I.A.Campbell, J.P.Compton, R.A.G.Lines, G.V.H.Wilson - Proc.Phys.Soc. (London) 90, 1089(1967)
Nuclear Orientation of ^{95}Nb Nuclei in Iron and Cobalt
67Ch10 W.J.Childs - Phys.Rev. 156, 71(1967)
Hyperfine Structure of Nine Levels in Two Configurations of V^{51}. II. Theoretical
67Ch26 W.J.Childs, L.S.Goodman - Bull.Am.Phys.Soc. 12, No.4, 509, DG12(1967)
Hfs Studies of Low-Lying Levels in Pt^{195} by Atomic-Beam Magnetic Resonance
67Cr03 T.E.Cranshaw, P.Reivari - Proc.Phys.Soc.(London) 90, 1059(1967)
A Mossbauer Study of the Hyperfine Spectrum of ^{57}Fe, Using Ultrasonic Calibration
67Da04 H.Dahmen, S.Penselin - Z.Physik 200, 456(1967)
Measurement of the Nuclear Magnetic Dipole Moment of Au^{197} and Hyperfine Structure Measurements in the Ground States of Au^{197}, Ag^{107}, Ag^{109} and K^{39}
67Di04 L.O.Dickie, F.M.Kelly - Can.J.Phys. 45, 2249(1967)
Hyperfine Structure in the Ground Configuration of Bismuth
67Dr09 V.Draganescu - Studii Cercetari Fiz. 19, 859 (1967); Phys.Abstr. 71, No.7078 (1968)
Contributions to the Hyperfine Structure of Spectral Lines
67Dy02 G.L.Dyer, G.A.Woonton - Can.J.Phys. 45, 2975(1967)
Investigation of the Hyperfine Structure of Divalent Manganese in a Magnesium Oxide Lattice
67Ea04 W.C.Easley - Thesis, Univ.California (1967); UCRL-17699 (1967)
Electron Paramagnetic Resonance Studies of Radioactive Transition-Metal Ions
67Eb01 W.Ebenhoh, V.J.Ehlers, J.Ferch - Z.Physik 200, 84(1967)
Hyperfine-Structure Measurements on Dy^{161} and Dy^{163}
67Ec01 J.S.Eck, Y.K.Lee, J.C.Walker, R.R.Stevens, Jr. - Phys.Rev. 156, 246(1967)
Mossbauer Effect Following Coulomb Excitation in the Even-Even Isotopes of Ytterbium
67Ec02 J.S.Eck, Y.K.Lee, J.C.Walker - Phys.Rev. 163, 1295(1967)
Measurement of the g(R) Factors for the First Excited States of Yb^{174} and Yb^{176} Using the Mossbauer Effect
67Ec03 J.S.Eck, Y.K.Lee, J.C.Walker - Bull.Am.Phys.Soc. 12, No.4, 596, KH1(1967)
Measurement of the g(R) Factor for the 82.2-keV State of Yb^{176} Using the Mossbauer Effect
67Es04 Y.H.Eskes, H.W.de Wijn - Phys.Letters 25A, 553 (1967)
Electron-Nuclear Double Resonance of $^{55}Mn^{2+}$ in MgO
67Fi02 W.Fischer, H.Huhnermann, K.-J.Kollath - Z.Physik 200, 158(1967)
Polarisationseffekte in der Hyperfeinstruktur von ^{65}Cu I, $3d^{9}4s^{2}$ $m^{2}D$
67Fi08 J.Fink - Z.Physik 207, 225(1967)
Mossbauereffektmessungen am 79,5 Kev-Niveau von Gd^{158}
67Fi11 H.Figger, D.Schmitt, S.Penselin - Colloq.Intern.Centre Natl.Rech.Sci., La Structure Hyperfine Magnetique des Atoms et des Molecules, Paris(1966), No.164, p.355(1967)
Direct Measurement of the Magnetic Dipole Moments of the Nuclei Cu^{63}, Cu^{65} and Rb^{87} and Determination of the Chemical Shift for Some Cu- and Rb-Compounds
67Fr15 A.J.Freeman, R.B.Frankel, Eds. - Hyperfine Interactions, Academic Press, New York (1967)
67Ga03 A.A.Galkin, A.D.Prokhorov, G.A.Tsintsadze, V.A.Shapovalov - Dokl.Akad.Nauk SSSR 173, 309(1967); Soviet Phys.Doklady 12, 236(1967)
Isotopic Hyperfine Structure of the EPR Spectrum of Cu^{2+} in $ZnWO_4$
67Ga08 G.J.Garrett, A.D.Jackson, Jr., O.Ames - Phys.Rev. 161, 1152(1967)
Decay Scheme, Spin, and Magnetic Moment of 20-min K^{45}
67Gi02 P.Gilad, G.Goldring, R.Herber, R.Kalish - Nucl.Phys. A91, 85 (1967); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions (II). Gyromagnetic Ratios of the 2^{+} States in Hf, W and Os Isotopes
67Gi03 P.Gilad, G.Goldring, R.Herber, R.Kalish - Nucl.Phys. A91, 633 (1967); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions (III). Gyromagnetic Ratios of Rotational States in W Isotopes
67Gi04 D.Giglberger, S.Penselin - Z.Physik 199, 244(1967)
Ground-State Hyperfine Structure and Nuclear Magnetic Moment of Thulium-169
67Go11 R.Gonano, E.Hunt, H.Meyer - Phys.Rev. 156, 521(1967)
Sublattice Magnetization in Yttrium and Lutetium Iron Garnets
67Gr08 G.Graff, R.Schonwasser, M.Tonutti - Z.Physik 199, 157(1967)
Gleichzeitige Messung von Hyperfeinstruktur, Starkeffekt und Zeemaneffekt des $^{85}Rb^{19}F$ mit einer Molekulstrahl-Resonanzapparatur

67Gr26 I.J.Gruverman, Ed. - Symp.Mossbauer Effect Methcdology, Vol.3, Plenum Press, New York (1967)
67Gu08 C.Gunther, D.R.Parsignault - Nucl.Phys. A104, 588(1967)
The Nuclear g-Factors of the 5/2-[523] States in ^{237}Np and ^{239}Np and the Level Structure of ^{237}Np
67Gu10 S.Gustafsson, K.Johansson, E.Karlsson, L.-O.Norlin, A.G.Svensson - Arkiv.Fysik 34, 169 (1967); E.Karlsson - Priv.Comm. (April 1972)
The Magnetic Moment of the 139 keV Level in ^{193}Ir and the Magnetic Hyperfine Interaction in an Fe-Ir Alloy
67Gu14 A.D.Gulko, S.S.Trostin, A.Hudoklin - Yadern.Fiz. 6, 657(1967); Soviet J.Nucl.Phys. 6, 477(1968)
Radiation Asymmetry and Nuclear Magnetic Resonance of the β-Active Nuclei Produced Upon Capture of Polarized Thermal Neutrons
67Ha33 T.Hadeishi, C.-H.Liu - Phys.Rev.Letters 19, 211 (1967); Erratum Phys.Rev.Letters 19, 684 (1967)
Nuclear Alignment of the $^1S_0$ Ground State of ^{131}Xe by Electron Pumping and Metastability-Exchange Collisions
67Ha40 S.S.Hanna, G.M.Kalvius, G.D.Sprouse - Contrib.Intern.Conf.Nucl.Struct., Tokyo, p.198 (1967)
Magnetic Moments, Polarizations, and Lifetimes by Recoil Implantation
67He02 W.Henning, P.Kienle, J.H.Korner - Z.Physik 199, 207(1967)
Mossbauer Effect and Magnetic Moment of the 75.9 keV Level in Yb^{171}
67He04 N.Hershkowitz, J.C.Walker - Phys.Rev. 156, 391(1967)
Mossbauer Effect of the Second Excited State of Fe^{57}
67He15 W.Henning, D.Heunemann, W.Weber, P.Kienle, H.J.Korner - Z.Physik 207, 505(1967)
Mossbauer Effect and Nuclear Moments of the 75 keV State of Dy^{161} and the 81 keV State of Dy^{162}
67He17 K.Heilig, P.Kasten - Naturwissenschaften 54, 338(1967)
Hyperfine Structure in the Lutetium (III) Spectrum and Nuclear Magnetic Dipole Moment of ^{175}Lu
67Ja11 A.P.Jain, T.E.Cranshaw - Phys.Letters 25A, 421(1967)
Anomalous Temperature Dependence of the Hyperfine Fields at Sn in Cobalt
67Jo11 K.Johansson, M.C.Joshi, E.Karlsson, A.G.Svensson - Arkiv Fysik 33, 329(1967)
The Nuclear g-Factor of the 1301 keV 4+-level in ^{144}Nd
67Jo16 C.E.Johnson - Proc.Phys.Soc.(London) 92, 748(1967)
Hyperfine Interactions in Ferrous Fluosilicate
67Jo17 K.Johansson, S.Gustafsson, A.G.Svensson - Arkiv Fysik 34, 97(1967)
The Nuclear Magnetic Moment of the 3.2 MeV State in ^{208}Pb
67Ka16 R.Kalish, L.Grodzins, R.R.Borchers, J.D.Bronson, E.Herskind - Phys.Rev. 161, 1196 (1967); R.R.Borchers - Priv.Comm. (May 1972)
Magnetic Moments of the First Excited 2+ States in the Even Pt Isotopes
67Ka26 B.Kardon, D.Kiss, Z.Perjes, Z.Seres, Z.Zamori - KFKI Kozlem. 15, 63 (1967)
g-Factor Measurement by the Method of Differential Perturbed Angular Correlation
67Ke01 L.Keszthelyi, I.Demeter, I.Dezsi, L.Pocs - Nucl.Phys. A91, 692 (1967)
The g-Factor of the 633 keV-Level in ^{188}Os
67Ke16 F.M.Kelly, E.Tomchuk - Can.J.Phys. 45, 3931(1967)
Isotope Shift in the Second Spectrum of Barium
67Ku07 J.D.Kurfess, R.P.Scharenberg - Phys.Rev. 161, 1185 (1967); R.P.Scharenberg - Priv.Comm. (April 1972)
Pulsed-Beam Measurements of the Nuclear g Factors of the 2+ Rotational States in Neodymium-150, Dysprosium-162 and -164, Erbium-166, -168, and -170, and Tungsten-186
67La23 R.F.Lacey - Metrologia 3, 70 (1967)
Thallium Beam Frequency Standards
67LeHo C.M.Lederer, J.M.Hollander, I.Perlman - Table of Isotopes, Sixth Edition, John Wiley and Sons, Inc., New York (1967)
67Le16 L.A.Levin, B.Budick - Bull.Am.Phys.Soc. 12, No.7, 1045, BF6(1967)
Polarization Corrections to the Copper Quadrupole Moment Deduced from hfs
67Le22 J.-C.Lehmann - Ann.Phys. (Paris) 2, 345 (1967)
Etude de l'Orientation Nucleaire par Pompage Optique des Isotopes Impairs Stables du Cadmium
67Li12 R.M.Lieder, W.Delang, M.Fleck - Z.Physik 206, 29(1967)
Untersuchung von Hyperfeinstrukturwechselwirkungen im 1274 keV-Niveau des ^{204}Pb-m durch γγ-Winkelkorrelationsmessungen
67Lo12 O.V.Lounasmaa - Hyperfine Interactions, A.J.Freeman, R.B.Frankel, Eds., Academic Press, New York, p.467 (1967)
Nuclear Specific Heats in Metals and Alloys
67Lu02 O.Lutz, A.Schwenk - Phys.Letters 24A, 122(1967)
The Ratio of the Larmor Frequencies of ^{41}K and ^{2}H

67Lu06 O.Lutz - Phys.Letters 25A, 440(1967)
The g-Factors and the Magnetic Moments of Alkali Nuclei and the Shielding of Rb^+ by Water
67Lu07 O.Lutz, A.Schwenk, G.Zimmermann - Phys.Letters 25A, 653(1967)
The Ratio of the Larmor Frequency of ^{73}Ge Relative to ^{2}H and ^{41}K
67Lu10 O.Lutz - Z.Naturforsch. 22a, 286 (1967)
Kernresonanzuntersuchungen an Elektrolytlosungen. I. Der Einfluss von Anionen und von paramegnetischen Kationen auf die Cs^{133}-Kernresonanzlinie
67Ma09 R.Marrus, E.Wang, J.Yellin - Phys.Rev.Letters 19, 1(1967)
Measurement of the Hyperfine Structure of Optically Excited States of Radioactive Isotopes
67Ma16 B.S.Mathur, S.B.Crampton, D.Kleppner, N.F.Ramsey - Phys.Rev. 158, 14(1967)
Hyperfine Separation of Tritium
67Ma17 J.B.Marion, H.Winkler - Phys.Rev. 156, 1062 (1967); See Also 66Ro09, 61Ry05, 62Ry01
New Method for Measuring the Ratio of the Proton Magnetic Moment to the Nuclear Magneton
67Ma56 S.A.Marshall - Phys.Rev. 159, 191 (1967)
Isotopic Shift in the Electron-Spin-Resonance Absorption Spectrum of Gd^{3+} in Thorium Oxide
67Mi04 W.B.Mims, G.E.Devlin, S.Geschwind, V.Jaccarino - Phys.Letters 24A, 481(1967)
New Value for the ^{55}Mn Nuclear Magnetic Moment
67Mi17 T.Miyachi, S.Morinobu. H.Ikegami - Contrib.Intern.Conf.Nucl.Struct., Tokyo, p.168 (1967)
Magnetic Dipole- and Electric Quadrupole-Moments of the Anomalous Coupling $7/2^+$ State in ^{83}Kr
67Mu05 J.Murray, T.A.McMath, J.A.Cameron - Can.J.Phys. 45, 1597(1967)
The g Factor of the 633-keV Level in ^{188}Os
67Mu06 J.Murray, T.A.McMath, W.H.Brooker, J.A.Cameron - Can.J.Phys. 45, 1600(1967)
The g Factor of the 603-keV Level in ^{124}Te
67Mu09 J.Murray, T.A.McMath, J.A.Cameron - Can.J.Phys. 45, 1813(1967)
Nuclear g Factor of the First Excited State in ^{106}Pd and the Internal Field on Palladium in Nickel
67Mu10 J.Murray, T.A.McMath, J.A.Cameron - Can.J.Phys. 45, 1821(1967)
Nuclear g Factors of the First Excited States of ^{76}Se and ^{122}Te
67Na13 A.Narath - Phys.Rev. 163, 232(1967); Erratum Phys.Rev. 175, 696(1968)
Nuclear Magnetic Resonance and Relaxation of ^{197}Au in Gold Metal and ^{109}Ag in Gold-Silver Alloys
67Ni05 A.K.Nigam, R.Bhattacharyya - Proc.Nucl.Phys. And Solid State Phys.Symp., Nucl.Phys., Kanpur, p.435 (1967)
The Gyromagnetic Ratio of 379 keV Level of ^{169}Tm
67No03 A.J.Nozik, M.Kaplan - Phys.Rev. 159, 273 (1967)
Significance of the Lattice Contribution to Mossbauer Quadrupole Splitting: Re-Evaluation of the $Fe^{57}m$ Nuclear Quadrupole Moment
67Of01 S.Ofer, I.Nowik - Nucl.Phys. A93, 689(1967)
Magnetic and Quadrupole Moments of the 22 keV State of ^{149}Sm
67Ol01 L.Olschewski, E.-W.Otten - Z.Physik 200, 224(1967)
Bestimming der Kerndipolmomente von ^{171}Yb und ^{173}Yb durch Optisches Pumpen
67Pa15 M.Pasternak, S.Bukshpan - Phys.Rev. 163, 297(1967)
Structural Studies of Some Tellurium Compounds Using the Mossbauer Effect in Te^{125} and I^{129} Nuclei
67Pa16 V.R.Pandharipande, K.G.Prasad, R.P.Sharma - Nucl.Phys. A104, 525(1967)
Magnetic Moment of the 660 keV State in ^{117}In
67Pa21 D.O.Patterson, L.D.Roberts, P.Huray, J.O.Thomson - Bull.Am.Phys.Soc. 12, No.1, 24, AI5 (1967)
Pressure Dependence of the Hyperfine-Structure Coupling to ^{197}Au in Ordered Au_2Mn
67Pe09 B.W.Petley, K.Morris - Nature 213, 586(1967)
New Determination of the Magnetic Moment of the Proton in Terms of the Nuclear Magneton
67Po09 A.R.Poletti, D.B.Fossan - Phys.Rev. 160, 883 (1967)
Measurement of the Magnetic Moment and Lifetime of the 1.131-MeV Level in F^{18}
67Pr13 M.H.Prior - Thesis, Univ.California (1967); UCRL-17472
Nuclear Spin and Hyperfine Structure Measurements on the Radioactive Isotopes ^{110}In, ^{121}Sn, and ^{88}Rb
67Pr16 G.C.Pramila, L.Grodzins - Bull.Am.Phys.Soc. 12, No.4, 581, JH10 (1971)
g Factors of Excited States in Gd^{152}, Gd^{154}, and Sm^{152}
67Re06 O.Redi, M.A.Graber - Bull.Am.Phys.Soc. 12, No.4, 474, AH5 (1967)
Spins of V^{47} and Sc^{48}

67Ri06 R.A.Ristinen, A.W.Sunyar - Phys.Rev. 153, 1209(1967)
Properties of Low-Lying States in Sc^{44}
67Ru01 S.L.Ruby, G.M.Kalvius - Phys.Rev. 155, 353(1967)
Magnetic Hyperfine Interaction in Sb^{121} Using the Mossbauer Effect
67Ru05 S.L.Ruby, G.M.Kalvius, G.B.Beard, R.E.Snyder - Phys.Rev. 159, 239(1967)
Interpretation of Mossbauer Measurements in Tin and Antimony
67Ru07 S.L.Ruby, C.E.Johnson - Phys.Letters 26A, 60(1967); See Also 67Ru01
Internal Magnetic Field at an Antimony Impurity in Iron or Nickel
67Sa10 V.Saraswati - J.Phys.Soc.Japan 23, 761(1967)
Quadrupole Interactions in Vanadates
67Sc04 S.G.Schmelling, V.J.Ehlers, H.A.Shugart - Phys.Rev. 154, 1142(1967)
Nuclear Magnetic Moment, Hyperfine Structure, and Hyperfine-Structure Anomaly of Ag^{110m}
67Sc09 H.Schmidt, J.Morgenstern, H.J.Korner, J.Braunsfurth, S.J.Skorka - Phys.Letters 24B, 457(1967)
Excited-State g Factors in ^{18}F and ^{22}Na
67Sc33 S.G.Schmelling, H.A.Shugart - Bull.Am.Phys.Soc. 12, No.7, 1046, BF10(1967)
Nuclear Spin, Hyperfine Structure, and Nuclear Magnetic Moment of ^{163}Tm
67Sh14 V.S.Shirley - UCRL-17990(1967); See Also 68Sh22
Table of Nuclear Moments
67Si03 J.J.Simpson, D.Eccleshall, M.J.L.Yates, N.J.Freeman - Nucl.Phys. A94, 177(1967)
A Determination of Quadrupole Moments in ^{114}Cd, ^{130}Ba, ^{148}Sm and ^{150}Sm
67Sp04 P.W.Spence, M.N.McDermott - Phys.Letters 24A, 430(1967)
Optical Orientation of ^{67}Zn
67Sp11 P.W.Spence, M.N.McDermott, D.L.Rump - Bull.Am.Phys.Soc. 12, No.6, 892, E8(1967)
Simultaneous Optical Pumping of Zn^{67} and Cd^{111}
67St01 T.Stovall, D.Vinciguerra, M.Bernheim - Nucl.Phys. A91, 513(1967)
Study of ^{27}Al by Elastic Electron Scattering
67St03 R.G.Stokstad, I.Hall, G.D.Symons, J.de Boer - Nucl.Phys. A92, 319(1967)
The Determination of the Static Quadrupole Moments of the First 2+ States in ^{114}Cd and ^{116}Cd by Higher Order Effects in Coulomb Excitation
67St16 R.G.Stokstad, I.Hall - Nucl.Phys. A99, 507(1967)
The Determination of the Static Quadrupole Moments of the First 2+ States in ^{126}Te and ^{128}Te by Coulomb Excitation
67St17 R.S.Stevens, Jr., J.S.Eck, E.T.Ritter, Y.K.Lee, J.C.Walker - Phys.Rev. 158, 1118(1967)
New Mossbauer Levels in the Rare Earths Following Coulomb Excitation
67St22 G.M.Stinson, N.P.Archer, J.C.Waddington, R.G.Summers-Gill - Can.J.Phys. 45, 3393(1967)
The Spin and Magnetic Moment of Cesium-138
67St27 S.Stein - Thesis, Univ.California (1967); UCRL-17969 (1967)
Hyperfine Structure of Dy^{165} and Spin of Er^{163}
67St29 R.M.Sternheimer - Phys.Rev. 164, 10(1967)
Quadrupole Shielding and Antishielding Factors for Atomic States
67St35 N.J.Stone - Quoted by 68Ba70
67Su03 K.Sugimoto, N.Nakai, K.Matuda, T.Minamisono - Phys.Letters 25B, 130(1967)
Nuclear Magnetic Resonance of 20-ms ^{12}B
67Su06 K.Sugibuchi - Phys.Rev. 153, 404(1967)
Photosensitive Electron Spin Resonance of Sn^{3+} in Zinc Sulfide
67Su09 K.Sugimoto, K.Nakai, K.Matuda, T.Minamisono - Contrib.Intern.Conf.Nucl.Struct., Tokyo, p.196 (1967); Oral Report
Magnetic Moment of ^{12}B
67Sv01 A.G.Svensson, R.W.Sommerfeldt, L.-O.Norlin, P.N.Tandon - Nucl.Phys. A95, 653(1967)
Nuclear Magnetic Moments of the First and the Second Excited States in ^{127}I
67Ta07 P.N.Tandon, H.G.Devare - Nucl.Phys. A102, 203(1967)
Measurement of the g-Factors of Two Levels of ^{131}I
67Te01 J.E.Templeton, D.A.Shirley - Phys.Rev.Letters 18, 240(1967)
Resonant Destruction of Nuclear Orientation in Ferromagnets
67Tr12 W.Traub, F.L.Roesler, M.M.Robertson, V.W.Cohen - J.Opt.Soc.Am. 57, 1452(1967)
Spectroscopic Measurement of the Nuclear Spin and Magnetic Moment of ^{39}Ar
67Tz01 A.Tzalmona - Phys.Lett. 26A, 65 (1967)
Nuclear Acoustic Quadrupole Resonance in CsI and RbI
67Ul01 J.F.Ullrich, D.H.Vincent - Phys.Letters 25A, 731(1967)
^{125}Te Mossbauer Effect Study of Magnetic Hyperfine Structure in the Ferromagnetic Spinel $CuCr_2Te_4$
67Va16 P.A.Vanden Bout, V.J.Ehlers, W.A.Nierenberg, H.A.Shugart - Phys.Rev. 158, 1078(1967)
Hyperfine-Structure Separations, Nuclear Magnetic Moments, and Hyperfine-Structure Anomalies of Gold-198 and Gold-199

67Wa12 F.Wagner, J.Klockner, H.J.Korner, H.Schaller, P.Kienle - Phys.Letters 25B, 253 (1967)
Isomer Shift and Quadrupole Splitting in ^{191}Ir and ^{193}Ir
67Wa16 R.E.Walstedt, J.H.Wernick, V.Jaccarino - Phys.Rev. 162, 301(1967)
New Determination of the Nuclear Gyromagnetic Ratio γ of Co^{59}
67Wa20 F.Wagner, G.Kaindl, P.Kienle, H.J.Korner - Z.Physik 207, 500(1967)
Nuclear g-Factors of the First Excited States in Ir^{191} and Ir^{193}
67Wi07 F.Wittmann - Phys.Letters 24A, 252(1967)
Quadrupolaufspaltung in Kalziumaluminatferriten
67Wo01 E.F.Worden, E.K.Hulet, R.Lougheed, J.G.Conway - J.Opt.Soc.Am. 57, 550(1967)
Nuclear Spin of ^{249}Bk from the Hyperfine Structure in its Emission Spectrum
67Wo04 G.A.Woonton, G.L.Dyer - Can.J.Phys. 45, 2265(1967)
On the Hyperfine Structure of Trivalent Chromium in a Cubic Environment
67Wo06 P.J.Wolfe, R.P.Scharenberg - Phys.Rev. 160, 866 (1967); R.P.Scharenberg - Priv.Comm. (April 1972)
Nuclear g Factors of the First Excited 2+ States in Samarium-152 and -154 and Gadolinium-156, -158, and -160
68Ac01 F.Ackermann, E.W.Otten, G.zu Putlitz, A.Schenck, S.Ullrich - Phys.Letters 26B, 367 (1968)
Nuclear Quadrupole Moments of the Neutron Deficient Isotopes ^{131}Cs and ^{132}Cs
68An05 H.R.Andrews, T.F.Knott, B.Greenebaum, F.M.Pipkin - Phys.Rev. 169, 978(1968)
Nuclear Orientation of ^{125}Sb
68Ar01 J.O.Artman, A.H.Muir, Jr., H.Wiedersich - Bull.Am.Phys.Soc. 13, No.1, 46, BK14 (1968)
Determination of the Nuclear Quadrupole Moment of $Fe^{57}m$ from α-Fe_2O_3 Data
68Ba44 A.Bamberger, P.G.Bizzeti, B.Povh - Phys.Rev.Letters 21, 1599 (1968)
Reorientation Measurement in Mg^{24}
68Ba70 J.A.Barclay, W.D.Brewer, E.Matthias, D.A.Shirley - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.902 (1968)
Magnetic Hyperfine Field, Nuclear g-Factor, and Spin-Lattice Relaxation for ^{125}Sb in Iron from Nuclear Orientation-NMR
68Be04 I.Ben-Zvi, P.Gilad, G.Goldring, P.Hillman, A.Schwarzschild, Z.Vager - Nucl.Phys. A109, 201(1968); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions (V). Hf Ions Recoiling into Liquid Gallium
68Be42 I.Ben Zvi, P.Gilad, M.Goldberg, G.Goldring, A.Schwarzschild, A.Sprinzak, Z.Vager - Nucl.Phys. A121, 592 (1968); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions (VI). Hyperfine Interactions of Nuclei in Highly Ionized Atoms
68Be51 I.Ben Zvi, P.Gilad, M.Goldberg, G.Goldring, A.Sprinzak, Z.Vager - Nucl.Phys. A122, 73(1968); G.Goldring - Priv.Comm. (April 1972)
Precession Measurements Following Coulomb Excitation with Oxygen Ions. (VII) Precession Measurements on Nuclei Recoiling into Gas and the Gyro-Magnetic Ratio of the First Excited 2+ State in ^{150}Nd
68Be60 W.Becker, W.Fischer, H.Huhnermann - Z.Physik 216, 142 (1968)
Die Hyperfeinstruktur der Ba II-Resonanzlinien und die Quadrupolmomente der Ungeraden Bariumisotope
68Be61 R.Beraud, I.Berkes, J.Daniere, M.Levy, G.Marest, R.Rougny, H.Bernas, D.Spanjaard - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.199 (1968)
The g-Factor of the First Excited State of ^{196}Pt
68Bh02 S.K.Bhattacherjee, J.D.Bowmann, E.N.Kaufmann - Phys.Letters 26B, 583(1968); Y.K.Agarwal - Priv.Comm. (April 1972)
Magnetic Moment of a Two-Quasiparticle State in ^{182}W
68Bl04 J.Bleck, D.W.Haag, W.Leitz, W.Ribbe - Phys.Letters 26B, 134(1968)
Half-Life and g-Factor Measurement of an Excited State in ^{79}Kr
68Bl07 H.Blumberg, B.Persson, M.Bent - Phys.Rev. 170, 1076(1968)
Nuclear Spins and Moments of the 86.5- and 105.3-keV States in Gd^{155}
68Bo15 J.D.Bowman, E.N.Kaufmann, S.K.Bhattacherjee, M.Levanoni - Phys.Rev.Letters 20, 1176(1968)
Measurement of the g Factor of the Second Excited, $I_\pi = 2^+$, Two Phonon Vibrational State in Pd^{106}
68Bo41 E.Bozek, A.Z.Hyrnkiewicz, G.Zapalski, R.Kulessa, W.Walus - Nucl.Instr.Methods 58, 325 (1968)
Application of the Sum-Coincidence Method for g-Factor Measurements of Short-Lived Excited Nuclear States

68Bo47 E.Bozek, R.Broda, J.Golczewski, A.Z.Hrynkiewicz, R.Kulessa, H.Niewodniczanski, M.Rybicka, W.Walus - Nucl.Phys. A122, 184(1968)
Level Scheme of ^{147}Sm and g-Factors of its Two Lowest Excited States
68Br12 D.Brinkmann - Helv.Phys.Acta 41, 367(1968)
Verschiebung des Lokalen Magnetischen Feldes in der Kernresonanz von Edelgasen
68Br15 W.H.Brooker, T.A.McMath, J.Murray, J.A.Cameron - Can.J.Phys. 46, 1523(1968)
Perturbed Angular Correlations in ^{177}Hf
68Br16 D.Brinkman - Phys.Letters 27A, 466(1968)
The Nuclear Magnetic Moments of ^{83}Kr and ^{39}K
68Bu04 B.Budick - Phys.Rev. 168, 89(1968)
Lifetime and Hyperfine Structure of the First Excited $^3P_1$ State of Palladium
68Bu06 H.Bucka, G.zu Putlitz, R.Rabold - Z.Physik 213, 101 (1968)
Hyperfeinstrukturaufspaltung und Lebensdauer des 7 $^2P_{3/2}$-Terms von Rb^{85} und Rb^{87}
68Bu07 J.W.Burton, L.D.Roberts, J.O.Thomson - Bull.Am.Phys.Soc. 13, No.2, 250, FD15 (1968)
Determination of the Hyperfine Structure Coupling and Isomer Shift for ^{197}Au in Au, Au-Ni, and Au-Cu-Ni by the Mossbauer Transmission Integral
68Bu16 B.Budick, L.A.Levin - Phys. Rev. 165, 141 (1968)
Polarization Corrections for Shielding and Antishielding Configurations of the Copper Atom
68Ca03 L.E.Campbell, G.J.Perlow - Nucl.Phys. A109, 59(1968)
Magnetic Moment of the First Excited State in ^{133}Cs by the Mossbauer Effect
68Ca10 B.R.Casserberg - Priv.Comm. (1968)
68Ca14 B.R.Casserberg - Priv.Comm. (1968)
68Ca25 B.R.Casserberg - Thesis, Princeton Univ. (1968); PUC-937-321 (1968)
The Spins and Moments of In^{110} and In^{112}
68Ca26 J.A.Cameron, T.A.McMath, M.B.Byrnes, D.B.Kenyon - Phys.Can. 24, No.3, 18 (1968)
Perturbed Angular Correlations in ^{160}Dy
68Ch09 W.J.Childs, L.S.Goodman - Phys.Rev. 170, 50 (1968); Priv.Comm. (1968)
Hyperfine Structure of Seven Low Atomic Levels in Co^{59}, and the Nuclear Electric-Quadrupole Moment
68Ch10 W.J.Childs, L.S.Goodman - Phys.Rev. 170, 136(1968)
Hyperfine-Structure Studies of Ni^{61}, and the Nuclear Ground-State Electric Quadrupole Moment
68Ch16 Y.W.Chan, W.J.Childs, L.S.Goodman - Phys.Rev. 173, 107(1968)
Magnetic Hyperfine Interaction Constants and Electronic g Factors for Eight Atomic States in Rh^{103}
68Ch18 Y.W.Chan, V.W.Cohen, H.B.Silsbee - Bull.Am.Phys.Soc. 13, No.6, 895, CE14(1968); Priv.Comm. (1968)
Nuclear Spin of Pt^{195} (20h)
68Ch38 A.Y.J.Chong, M.H.Prior, H.A.Shugart - Bull.Am.Phys.Soc. 13, No.12, 1650, BE3 (1968)
Nuclear Spin of (40-min) ^{123}m-Sn
68Co15 R.L.Cohen - Phys.Rev. 169, 432(1968)
Analysis of Mossbauer Hyperfine Structure in Thulium Metal below the Neel Temperature
68Co17 R.L.Cohen - Phys.Rev. 171, 343(1968)
Hyperfine Structure of Au^{197} in Fe Measured with the Mossbauer Effect
68Co18 V.W.Cohen - Priv.Comm. (1968)
68Co21 G.Copley, B.P.Kibble, G.W.Series - J.Phys., B(London) 1, 724(1968)
A Method of Improved Resolution of Level-Crossing Curves: Application to the Hyperfine Structure of the Level 3 $^2P_{3/2}$ in Atomic Sodium
68Cr10 G.Crecelius, D.Quitmann - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p. 172 (1968)
Nuclear Moments of the 75-keV State in ^{161}Dy
68Da19 A.V.Davydov, G.R.Kartashov, Y.V.Khrudev - Yadern.Fiz. 7, 735(1968); Soviet J.Nucl.Phys. 7, 447(1968)
Resonant Scattering of 129-keV Gamma Rays of Ir^{191}
68De28 B.I.Deutch, G.B.Hagemann, K.A.Hagemann, S.Ogaza - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amstercam, p.731 (1968)
Larmor Precession for the 4^+ States in Some Erbium Isotopes
68De34 J.de Boer, J.Eichler - Advan.Nucl.Phys. 1, 1 (1968)
The Reorientation Effect
68Do07 D.A.Dobson, S.R.Brown - Bull.Am.Phys.Soc. 13, No.2, 173, CD3 (1968)
Nuclear Magnetic Moment of Ne^{23}

68Dr06 R.L.Driscoll, P.T.Olson - NBS Rept.to Com.Consult.d'Electricite, Com.Int.Poids et Mesures, 12th Sess. (October 1968)
Measurement of γ'(p) at the National Bureau of Standards
68Du02 B.D.Dunlap, G.M.Kalvius, S.L.Ruby, M.B.Brodsky, D.Cohen - Phys.Rev. 171, 316 (1968)
Isomer Shift and Hyperfine Splittings of the 59.6-keV Mossbauer Resonance in ^{237}Np
68Du05 T.H.Duong, R.Marrus, J.Yellin - Phys.Letters 27B, 565 (1968)
Atomic Beam Study of the Rubidium 85, 87 Relative Isotope Shift
68Ea02 H.K.Eastwood, R.G.Summers-Gill - Can.J.Phys. 46, 230(1968)
The Nuclear Spin of Samarium-155
68Ea04 W.C.Easley, J.A.Barclay, D.A.Shirley - Phys.Rev. 170, 1083(1968)
Nuclear Moments of Tb^{157}, Tb^{158}, and Tb^{160} by Electron Paramagnetic Resonance and Nuclear Alignment
68Ed01 N.Edelstein, W.Easley - J.Chem.Phys. 48, 2110 (1968)
Zero-Field Splittings of Am^{2+} and Cm^{3+} in Cubic Symmetry Sites in CaF_2
68Eh01 V.J.Ehlers, T.R.Fowler, H.A.Shugart - Phys.Rev. 167, 1062(1968)
Nuclear Magnetic Moment of ^{85}Rb: Resolving a Discrepancy
68Eh02 V.J.Ehlers, Y.Kabasakal, H.A.Shugart, O.Tezer - Phys.Rev. 176, 25(1968)
Hyperfine Structure of ^{67}Ga and ^{72}Ga
68Ei04 G.Eisele, I.Koniordos, G.Muller, R.Winkler - Phys. Letters 28B, 256 (1968)
Kern-Quadrupolmoment des Isotops ^{209}Bi
68Ek01 C.Ekstrom, I.Lindgren, H.Nygvist, A.Rosen, K.E.Adelroth - Phys.Letters 26B, 146 (1968); Erratum Phys.Letters 26B, 387(1968)
Nuclear Spins of ^{169}Lu, ^{170}Lu, ^{171}Lu, ^{165}Tm and ^{160}Er
68Ep01 B.W.Epperlein, O.Lutz - Z.Naturforsch. 23a, 1413(1968)
^{27}Al Nuclear Magnetic Resonance Studies in Solutions of Light and Heavy Water and the Ratio of the Larmor-Frequencies of ^{27}Al and ^{2}H
68Fe01 D.Feiertag, G.zu Putlitz - Z.Physik 208, 447 (1968)
Zur Rumpfpolarisation des Rb-Atoms: Hyperfeinstruktur des 7 $^{2}P_{1/2}$-Terms von Rb^{85}
68Fe05 F.D.Feiock, W.R.Johnson - Phys.Rev.Letters 21, 785(1968)
Relativistic Evaluation of Internal Diamagnetic Fields for Atoms and Ions
68Fo02 D.B.Fossan, A.R.Poletti - Phys.Rev. 168, 1228(1968)
Magnetic Moment and Core Excitation of the $d_{3/2}$ Hole State in Sc^{47}
68Fo10 T.R.Fowler - Thesis, Univ.California (1968); UCRL-18331 (1968)
Precision Atomic-Beam Studies of the Zeeman Effect in Thallium and Gallium (Electronic and Nuclear Magnetic Moments)
68Fr06 R.B.Frankel, J.J.Huntzicker, D.A.Shirley, N.J.Stone - Phys.Letters 26A, 452 (1968)
Magnetic Hyperfine Structure in ^{125}Te
68Fr17 F.W.Freeman - Thesis, Univ.Tennessee (1968); Nucl.Sci.Abstr. 23, 4594, Abstr. 44925 (1969)
The Determination of the Nuclear g Factor of the First Excited State of ^{102}Ru Using Internal Magnetic Fields
68Ga08 G.J.Garrett - Priv.Comm. (1968)
68Ga28 G.J.Garrett - Thesis, Princeton Univ. (1968); Diss.Abstr. 29B, 313 (1968)
The Spins and Magnetic Dipole Moments of ^{45}K and ^{120}Sb
68Ge08 E.Gerdau, W.Sell, K.Auerbach, J.Braunsfurth - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.183 (1968)
The g-Factor of the 496-keV Level in ^{183}Re
68Ge09 E.Gerdau, P.Steiner, D.Steenken - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.261 (1968)
Mossbauer Experiments with the 93.2-keV Transition in ^{178}Hf
68Gr01 B.Greenebaum, A.D.Jackson, Jr., R.A.Naumann - Nucl.Phys. A106, 193 (1968)
Measurement of a Spin 2 State in ^{102}Ag and the Decay of ^{102}Ag
68Gr03 B.Greiner, H.Arenhovel - Nucl.Phys. A107, 225 (1968)
Corrections to the Reorientation Effect of Coulomb Excitation in Deformed Doubly Even Nuclei
68Gr31 L.Grodzins - Ann.Rev.Nucl.Sci. 18, 291 (1968)
Magnetic Dipole Moments of Excited Nuclear States
68Gu02 G.Guthohrlein - Z.Physik 214, 332(1968)
Bestimmung der Kernquadrupolmomente der beiden stabilen Europiumisotope aus dem Eu II-Spektrum
68Ha01 G.S.Hayne, C.W.White, W.M.Hughes, H.G.Robinson - Bull.Am.Phys.Soc. 13, No.1, 20, AF4 (1968)
Determination of gI/gJ of Cs^{133} and $gJ(Cs^{133})/gJ(Rb^{87})$ for Free Cs and Rb Atoms

68Ha24 G.S.Hayne, E.S.Ensberg, H.G.Robinson - Phys.Rev. 171, 20(1968)
Measurement of g(J) Ratios for Rb^{85}, Rb^{87}, Hydrogen, and Deuterium, and of the Hyperfine Separation of Deuterium
68Ha25 R.A.Haberstroh, T.I.Moran, S.Penselin - Priv.Comm. (1968)
68Ha43 H.Hartmann, W.Strehlow, H.Haas - Z.Naturforsch. 23a, 2029(1968)
^{133}Cs-Kernresonanz in Cs_2MX_4-Kristallen
68Ha49 K.Hara, H.Nakamura, T.Sakai, N.Koizumi - ETL Rept.to Com.Consult.d'Electricite, Com.Int.Poids et Mesures, 12th Sess. (October 1968)
γ(p) Determination at the ETL in 1968 Supplement to 1965 Report
68He07 G.Heinzelmann, U.Knohl, G.zu Putlitz - Z.Physik 211, 20 (1968)
Elektrisches Kernquadrupolmoment von Casium 134
68Hi04 G.Himmel - Z.Physik 211, 68(1968)
Das Kernquadrupolelement des Os^{189}
68Ja05 A.D.Jackson, Jr., E.H.Rogers, Jr., G.J.Garrett - Phys.Rev. 175, 65(1968)
Spins and Nuclear Moments of Sb^{115}, Sb^{117}, Sb^{118}, Sb^{119} and Sb^{120}
68Jo17 K.Johansson, L.-O.Norlin, G.Carlsson - Arkiv Fysik 37, 445 (1968)
The g-Factor of the First Excited State in ^{106}Pd
68Jo19 J.O.Jonsson, M.Olsmats, L.Sanner, B.Wannberg - Arkiv Fysik 37, 317 (1968)
Atomic Beam Measurements at Uppsala and Gothenburg
68Ka14 E.N.Kaufmann, J.D.Bowman, S.K.Bhattacherjee - Nucl.Phys. A119, 417 (1968)
Properties of the K = 1/2 Ground State Rotational Bands in ^{169}Tm and ^{171}Tm
68Ke09 L.Keszthelyi, I.Demeter, Z.Szokefalvi-Nagy, L.Varga, Z.Zamori - Nucl.Phys. A120, 540 (1968)
The g-Factor of the 320 keV State of ^{51}V Measured by Coulomb Excitation in Fe-V Alloy
68Ke17 L.Keszthelyi, I.Demeter, I.Dezsi, L.Varga - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.155 (1968)
g-Factor of the 656 keV State in ^{110}Cd
68Kh01 B.Khurgin, S.Ofer, M.Rakavy - Nucl.Phys. A110, 577(1968)
Mossbauer Effect Studies of the 74.5 keV Level of ^{161}Dy
68Kl02 E.Klein - Z.Physik 208, 28(1968)
Eine Prazisionsmessung des Verhaltnisses der Spinresonanzfrequenz von Protonen Zur Zyklotronfrequenz Freier Elektronen im Gleichen Magnetfeld
68Kn01 U.Knohl, G.Zu Putlitz, A.Schenck - Z.Physik 208, 364 (1968)
Hyperfeinstruktur des 8 $^2P_{3/2}$-Terms von Casium 134
68Kn02 T.F.Knott, H.R.Andrews, B.Greenebaum, F.M.Pipkin - Phys.Rev. 170, 1051(1968)
Nuclear Orientation of ^{124}Sb
68Le08 M.Leduc, J.Brossel - Compt.Rend. 266B, 12(1968)
Mesure du Rapport des Moments Magnetiques Nucleaires des Isotopes 111 et 109 du Cadmium
68Li02 R.M.Lieder, M.Fleck, K.Killig, M.Forker, K.-H.Speidel, E.Bodenstedt - Nucl.Phys. A106, 389 (1968)
The g-Factor of the 184 keV State of ^{67}Zn
68Lo05 W.Low, A.Rosenthal - Phys.Letters 26A, 143(1968)
ESR and Optical Spectrum of Ti^{3+} in CaF_2
68Lo06 J.C.Love, G.Czjzek, F.E.Obenshain - Bull.Am.Phys.Soc. 13, No.2, 250, FD14 (1968)
Hyperfine Interaction of ^{61}Ni Measured by the Mossbauer Effect
68Lo07 J.C.Love, F.E.Obenshain - Bull.Am.Phys.Soc. 13, No.4, 667, GL7 (1968); See also 68Lo06
Mossbauer Investigations of Nickel Alloys
68Lu07 O.Lutz - Z.Naturforsch. 23a, 1202(1968)
Untersuchungen uber die Magnetische Kernresonanz von Alkalikernen in Wassriger Losung
68Lu08 A.Lurio - Priv.Comm. (1968)
68Ma22 T.J.Manakkil - Bull.Am.Phys.Soc. 13, No.4, 619, DL3 (1968)
Electron Spin Resonance of Copper-Doped Magnesium Acetate Tetrahydrate
68Ma23 N.J.Martin, P.G.H.Sandars, G.K.Woodgate - Proc.Roy.Soc.(London) 305A, 139(1968)
The Hyperfine Structure Stark Effect. II. The Ground Levels of Samarium, Europium and Aluminium
68Ma42 V.I.Matvienko, A.V.Kogan, K.A.Petrzhak - Yadern.Fiz. 7, 473(1968); Soviet J.Nucl.Phys. 7, 297(1968)
Investigation of Angular Distribution of α Particles of Aligned U^{233} Nuclei at Infralow Temperature
68Ma48 S.A.Marshall, R.A.Serway - Phys.Rev. 171, 345 (1968)
Electron-Spin-Resonance Absorption Spectrum of Trivalent Gadolinium in Single-Crystal Calcite

68Ma49 A.Marelius, P.Sparrman, T.Sundstrom - Proc.Intern.Conf.Hyperfine Interactions Detected by Nucl.Radiation, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publishing Co., p.1043 (1968)
Table of Nuclear Lifetimes
68Ma56 E.Matthias, D.A.Shirley, Eds. - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), North-Holland Publ.Co., Amsterdam (1968)
68Ma57 S.Martensson, L.Stigmark - Arkiv Fysik 37, 366 (1968)
Precision Frequency Measurements of the 0-0 Transition in Optically Pumped Sodium
68Mc20 M.N.McDermott, P.W.Spence, R.L.Chaney - Abstracts, Contrib.Intern.Conf.At.Phys., New York, V.W.Cohen, G.zu Putlitz, Eds., p.82 (1968)
Hyperfine Structure Anomalies in the Cadmium Isotopes
68Mo12 J.Morgenstern, J.W.Schmidt, G.Flugge, H.Schmidt - Phys.Letters 27B, 370 (1968)
The g Factor of the 175 keV State in ^{71}Ge and Hyperfine Fields of ^{71}Ge in Fe and Ni
68Mu01 E.Munck - Z.Physik 208, 184 (1968)
Messung der Magnetischen Momente der Tiefsten 2-zustande fur Einige Dy-, Er- und Yb-Isotope
68Mu02 J.Murray, T.A.McMath, J.A.Cameron - Can.J.Phys. 46, 75 (1968)
The Nuclear g Factor of the 356-keV Level in ^{196}Pt and the Internal Field on Mercury in Iron
68Mu04 A.R.Mufti, J.A.Cameron, J.C.Waddington, R.G.Summers-Gill - Can.J.Phys. 46, 177 (1968)
The Nuclear Magnetic Moment of Indium-117m
68Na01 A.Narath - Phys.Rev. 165, 506(1968); Erratum Phys.Rev. 175, 696(1968)
Magnetic Dipole Moments of ^{191}Ir and ^{193}Ir
68Na12 A.Narath, D.C.Barham - Phys. Rev. 176, 479 (1968)
Nuclear Magnetic Resonance in the Metal ReO_3: ^{185}Re and ^{187}Re Knight Shifts and Spin Relaxation Rates
68Ne05 J.Ney, R.Repnow, H.Bucka, S.Svanberg - Z.Physik 213, 192 (1968)
Untersuchung des 4p $^2P_{3/2}$-Termes des K I-Spektrums durch Resonanzstreuung von Licht zur Bestimmung des Kernquadrupolmoments von K^{40}
68No05 A.J.Nozik, M.Kaplan, A.I.Weiss - Bull.Am.Phys.Soc. 13, No.6, 894, CE10(1968)
Mossbauer Resonance Determination of the Nuclear Quadrupole Moment of the 21.7-keV State of Eu^{151}
68Ol03 J.R.Oleson, J.C.Walker - Bull.Am.Phys.Soc. 13, No.4, 691, HL9 (1968)
Mossbauer Effect Following Coulomb Excitation of Dy^{164} in $Dy^{164}Sb$
68Op01 G.V.Oppen - Z.Physik 213, 254(1968)
Level-Crossing-Experiment am 6s6p $^3P_1$-Term im Ba I-Spektrum
68Pa07 H.G.Palmer, F.R.Petersen, R.C.Mockler - Bull.Am.Phys.Soc. 13, No.6, 892, CD9 (1968)
Quadratic Stark Shift in the Hyperfine Structure of Tl^{203}
68Pe05 B.Persson, H.Blumberg, M.Bent - Phys.Letters 27A, 189(1968)
Induced Magnetic Fields at Gd Nuclei in $GdFe_2$ and Gd
68Pe06 B.Persson, H.Blumberg, D.Agresti - Phys.Rev. 170, 1066(1968)
Magnetic Moments and Quadrupole-Moment Ratios of the First Excited States in ^{182,184,186}W
68Pe18 F.R.Petersen, H.G.Palmer, J.H.Shirley - Bull.Am.Phys.Soc. 13, No.12, 1674, EC6 (1968)
Stark Effect in the $6^2P_{3/2}$ State of Tl^{203} and Tl^{205}
68Pf03 L.Pfeiffer, J.C.Wells,Jr., L.Madansky - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.871 (1968)
Measurement of the Magnetic Moment of ^{12}B by Nuclear Spin Precession About a Weak Field
68Ph01 E.A.Phillips, A.D.Jackson,Jr. - Phys.Rev. 169, 917 (1968)
Nuclear-Magnetic Moments of Cu^{60} and Cu^{62}: hfs Experiment and Configuration-Mixing Calculation
68Ph02 E.A.Phillips - Priv.Comm. (1968)
68Pi01 W.L.Pillinger, J.A.Stone - Bull.Am.Phys.Soc. 13, No.1, 28, AK1 (1968)
Mossbauer Effect in α-Neptunium Metal
68Pr08 H.Prange - Z.Physik 212, 415(1968)
Mossbauereffekt in ^{157}Gd und ^{155}Gd
68Ra03 A.T.Ramsey, S.Stein - Phys.Rev. 165, 1360(1968)
Ground-State Hyperfine Structure of ^{165}Dy

68Re05 B.Reuse, H.Schneider - Z.Naturforsch. 23a, 786(1968)
Differentielle Messung der Gestorten γγ-Winkelkorrelation am 81 keV Niveau des Cs^{133}
68Re06 R.W.Reynolds, M.M.Abraham, L.A.Boatner - Bull.Am.Phys.Soc. 13, No.1, 72, EI5 (1968)
ESR Spectra of Er^{3+} and Yb^{3+} in Single Crystals of $SrCl_2$
68Ro08 R.G.H.Robertson - Priv.Comm. (1968)
68Ro16 R.G.H.Robertson, J.C.Waddington, R.G.Summers-Gill - Can.J.Phys. 46, 2499 (1968)
Hyperfine Interactions in the J = 5 States of ^{147}Sm and ^{149}Sm
68Ru03 D.C.Russell, R.M.Wilenzick, K.A.Hardy - Bull.Am.Phys.Soc. 13, No.4, 690, HL5 (1968)
Mossbauer Effect in Even-Even Isotopes of Erbium
68Sa07 C.Sauer, E.Matthias, R.L.Mossbauer - Phys.Rev.Letters 21, 961(1968)
Recoilless Resonance Absorption and Hyperfine Structure of the 6.2-keV State in ^{181}Ta
68Sc03 A.Schwenk, G.Zimmermann - Phys.Letters 26A, 258 (1968); Erratum Priv.Comm. (June 1968)
The Ratio of the Larmor Frequency of ^{189}Os Relative to ^{1}H
68Sc06 A.Schwenk - Z.Physik 213, 482 (1968)
Ein Impulsverfahren zum Nachweis sehr schwacher Kernresonanz-Signale und die Messung des magnetischen Kernmoments von $^{187}Osmium$
68Sc09 R.W.Schmieder, A.Lurio, W.Happer - Phys.Rev. 173, 76(1968)
Hyperfine Structure and Lifetimes of the $4^2P_{3/2}$ and $5^2P_{3/2}$ States of K^{39}
68Sc12 D.Schonberner, D.Zimmermann - Z.Physik 216, 172 (1968)
Level-Crossing-Untersuchung der Hyperfeinstruktur des Angeregten 3 $^2P_{3/2}$- und 4 $^2P_{3/2}$-Zustands von Na^{23}
68Sc18 H.F.Schaefer III, R.A.Klemm, F.E.Harris - Phys.Rev. 176, 49 (1968)
Atomic Hyperfine Structure. I. Polarization Wave Functions for the Ground States of B, C, N, O, and F
68Sc26 S.G.Schmelling, H.A.Shugart - Bull.Am.Phys.Soc. 13, No.12, 1650, BE2 (1968)
Hyperfine Structure and Nuclear Magnetic Moment of ^{165}Tm
68Se09 G.K.Semin, E.V.Bryukhova - Yadern.Fiz. 7, 1346 (1968); Soviet J.Nucl.Phys. 7, 797 (1968)
Numerical Value of the Ratio of the Nuclear Quadrupole Moments of Re^{185} and Re^{187}
68Se12 S.L.Segel, R.G.Barnes - IS-520 (1968)
Catalog of Nuclear Quadrupole Interactions and Resonance Frequencies in Solids. Part I. Elements and Inorganic Compounds
68Sh22 V.S.Shirley - Proc.Intern.Conf.Hyperfine Interactions Detected by Nucl.Radiation, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publishing Co., p.985 (1968)
Table of Nuclear Moments
68Sh25 D.A.Shirley - Proc.Intern.Conf.Hyperfine Interactions Detected by Nucl.Radiation, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publishing Co., p.843 (1968)
Magnetic Resonance in Oriented Nuclei
68Si05 J.J.Simpson, U.Smilansky, J.P.Wurm - Phys.Letters 27B, 633 (1968); Erratum Phys.Letters 28B, 422(1969)
The Reorientation Effect in ^{114}Cd
68So06 W.H.Southwell, D.L.Decker, H.B.Vanfleet - Phys.Rev. 171, 354(1968)
Mossbauer-Effect Measurements in Iron at High Pressures
68Sp03 G.Sprott, R.Novick - Phys.Rev.Letters 21, 336(1968)
Identification of the Metastable Autoionizing States in Potassium with a new rf spectroscopic Technique
68St03 J.A.Stone, W.L.Pillinger - Phys.Rev. 165, 1319(1968)
Nuclear Moment Ratios in ^{237}Np from Mossbauer Spectra
68St16 N.J.Stone, R.B.Frankel, D.A.Shirley - Phys.Rev. 172, 1243 (1968)
Three-Quasiparticle Intruder State in Te^{125} and the Magnetic Moment of Sb^{125}
68St27 N.V.Studentsov, T.N.Malyarevskaya, V.Y.Shifrin - Izmeritel.Tekhn. No.11, 29 (1968); Meas.Tech.(USSR) No.11, 1483 (1968)
Measurement of the Proton Gyromagnetic Ratio in a Weak Magnetic Field
68St28 P.H.Stelson - Quoted by 69Ro05
68Su04 J.Sugar - J. Opt. Soc. Am. 58, 1519 (1968)
Nuclear Magnetic Dipole Moment of ^{165}Ho
68Su05 K.Sugimoto, K.Nakai, K.Matuda, T.Minamisono - J.Phys.Soc.Japan 25, 1258(1968)
Magnetic Moments of Short-Lived β-Radioactive Nuclei, ^{12}B and ^{12}N
68Ta12 P.N.Tandon, H.G.Devare - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.164 (1968)
On the Ionic State of ^{143}Pr from the Decay of ^{143}Ce

68Te02 J.Terrien - Metrologia 4, 41(1968)
News from the International Bureau of Weights and Measures
68Tr05 J.C.Travis, J.J.Spijkerman - Priv.Comm. (1968)
Mossbauer Spectroscopy Using ^{61}Ni
68Tr11 W.J.Treytl, E.Matthias - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.145 (1968)
g-Factor of the 243-keV Level in ^{86}Y
68Va03 P.A.Vanden Bout, A.Dymanus, V.J.Ehlers, M.H.Prior, H.A.Shugart - Phys.Rev. 166, 1131(1968)
Nuclear Spin, Hyperfine-Structure Separation, and Nuclear Magnetic Moment of 18-min ^{88}Rb
68Wa10 J.C.Waddington - Priv.Comm. (1968)
68Wa22 F.Wagner, J.Klockner, H.J.Korner, H.Schaller, P.Kienle - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.77 (1968)
Isomer Shift and Quadrupole Splitting in ^{191}Ir and ^{193}Ir
68We17 A.Weitsch, H.K.Walter - Z.Physik 216, 459 (1968)
g-Faktoren und Multipol-Mischungsverhaltnisse in ^{156}Gd
68Wh01 C.W.White, W.M.Hughes, G.S.Hayne, H.G.Robinson - Phys.Rev. 174, 23(1968)
Determination of g-Factor Ratios for Free Rb^{85} and Rb^{87} Atoms
68Wi04 J.M.Williams - J.Phys., C (London) 1, 473(1968)
Mossbauer Effect in the Heusler Alloy Co_2MnSn
68Wi09 J.W.Wiggins, J.C.Walker - Bull.Am.Phys.Soc. 13, No.4, 672, HE10 (1968)
Measurement of the Nuclear Moments of Er^{170} by the Mossbauer Effect Following Coulomb Excitation
68Wi23 A.Winther - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.217 (1968)
Static Quadrupole Moments from Coulomb Excitation
68Wo07 E.F.Worden, R.G.Gutmacher, R.W.Lougheed, J.E.Evans, J.G.Conway - J.Opt.Soc.Am. 58, 998(1968)
Hyperfine Structure in the ^{253}Es Emission Spectrum
68Ya06 G.C.Yang, J.B.Sampson - Bull.Am.Phys.Soc. 13, No.3, 435, DH8 (1968)
Electron Spin Resonance of Ru in TiO_2
68Ya08 T.Yamazaki, E.Matthias - Phys.Rev. 175, 1476 (1968)
g-Factor Measurement of a Three-Particle Isomeric State of ^{209}Po Following Pulsed Generation in (α,xn) Reactions
68Za04 F.C.Zawislak, J.D.Rogers - Proc.Intern.Conf.Hyperfine Struct.Nucl.Radiations, Asilomar, Pacific Grove, Calif. (1967), E.Matthias, D.A.Shirley, Eds., North-Holland Publ.Co., Amsterdam, p.151 (1968)
Nuclear Spectroscopy Studies of Low-Lying States in ^{99}Tc
68Ze03 T.Zemcik - Czech.J.Phys. 18B, 551(1968)
Moessbauer Six-Line Spectra Position Analysis for ^{57}Fe in Metallic Iron
68Ze04 A.v.Zelewsky - Helv.Chim.Acta 51, 803 (1968)
^{195}Pt-Kernresonanz in Pt(II)-und Pt(IV)-Verbindungen
68Zu01 G.Zu.Putlitz, K.V.Venkataramu - Z.Physik 209, 470(1968)
Hyperfeinstruktur und Lebensdauer des $8^2P_{3/2}$-Terms von Rubidium
68Zu03 G.zu Putlitz - Priv.Comm. (March 1968)
69Ab12 M.M.Abraham, C.B.Finch, R.W.Reynolds, H.Zeldes - Phys.Rev. 187, 451 (1969)
Electron-Spin-Resonance Spectrum of Divalent Eruopium in Thorium Dioxide
69Ac02 H.Ackermann, D.Dubbers, J.Mertens, A.Winnacker, P.von Blankkenhagen - Z.Physik 228, 329 (1969)
Measurement of the Nuclear Magnetic Moment of ^{110}Ag ($T_{1/2}$ = 24.4 s)
69Ad11 A.Adler, T.Lucatorto, R.Novick, G.Sprott - Bull.Am.Phys.Soc. 14, No.10, 942, CC4 (1969)
Hyperfine Structure of Li^+_6
69Ba10 J.M.Baker, W.B.J.Blake, G.M.Copland - Proc.Roy.Soc.(London) 309A, 119 (1969)
ENDOR of $^{171}Yb^{3+}$ and $^{173}Yb^{3+}$ on Cubic Sites in Calcium Fluoride
69Ba15 J.M.Baker, G.M.Copland, B.M.Wanklyn - J.Phys., C (London) 2, 862 (1969)
Nuclear Moments and Hyperfine Structure Anomaly for Gadolinium
69Ba27 M.Baumann - Z.Naturforsch. 24a, 1049 (1969)
Ein level-crossing-Experiment zur Untersuchung der Hyperfeinstruktur des Angeregten $3^2P_{3/2}$-Zustandes von ^{23}Na
69Ba48 M.Baumann, H.Liening, G.Wandel - Z.Physik 221, 245 (1969)
Die Hyperfeinstruktur des 6s 6p $^3P_1$-Zustandes von ^{171}Yb und ^{173}Yb
69Ba51 A.R.Barnett, W.R.Phillips - Phys.Rev. 186, 1205 (1969)
Coulomb Excitation and Reorientation of the Octupole State in ^{208}Pb

69Ba52 C.Bauche-Arnoult - Quoted by 69Be29
69Be25 R.B.Begzhanov, D.Gaffarov, K.T.Salikhbaev - ZhETF Pisma v Redaktsiyu 9, 413 (1969); JETP Letters 9, 246 (1969)
Magnetic Moments of the 114 and 270 keV Levels in Pm^{149}
69Be29 T.Ben Mena, J.M.Gagne, J.M.Helber - J.Phys. (Paris), Suppl.No.1, Colloq.C1-78 (1969)
Structure Hyperfine du Niveau Fondamental de l'Uranium 233
69Be50 M.Bernheim, R.Riskalla, T.Stovall, D.Vinciguerra - Phys.Letters 30B, 412 (1969)
Electron Scattering Form Factor of ^{9}Be
69Be77 L.F.Bertain, J.K.Kliwer - Bull.Am.Phys.Soc. 14, No.12, 1233, EE1 (1969)
Electric Quadrupole Moment of the ^{44}Sc First Excited State
69Be78 R.B.Begzhanov, K.T.Salikhbaev, D.Gaffarov - Program and Theses, Proc.19th Ann.Conf.Nucl.Spectroscopy and Struct.Of At.Nuclei, Erevan, p.77 (1969)
Spectroscopy of the 58-keV State of ^{127}I
69Be79 R.B.Begzhanov, K.T.Salikhbaev, D.Gaffarov - Program and Theses, Proc.19th Ann.Conf.Nucl.Spectroscopy and Struct.Of At.Nuclei, Erevan, p.80 (1969)
Magnetic Moment of the 133-keV State of ^{131}Cs
69Bl02 J.Bleck, D.W.Haag, W.Leitz, R.Michaelsen, W.Ribbe, F.Sichelschmidt - Nucl.Phys. A123, 65(1969)
The g-Factor of the First Excited State in ^{19}Ne
69Bl07 J.Bleck, D.W.Haag, W.Leitz, R.Michaelsen, W.Ribbe - Phys.Letters 28B, 651 (1969)
The Magnetic Moment of the 7/2- State at 1.29 MeV in ^{41}K
69Bl08 A.G.Blachman, D.A.Landman, A.Lurio - Phys.Rev. 181, 70 (1969)
Hyperfine Structure and g(J) Value of the $^{4}F_{9/2}$ and $^{4}P_{5/2}$ Levels of Cu^{63} and Cu^{65}
69Bl18 J.Bleck, D.W.Haag, W.Ribbe - Nucl.Instr.Methods 67, 169 (1969)
Calibration of an Excited Nuclear State g-Factor in Terms of the Proton g-Factor
69Bo01 J.D.Bowman, F.C.Zawislak - Nucl.Phys. A138, 90 (1969)
Hyperfine Fields at Pb in Fe, Co and Ni Lattices and the g-Factor of the First 5- State in ^{208}Pb
69Bo12 J.D.Bowman, F.C.Zawislak, E.N.Kaufmann - Phys.Letters 29B, 226 (1969)
Measurement of the g-Factor of the 3- Octopole Vibrational State in ^{208}Pb
69Bo41 E.Bozek, R.Broda, J.Golczewski, A.Z.Hrynkiewicz, R.Kulessa, M.Rybicka, S.Szymczyk, W.Walus - Acta Phys.Polon. 36, 1065 (1969)
The g-Factor of the 184 keV State of ^{67}Zn
69Br09 M.Brieger, H.Bucka, A.Reichelt, P.Zimmermann - Z.Naturforsch 24a, 903 (1969)
Untersuchung der Hyperfeinstruktur des $5s^25d\ ^2D_{3/2}$- und $5s^26d\ ^2D_{3/2}$-Terms im In I-Spektrum
69Bu06 B.Budick, J.Snir - Phys.Rev. 178, 18 (1969)
Hyperfine Structure of the 6s6p $^1P_1$ Level of the Stable Ytterbium Isotopes
69Ch07 R.L.Chaney, M.N.McDermott - Phys.Letters 29A, 103 (1969)
Nuclear Orientation of ^{113}m-Cd, ^{115}Cd and ^{115}m-Cd
69Ch20 Y.W.Chan, V.W.Cohen, H.B.Silsbee - Phys.Rev. 184, 1102 (1969)
Hyperfine Structure and Nuclear Magnetic Moment of K^{42}
69Cl05 D.Cline, H.S.Gertzman, H.E.Gove, P.M.S.Lesser, J.J.Schwartz - Nucl.Phys. A133, 445(1969)
The Static Quadrupole Moment of the First Excited State of ^{60}Ni
69Cu09 C.J.Cussens, G.K.Rochester, K.F.Smith - J.Phys., A (London) 2, 658 (1969)
Measurements of the Nuclear Spin of ^{206}Tl, the Hyperfine Structure Splitting of ^{66}Cu, and the Nuclear Magnetic Moments of ^{108}Ag(2.3 min) and ^{110}Ag(24 s)
69Da11 J.J.Davies, J.Owen - J.Phys., C(London) 2, 1405 (1969)
The Hyperfine Interactions of Isolated and of Exchange-Coupled Iridium Ions in $(NH_4)_2PtCl_6$
69De33 L.Degener, S.Penselin, W.Schumacher, G.Wolber - Proc.Intern.Conf.At.Phys., 1st, New York (1968), B.Bederson, V.W.Cohen, F.M.J.Pichanick, Eds., Plenum Press, New York, p.49 (1969)
Direct Measurement of the Nuclear Magnetic Dipole Moments of Rb^{85} and Ag^{107} with the Atomic Beam Magnetic Resonance Method
69Ek01 C.Ekstrom, T.Noreland, M.Olsmats, B.Wannberg - Nucl.Phys. A135, 289 (1969)
Nuclear Spins of Neutron-Deficient Holmium and Erbium Isotopes
69Fe02 J.Fechner, A.Hammesfahr, A.Kluge, S.K.Sen, H.Toschinski, J.Voss, P.Weight, B.Martin - Nucl.Phys. A130, 545 (1969)
The Decay of ^{131}Cs
69Fo07 M.Forker, H.F.Wagner - Nucl.Phys. A138, 13 (1969)
Determination of the Ratio of the Quadrupole Moments of the 1174 keV and the 78 keV Levels in ^{172}Yb

69Fo08 M.Forker, H.F.Wagner, G.Schmidt - Nucl.Phys. A138, 97 (1969)
Time Differential Angular Correlation Measurements on ^{160}Dy and the Electric Quadrupole Moment of the First Excited State
69FuCo G.H.Fuller, V.W.Cohen - Nucl.Data Tables A5, 433(1969)
Nuclear Spins and Moments
69Ge04 S.Gerstenkorn, F.S.Tomkins - Physica 42, 581 (1969)
Moment Magnetique de Pu 241
69Ge06 C.Gerschel, J.P.Husson, N.Perrin, L.Valentin - Contrib.Intern.Conf.Properties Nucl.States, Montreal, Canada, p.85 (1969)
Etude de la Deformation des Niveaux Excites du Ia 133
69Gi03 H.M.Gibbs, B.Chang, R.C.Greenhow - Phys.Rev. 188, 172 (1969)
Polarization of Pb Vapor. I. Orientation of the $^3P_0$ Ground State of Pb^{207}
69Gi04 H.M.Gibbs, C.M.White - Phys.Rev. 188, 180 (1969)
Polarization of Pb Vapor. II. Disorientation of the Pb^{207} Ground State and $\mu(I)(Pb^{207})/\mu(I)(Hg^{199})$
69Gl08 J.E.Glenn, R.J.Pryor, J.X.Saladin - Phys.Rev. 188, 1905 (1969)
Measurement of the Static Quadrupole Moments of the First 2^+ States of ^{194}Pt, ^{196}Pt, and ^{198}Pt
69Go10 G.Goldmann, C.Hahn, J.Ney - Z.Physik 225, 1 (1969)
Hyperfeinstrukturuntersuchung des 6p $^2P_{3/2}$-Terms im Au I-Spektrum durch Resonanzstreuung von Licht
69Go12 W.A.Goddard III - Phys.Rev. 182, 48 (1969)
Core Polarization and Hyperfine Structure of the B,C,N,O, and F Atoms
69Go21 D.Goorvitch, S.P.Davis, H.Kleiman - Phys.Rev. 188, 1897 (1969)
Isotope Shift and Hyperfine Structure of the Neutron-Deficient Thallium Isotopes
69Gu01 C.Gunther, H.Hubel, A.Kluge, K.Krien, H.Toschinski - Nucl.Phys. A123, 386 (1969)
Electromagnetic Properties of the K = 1/2 Rotational Band in ^{169}Tm
69Ha22 E.Handrich, A.Steudel, H.Walther - Phys.Letters 29A, 486 (1969)
The Hyperfine Splitting of the $3d^54s4p$ Levels of Mn I and the Quadrupole Moment of ^{55}Mn
69Ha31 O.Hausser, T.K.Alexander, D.Pelte, B.W.Hooton, H.C.Evans - Phys.Rev.Letters 23, 320 (1969)
Coulomb Excitation of ^{28}Si Projectiles
69Ha60 E.Handrich, A.Steudel, R.Wallenstein, H.Walther - J.Phys.(Paris), Suppl.No.1, Colloq.C1-18 (1969)
Level Crossing Experiments in the Tm I and Sm I Spectra
69He04 A.J.Hebert, K.Street, Jr. - Phys.Rev. 178, 205(1969)
Nuclear-Quadrupole Ratio of Bromine Isotopes in Molecular LiBr
69He11 G.M.Heestand, R.R.Borchers, B.Herskind, L.Grodzins, R.Kalish, D.E.Murnick - Nucl.Phys. A133, 310 (1969); R.R.Borchers - Priv.Comm. (May 1972)
g-Factors for 2^+ States of Doubly Even Nuclei (Ge, Se, Mo, Ru, Pd, Cd and Te)
69Hu10 H.Hubel, H.Toschinski, E.Bodenstedt, F.Freitag - Proc.Roy.Soc.(London) 311A, 181 (1969)
On the Magnetic Hyperfine Field at Hf in Iron and the Gyromagnetic Factors g(K) and g(R) of the 624 Rotational Band of ^{177}Hf
69Hu12 S.G.Hussein, A.R.Pierce, R.G.H.Robertson, R.G.Summers-Gill - Contrib.Intern.Conf.Properties Nucl.States, Montreal, Canada, p.91 (1969)
Spins and Nuclear Moments of ^{60}m-Co, ^{140}La and ^{142}m-Pr
69In07 P.Inia, Y.K.Agarwal, H.de Waard - Phys.Rev. 188, 605 (1969)
Hyperfine Fields of Technetium and Zinc Impurities in Iron
69Is05 R.C.Isler, S.Marcus, R.Novick - Phys.Rev. 187, 76 (1969)
Hyperfine Structure of the 3 ^{2}p and 4 ^{2}p States of Lithium and Lifetime of the 3 ^{2}p State
69Jo06 E.P.Jones, S.R.Hartmann - Phys.Rev.Letters 22, 867 (1969)
Steady-State Nuclear Double-Resonance Detection of Electric Quadrupole Moment of K^{40}
69Jo26 C.E.Johnson, M.H.Prior, H.A.Shugart - Bull.Am.Phys.Soc. 14, No.4, 524, BM5 (1969)
Hyperfine Structure and g(J) of ^{129}Xe in the $5d(3_{1/2})_4$ State
69Jo27 C.E.Johnson - Bull.Am.Phys.Soc. 14, No.10, 953, F15 (1969)
3^3P Hyperfine Structure of He^3
69Ka21 M.Kaplan, J.Blok, D.A.Shirley - Phys.Rev. 184, 1177 (1969)
Magnetic Moment of Sm^{145} and Attenuation Following the Decay of Oriented Sm^{145}
69Ke07 H.P.Kelly - Phys.Rev. 180, 55 (1969)
Hyperfine Structure of Oxygen Calculated by Many-Body Theory. II
69Ke11 D.B.Kenyon, L.Keszthelyi, J.A.Cameron - Can.J.Phys. 47, 2395 (1969)
Nuclear g Factors of Three Levels of ^{192}Pt

69Ke16 J.R.Kerns, J.X.Saladin, R.J.Pryor, S.A.Lane - Bull.Am.Phys.Soc. 14, No.1, 122, KE12 (1969)
Coulomb Excitation of the First Excited States of Ba^{134} and Ba^{136}
69Ke17 J.R.Kerns - Thesis, Univ.Pittsburgh (1969); Diss.Abstr.Int., 31B, 336 (1970)
Coulomb Excitation Studies of Ba^{134}, Ba^{136}, Ba^{138}, and Nd^{150}
69Ki19 C.Kikuchi, D.L.Tseng - Bull.Am.Phys.Soc. 14, No.2, 188, BC8 (1969)
EPR and ENDOR or Nb^{4+} in $CaWO_4$
69Kl03 H.-J.Kluge, E.-W.Otten, G.Zimmermann - J.Phys.(Paris), 30, Suppl.No.1, Colloq. C1-15 (1969)
Hfs Measurements in the 4s4p $^1P_1$ State of ^{43}Ca by the Level Crossing Technique
69Kn03 E.Knapek, R.Simon, R.S.Raghavan, H.J.Korner - Phys.Letters 29B, 581 (1969)
Nuclear g-Factor of the 322 keV Intruder State in ^{125}Te
69Ko10 U.Kopf, H.J.Besch, E.W.Otten, C.von Platen - Z.Physik 226, 297 (1969)
Optical Pumping of Short Lived β-Radioactive Isotopes and the Magnetic Moment of ^{37}K
69Kr07 H.Krause, K.Krebs, R.Winkler, M.Zschimmer - Naturwissenschaften 56, 84 (1969)
Die Kern-Quadrupolmomente der Stabilen Isotope ^{185}Re und ^{187}Re
69Kr19 M.Krusius, A.C.Anderson, B.Holmstrom - Phys.Rev. 177, 910 (1969)
Calorimetric Investigation of Hyperfine Interactions in Metallic Ho and Tb
69Ku06 H.W.Kugel, R.R.Borchers, R.Kalish - Nucl.Phys. A137, 500 (1969)
Magnetic Moment Measurements of the 211.2 keV(3/2$^-$) and 239.8 keV(5/2$^-$) States of ^{195}Pt
69Ku18 B.G.Kulchinskii, A.I.Levon, O.F.Nemets - Program and Theses, Proc.19th Ann.Conf.Nucl.Spectroscopy and Struct.Of At.Nuclei, Erevan, p.38 (1969)
Measurement of the Magnetic Moments of Excited States at 197 keV in ^{19}F and 750 keV in ^{51}Cr
69La05 N.S.Laulainen, M.N.McDermott - Phys.Rev. 177, 1606(1969)
Spin and Nuclear Moments of the Zn^{63} Ground State
69La06 N.S.Laulainen, M.N.McDermott - Phys.Rev. 177, 1615(1969)
Spin and Nuclear Moments of 55-min Cd^{105} and 49-min Cd^{111m}
69La29 D.J.Larson, P.A.Valberg, N.F.Ramsey - Phys.Rev.Letters 23, 1369 (1969)
Measurements of the Hydrogen-Deuterium Atomic Magnetic Moment Ratio and of the Deuterium Hyperfine Frequency
69Le02 J.S.Levine, P.A.Bonczyk, A.Javan - Phys.Rev.Letters 22, 267(1969)
Observation of Hyperfine Level Crossing in Stimulated Emission
69Le10 J.C.Lehmann - Phys.Rev. 178, 153 (1969)
Nuclear Orientation of Cadmium-111 by Optical Pumping with the Resonance Line 5^1S_0-5^1P_1
69Le11 A.F.Leung, E.Y.Wong - Phys.Rev. 180, 380 (1969)
Electron Paramagnetic Resonance of NpO_2^{2+} in $Cs_2UO_2Cl_4$ and $CsUO_2(NO_3)_3$
69Le19 M.Levanoni - Phys.Rev. 186, 1253 (1969)
g-Factor Measurements in Os^{192} and Pt^{192}
69Lu01 O.Lutz - Phys.Letters 29A, 58 (1969)
The Magnetic Moment of 45-Scandium
69Lu06 O.Lutz, W.Steinkilberg - Phys.Letters 30A, 183 (1969)
^{55}Manganese Nuclear Magnetic Resonance Studies
69Lu11 E.A.C.Lucken - Nuclear Quadrupole Coupling Constants, Academic Press, London (1969)
69Ly05 J.D.Lyons, R.T.Pu, T.P.Das - Phys.Rev. 178, 103 (1969); Erratum Phys.Rev. 186, 266 (1969)
Many-Body Approach to Hyperfine Structure in the ^2P State of Lithium
69Ma43 P.C.Magnante, H.H.Stroke - J.Opt.Soc.Am. 59, 836 (1969)
Isotope Shift between ^{209}Bi and 6.3-Day ^{206}Bi
69Mc20 F.K.McGowan, W.T.Milner, R.O.Sayer, R.L.Robinson, P.H.Stelson - Bull.Am.Phys.Soc. 14, No.12, 1204, AC12 (1969)
Electric Quadrupole Moments of States in $^{166,168,170}Er$, $^{172,174,176}Yb$, And ^{186}W
69Mu11 K.Murakawa - J.Phys.Soc.Japan 27, 1690 (1969)
Quadrupole Moment of Co^{59}
69Mu14 D.E.Murnick, J.R.MacDonald, R.R.Borchers, G.Heestand, B.Herskind - Proc.Roy.Soc.(London) 311A, 111 (1969)
Implantation Perturbed Angular Correlation Experiments in Iron after Inelastic Proton Scattering
69Ne03 J.Ney - Z.Physik 223, 126 (1969)
Hyperfeinstrukturuntersuchung der 4p und 5p $^2P_{3/2}$-Terme im KI-Spektrum durch Resonanzstreuung von Licht zur Bestimmung der Kernquadrupolmomente von K^{39} und K^{41}
69Ni14 A.K.Nigam, R.Bhattacharyya - Saha Inst.Nucl.Phys.Ann.Rept., p.61 (1969); NP-18141 (1969)
g-Factor Measurement of the 482 keV Level of ^{181}Ta

69Ni15 A.K.Niqam, R.Bhattacharyya - Saha Inst.Nucl.Phys.Ann.Rept., p.64 (1969); NP-18141 (1969)
The g-Factor of the Level of ^{177}Hf
69Ow02 W.R.Owens, B.L.Robinson, S.Jha - Phys.Rev. 185, 1555 (1969)
Gyromagnetic Ratio of the 129-keV State in Iridium-191
69Pa12 B.K.Patnaik, S.Gangadharan, S.Jha - Contrib.Intern.Conf.Properties Nucl.States, Montreal, Canada, p.90 (1969)
Magnetic Moment of the 310 keV State in V^{48}
69Pe08 D.Pelte, O.Hausser, T.K.Alexander, B.W.Hooton, H.C.Evans - Phys.Letters 29B, 660 (1969)
Coulomb Excitation of the First Excited State of ^{28}Si
69Ph04 E.A.Phillips, B.R.Casserberg, W.G.Unruh - Bull.Am.Phys.Soc. 14, No.10, 944, CC16 (1969)
Nuclear Spins of As^{70} and As^{72}
69Pi15 A.R.Pierce, R.G.Summers-Gill - Phys.Can. 25, No.4, 39, FM4.7 (1969)
Nuclear Moments of ^{140}La
69Pr07 M.H.Prior, A.Dymanus, H.A.Shugart, P.A.Vanden Bout - Phys.Rev. 181, 1665 (1969)
Nuclear Spin and Hyperfine Structure of ^{121}Sn and ^{113}Sn
69Qu03 D.Quitmann, J.M.Jaklevic, D.A.Shirley - Phys.Letters 30B, 329 (1969)
Observation of NMR in an Isomeric State Following a Nuclear Reaction
69Qu04 D.Quitman, J.M.Jaklevic - Bull.Am.Phys.Soc. 14, No.4, 624, HE9 (1969); Oral Report
Measurement of the Magnetic Moments of Isomeric Levels in ^{79}As and ^{206}Pb Populated by Nuclear Reactions
69Re06 P.G.E.Reid, M.Sott, N.J.Stone - Nucl.Phys. A129, 273 (1969)
A Study of the Magnetic Dipole Moments of ^{192}Ir and ^{194}Ir and the Decay Scheme of ^{192}Ir by Nuclear Orientation
69Ri07 R.J.Riggs, K.J.Standley - J.Phys., C (London) 2, 992 (1969)
The Electron Spin Resonance of Cu^{2+} and Ni^{2+} Ions in Zinc Tungstate
69Ro05 R.L.Robinson, F.K.McGowan, P.H.Stelson, W.T.Milner, R.O.Sayer - Nucl.Phys. A124, 553(1969)
Coulomb Excitation of ^{106},^{108},^{110}Pd
69Ro29 A.Rosen - J.Phys., B (London) 2, 1257 (1969)
Analysis of the Hyperfine Structure of the Ground-State Multiplet of the Samarium Atom
69Sa27 J.X.Saladin, J.E.Glenn, R.J.Pryor - Phys.Rev. 186, 1241 (1969)
Reorientation-Effect Measurements on Cd^{114}
69Sc08 D.Schwalm, B.Povh - Phys.Letters 29B, 103 (1969)
Reorientation Measurements in ^{20}Ne and ^{22}Ne
69Sc15 A.Schenck - Z.Physik 224, 461 (1969)
Die elektrischen Kernquadrupolmomente von Casium 131 and Casium 132 aus Doppelresonanzmessungen am 7 $^2P_{3/2}$-Term
69Sc26 H.A.Schuessler, E.N.Fortson, H.G.Dehmelt - Phys.Rev. 187, 5 (1969); Erratum Phys.Rev. A2, 1612 (1970)
Hyperfine Structure of the Ground State of $^3He^+$ by the Ion-Storage Exchange-Collision Technique
69Sc32 R.P.Scharenberg, R.Beyer, D.Grissmer - Bull.Am.Phys.Soc. 14, No.4, 555, DH4 (1969)
Static Quadrupole Moments of First-Excited 2^+ States in Ge^{74} and Ge^{76}
69Sc34 H.F.Schaefer,III, R.A.Klemm, F.E.Harris - Phys.Rev. 181, 137 (1969)
Atomic Hyperfine Structure. II. First-Order Wave Functions for the Ground States of B, C, N, O, and F
69Se11 R.A.Serway, S.A.Marshall, J.A.McMillan, R.L.Marshall, W.D.Ohlsen - J.Chem.Phys. 51, 4978 (1969)
Electron Spin Resonance Absorption Spectra of Hole-Trap Centers Associated with Phosphorous in Irradiated Single Crystal Calcite
69Si01 R.Simon, I.Arens, R.S.Raghavan, H.J.Korner - Phys.Letters 28B, 590(1969)
Nuclear g-Factor of the 2^{+1} Gamma Vibrational State in ^{160}Dy
69Si06 V.Singh, P.N.Tandon, S.H.Devare, H.G.Devare - Nucl.Phys. A132, 221 (1969)
Magnetic Moment of the 49.7 keV Level in ^{132}I
69Si09 V.Singh, P.N.Tandon, S.H.Devare, H.G.Devare - Contrib.Intern.Conf.Properties Nucl.States, Montreal, Canada, p.88 (1969)
Magnetic Moments of the First Excited 2^+ States in ^{58}Fe and ^{132}Xe
69Si13 V.Singh, P.N.Tandon, S.H.Devare, H.G.Devare - Nucl.Phys. A137, 278 (1969)
g-Factor of the 810.5 keV Level in ^{58}Fe
69Si15 J.J.Simpson, U.Smilansky, D.Ashery - Nucl.Phys. A138, 529 (1969)
Coulomb Excitation and the Reorientation Effect in ^{70}Ge and ^{76}Ge
69Sp05 G.D.Sprouse, S.S.Hanna - Nucl.Phys. A137, 658 (1969)
Lifetimes and Magnetic Moments of Levels in ^{57}Fe

69St05 S.Stein, A.T.Ramsey - Phys.Rev. 179, 1170 (1969)
Ground-State Spin of ^{163}Er

69St24 R.M.Sternheimer - Proc.Intern.Conf.At.Phys., 1st, New York (1968), B.Bederson, V.W.Cohen, F.M.J.Pichanick, Eds., Plenum Press, New York, p.94 (1969)
Shielding and Antishielding Effects for the Nuclear Quadrupole Moments Of the Copper Isotopes

69Su13 A.W.Sunyar, W.Gelletly, M.A.J.Mariscotti, P.Thieberger - Bull.Am.Phys.Soc. 14, No.12, 1203, AC4 (1969)
$Ni^{60}(\alpha,np\gamma)Cu^{62}$ Reaction Studies at E = 32-40 MeV

69Sv01 S.Svanberg, S.Rydberg - Z.Physik 227, 216 (1969)
Level Crossing Investigation of the 6p $^2P_{3/2}$ and 7p $^2P_{3/2}$ Levels of Cs^{133}, Cs^{135}, and Cs^{137}

69TaPa B.N.Taylor, W.H.Parker, D.N.Langenberg - Rev.Mod.Phys. 41, 375 (1969); Reprinted by Academic Press, New York (1970)
Determination of e/h, Using Macroscopic Quantum Phase Coherence in Superconductors: Implications for Quantum Electrodynamics and the Fundamental Physical Constants

69Ta08 P.N.Tandon, H.G.Devare - Indian J.Pure Appl.Phys. 7, 1 (1969)
The g Factor of the 114 keV State in ^{149}Pm

69Te08 J.Terrien - Metrologia 5, 68 (1969)
News from the Bureau International des Poids et Mesures

69Un02 P.J.Unsworth - J.Phys., B (London) 2, 122 (1969); Priv.Comm. (April, 1970)
Nuclear Dipole, Quadrupole and Octupole Moments of ^{155}Gd by Atomic Beam Magnetic Resonance

69Va05 L.Varga, I.Demeter, L.Keszthelyi, Z.Szokefalvi-Nagy, Z.Zamori - Phys.Rev. 177, 1783 (1969)
g Factors of the 210-keV and 240-keV States of ^{195}Pt

69Vi02 D.Vinciguerra, T.Stovall - Nucl.Phys. A132, 410 (1969)
Electron Scattering from p-Shell Nuclei

69Vi03 P.Violino - Can.J.Phys. 47, 2095 (1969)
Investigation of the Hyperfine Structure of the $6^2P_{3/2}$ State of ^{133}Cs by a Level-Crossing Method

69Wa30 R.Wappling, E.Karlsson, K.Johansson - Phys.Stat.Sol. 32, 151 (1969)
Supertransferred Hyperfine Field for Lu in YbIG

69Wi19 W.L.Williams, V.W.Hughes - Phys.Rev. 185, 1251 (1969)
Magnetic Moment and hfs Anomaly for He^3

69Wo07 E.F.Worden, R.G.Gutmacher, J.G.Conway, R.J.Mehlhorn - J.Opt.Soc.Am. 59, 1526A (1969)
Nuclear Magnetic Moments of ^{249}Bk and ^{253}Es

69Wr01 J.J.Wright, L.C.Balling, R.H.Lambert - Phys.Rev. 183, 180 (1969)
Hyperfine Splitting and Pressure Shifts of Li^6 and Li^7

69Zi01 D.Zimmermann - Z.Physik 224, 403 (1969)
Atomstrahlresonanzexperiment zur Untersuchung der Hyperfeinstruktur angeregter Atomzustande durch Beobachten von Besetzungszahlanderungen ..m Grundzustand

69Zi02 P.Zimmermann - Z.Physik 226, 415 (1969)
Der Einfluss eines elektrischen Feldes auf Level-Crossings des $6d^2D_{3/2}$-Zustands im Tl I-Spektrum

69Zm01 H.Zmora, M.Blau, S.Ofer - Nucl.Phys. A130, 541 (1969); H.Zmora - Priv.Comm. (May 1972)
The Magnetic Moment of the 344 keV Level of ^{152}Gd

69Zu04 G.zu Putlitz - Proc.Intern.Conf.At.Phys., 1st, New York (1968), B.Bederson, V.W.Cohen, F.M.J.Pichanick, Eds., Plenum Press, New York (1969); Quoted by 70Pi17

70Ab03 M.M.Abraham, L.A.Boatner, C.B.Finch, R.W.Reynolds, H.Zeldes - Phys.Rev. B1, 3555 (1970)
Electron Paramagnetic Resonance Investigations of Divalent Americium and Trivalent Curium in Strontium Chloride

70Ab20 A.Abragam, B.Bleaney - Electron Paramagnetic Resonance of Transition Ions, Clarendon Press, Oxford (1970)

70Ad07 K.E.Adelroth, A.Rosen - Ark.Fys. 40, 457 (1970)
Atomic Beam Investigation of the Hyperfine Structure of ^{51}Cr

70Ad09 K.E.Adelroth, H.Nyqvist, A.Rosen - Phys.Scr. 2, 96 (1970)
Nuclear Spins of Neutron-Deficient Terbium Isotopes

70Al18 K.Alder, R.Morf, F.Roesel - Phys.Lett. 32B, 645 (1970)
Quantum Mechanical Corrections for Double Coulomb Excitation in ^{152}Sm and the Determination of the E4 Transition Probability

70An09 D.S.Andreyev, G.M.Gusinsky, K.I.Erokhina, M.F.Kudojarov, I.K.Lemberg, I.N.Chugunov - Phys.Lett. 32B, 187 (1970)
The Quadrupole Moment of the First Excited State in ^{114}Cd

70Av02 R.Avida, I.Ben Zvi, P.Gilad, M.B.Goldberg, G.Goldring, K.H.Speidel, A.Sprinzak - Nucl.Phys. A147, 200 (1970)
Angular Correlation Measurements on ^{191,193}Ir Following Coulomb Excitation
70Az01 K.S.Azimov, R.B.Begzhanov, K.T.Salikhbaev, K.T.Teshabaev - Izv.Vyssh.Ucheb.Zaved.Fiz. No.8, 114 (1970); Sov.Phys.J. 13, 1078 (1973)
Nature of the As^{75} Excited States
70Be08 R.Beraud, I.Berkes, R.Chery, R.Haroutunian, M.Levy, G.Marguier, G.Marest, R.Rougny - Phys.Rev. C1, 303 (1970)
Lifetimes and Nuclear Moments in Os^{192} and Pt^{192}
70Be13 K.H.Beckurts, G.Brunhart - Phys.Rev. C1, 726 (1970)
Magnetic Moments of Compound States in Er^{168}
70Be19 R.Beyer, R.P.Scharenberg, J.Thomson - COO-1746-32 (1970)
Measurements of the Static Quadrupole Moment of the First Excited 2^+ States of the Nuclei Pd^{106} and Pd^{110} by Heavy Ion Coulomb Excitation
70Be23 H.Bertschat, J.Christiansen, H.-E.Mahnke, E.Recknagel, G.Schatz, R.Sielemann, W.Witthuhn - Phys.Rev.Lett. 25, 102 (1970)
Time-Dependent Relaxation of Aligned Nuclei Due to Radiation-Induced Vacancies in Solid Germanium
70Be29 H.Bertschat, J.Christiansen, H.-E.Mahnke, E.Recknagel, G.Schatz, R.Sielemann, W.Witthuhn - Nucl.Phys. A150, 282 (1970)
Stroboscopic and Time-Differential Observation of the Nuclear Larmor Precession on the 20 ms Isomeric State of ^{71}Ge
70Be33 H.Bertschat, J.Christiansen, H.-E.Mahnke, E.Recknagel, G.Schatz, R.Sielemann, B.Spellmeyer, W.Witthuhn - Nucl.Phys. A151, 193 (1970)
Magnetic Moment of the 10 μsec Level in ^{58}Co
70Be36 I.Ben-Zvi, P.Gilad, M.B.Goldberg, G.Goldring, K.-H.Speidel, A.Sprinzak - Nucl.Phys. A151, 401 (1970); G.Goldring - Priv.Comm. (April 1972)
Hyperfine Interaction Studies of Heavy Nuclei in Highly Ionized Atoms
70Be45 R.Beyer, R.P.Scharenberg, J.Thomson - Phys.Rev. C2, 1469 (1970); See Also 70Be19
Measurements of Static Quadrupole Moment of the First Excited 2^+ States of the Nuclei Pd^{106} and Pd^{110} by Heavy-Ion Coulomb Excitation
70Be50 H.Beer - Z.Naturforsch. 25a, 1513 (1970)
Die Rotation der γγ-Winkelkorrelation der Kaskaden (570-797) keV, (570-797-605) keV and (797-605) keV von Ba^{134} in einem ausseren Magnetfeld
70Be59 H.Beer - Z.Phys. 239, 351 (1970)
Hyperfeinstruktur- und Stark-Effekt-Untersuchungen der Terme $4d5s5pz^2F_{5/2}$ und $z^2F_{7/2}$ im Yttrium I Spektrum
70Be67 R.B.Begzhanov, D.G.Gaffarov, N.Ilkhamdzhanov, A.I.Muminov - Izv.Akad.Nauk Uzb.SSR, Ser.Fiz.-Mat.Nauk, No.2, 65 (1970)
Properties of the Excited States of ^{147}Sm and ^{149}Pm
70Be71 N.Benczer-Koller, R.Hensler, J.W.Tape, J.R.MacDonald - Bull.Amer.Phys. Soc. 15, No.12, 1666, CE13 (1970)
Magnetic Moments of the 4.49 MeV (5−) and 3.74 MeV (3−) States of ^{40}Ca
70Be75 M.Bernasson, P.Descouts, G.A.Styles - Helv.Phys.Acta 43, 393 (1970)
Nuclear Magnetic Resonance in $Be_{22}Re$ and $Be_{22}Tc$
70Be78 M.Becker, H.Bertschat, J.Christiansen, H.-E.Mahnke, E.Recknagel, G.Schatz, R.Sielemann, B.Spellmeyer, W.Wasserthal, T.Wichert, W.Witthuhn - HMI-B-91, p.53 (1970)
Stroboskopische Beobachtung der Kernlarmorprazessian am isomeren $9/2^+$ Zustand im As^{77}
70Bl06 J.Bleck, R.Michaelsen, W.Ribbe, W.Zeitz - Phys.Lett. 32B, 41 (1970)
Energy, Lifetime and g-Factor of the First Excited State in ^{63}Ni
70Bl08 J.Blaser, O.Lutz, W.Steinkilberg - Phys.Lett. 32A, 403 (1970)
Nuclear Magnetic Resonance Studies of ^{35}Cl, ^{37}Cl, ^{79}Br and ^{81}Br
70Bo28 P.Bond, S.Jha - Phys.Rev. C2, 1887 (1970)
Nuclear-Structure and Hyperfine-Field Studies with Mo^{95}
70Bo31 J.S.Boyno, T.W.Elze, J.R.Huizenga - Nucl.Phys. A157, 263 (1970)
A Study of the ^{232}Th(d,t)^{231}Th and ^{238}U(d,t)^{237}U Reactions
70Bo47 J.Bonn, E.W.Otten, C.von Platen, W.Linder, H.Muller, H.Schweickert - Proc.Int.Conf.Prop.Nuclei Far from Region of Beta-Stability, Leysin, Switzerland, Vol.1, p.383 (1970); CERN 70-30 (1970)
Measurement of the Spin and Nuclear Magnetic Moment of the 408 msec ^{20}Na
70Bo48 R.R.Borchers, W.M.Roney, P.Ryge - Bull.Amer.Phys.Soc. 15, No.12, 1676, DC7 (1970); R.R.Borchers - Priv.Comm. (May 1972)
G-Factor Measurements of Excited States of ^{123}Te
70Bu09 J.Buttet, P.K.Baily - Phys.Rev.Lett. 24, 1220 (1970)
Knight Shift and Zero-Field Splitting in Rhenium Determined by Nuclear Acoustic Resonance
70Bu11 B.Budick, J.Snir - Phys.Rev. A1, 545 (1970)
Hyperfine-Structure Anomalies of Stable Ytterbium Isotopes

70Ca15 R.Calvo, M.C.G.Passeggi, R.A.Isaacson - Phys.Lett. 31A, 407 (1970)
ENDOR Measurements in $^{57}Fe^{3+}$ in Calcium Oxide
70Ch01 A.Christy, I.Hall, R.P.Harper, I.M.Naqib, B.Wakefield - Nucl.Phys. A142, 591 (1970)
Measurement of the Static Quadrupole Moments of the First 2^+ States in $^{104,106}Pd$ and ^{130}Te
70Ch05 J.Christiansen, H.-E.Mahnke, E.Recknagel, D.Riegel, G.Schatz, G.Weyer, W.Witthuhn - Phys.Rev. C1, 613 (1970)
Stroboscopic Observation of Nuclear Larmor Precession
70Ch26 W.J.Childs - Phys.Rev. A2, 316 (1970)
Hyperfine Structure of Many Atomic Levels of Tb^{159} and the Tb^{159} Nuclear Electric-Quadrupole Moment
70Ch31 W.J.Childs - Phys.Rev. A2, 1692 (1970)
Hyperfine Structure of $^5I_{8,7}$ Atomic States of $Dy^{161,163}$ and the Ground-State Nuclear Moments
70Ch40 Y.W.Chan, V.W.Cohen - Bull.Amer.Phys.Soc. 15, No.11, 1521, HA3 (1970)
Measurement of the Hyperfine Structure in the Ground States of K^{39}, K^{41} and Na^{23}
70Ch41 W.J.Childs - Bull.Amer.Phys.Soc. 15, No.11, 1521, HA2 (1970)
Hyperfine Structure of $Nd^{143,145}$
70Co28 S.Cochavi, J.M.McDonald, D.B.Fossan - Phys.Lett. 33B, 297 (1970)
The Magnetic Moment of the 2761 keV 8^+ State in ^{92}Mo
70Co34 J.G.Conway, E.F.Worden - UCRL-19530, p.200 (1970)
The Spectrum of DyI
70Cr01 A.M.Crooker, G.Shipley - Can.J.Phys. 48, 730 (1970)
A Spectroscopic Determination of the Nuclear Moments of Bismuth
70Cr02 S.B.Crampton, H.C.Berg, H.G.Robinson, N.F.Ramsey - Phys.Rev.Lett. 24, 195 (1970)
Determination of the Quadrupole Coupling Constant in the N^{14} Atomic Ground State
70Cr07 D.W.Cruse, K.Johansson, E.Karlsson - Nucl.Phys. A154, 369 (1970); Priv.Comm. (March 1972)
Magnetic Moment of a Suggested Three-Quasiparticle State in ^{125}Te
70De05 J.W.M.Dekker, H.F.Bloemhof, J.H.Brouwer, P.F.A.Klinkenberg - Physica 46, 119 (1970)
Hyperfine Structure in Tb II and Nuclear Moments of ^{159}Tb
70Ed01 N.Edelstein - Phys.Lett. 33A, 233 (1970)
The Hyperfine Structure Anomaly of ^{241}Pu and ^{239}Pu and the Nuclear Moment of ^{241}Pu
70Ed02 N.Edelstein, J.G.Conway, D.Fujita, W.Kolbe, R.McLaughlin - J.Chem.Phys. 52, 6425 (1970)
Formation and Characterization of Divalent Einsteinium in a CaF_2 Crystal
70En01 G.Engler - Phys.Rev. C1, 734 (1970)
Determination of the Static Quadrupole Moment of the First 2^+ Excited State in ^{142}Ce
70Fi17 W.Fischer - Fortschr.Phys. 18, 89 (1970)
Einfluss der Elektronenrumpfpolarisation auf die Hyperfeinstruktur alkaliahnlicher Atome
70FuCo G.H.Fuller, V.W.Cohen - ORNL-4591 (1970)
A Table of Magnetic Hyperfine-Structure Anomalies
70Ge01 E.Gerdau, D.Ruter, J.Braunsfurth - Z.Phys. 230, 72 (1970)
Lebensdauer- und Spinrotationsmessungen an den ersten angeregten Zustanden in ^{197}Pt und ^{197}Hg
70Ge06 E.Gerdau, W.K.Muller, H.J.Wolf - Z.Phys. 235, 124 (1970)
Der g-Faktor des 364 keV-Zustandes von ^{184}W und die Hyperfeinfelder von Wolfram in Eisen, Kobalt und Nickel
70Ge07 H.S.Gertzman, D.Cline, H.E.Gove, P.M.S.Lesser, J.J.Schwartz - Nucl.Phys. A151, 273 (1970)
The Static Electric Quadrupole Moment of the First Excited State of ^{148}Sm
70Ge08 H.S.Gertzman, D.Cline, H.E.Gove, P.M.S.Lesser - Nucl.Phys. A151, 282 (1970)
The Static Electric Quadrupole Moments of the First Excited States of $^{144,146,148,150}Nd$
70Ge10 S.George, R.A.Klingberg - J.Opt.Soc.Amer. 60, 869 (1970)
Interferometric Measurements of the Hyperfine Structure in Bismuth
70Ge14 C.Gerschel, N.Perrin, L.Valentin - Phys.Lett. 33B, 299 (1970)
Mesure du Moment Quadrupolaire d'un Isomere de Forme
70Go15 L.H.Gobel - Z.Naturforsch. 25a, 611 (1970)
Level-crossing-Experimente in angeregten Termen des Lu I zur Untersuchung der Hyperfeinstruktur von ^{175}Lu
70Go50 W.Gordy, R.L.Cook - Microwave Molecular Spectra, Chemical Applications Of Spectroscopy, 2nd Ed., W.West, Ed., Part II, Technique of Organic Chemistry, A.Weissburger, Ed., Vol.IX, Interscience Publishers, New York (1970)

70Gr25 Z.W.Grabowski - Phys.Rev. C2, 1093 (1970); R.P.Scharenberg - Priv.Comm. (April 1972)
g Factors of the First Two Excited 2+ States in Pt^{192}

70Gr29 J.S.Greenberg, Z.Brandt, R.A.Eisenstein, Y.Horowitz, U.Smilansky, P.N.Tandon, A.M.Kleinfeld, D.Maggi - Bull.Amer.Phys.Soc. 15, No.12, 1676, DC6 (1970)
Reorientation Effect Measurement of Q_{2^+} in Cd^{110} and Cd^{114}

70Ha04 O.Hausser, B.W.Hooton, D.Pelte, T.K.Alexander, H.C.Evans - Can.J.Phys. 48, 35 (1970)
Measurement of the Reorientation Effect in ^{24}Mg

70Ha24 O.Hausser, D.Pelte, T.K.Alexander, H.C.Evans - Nucl.Phys. A150, 417 (1970)
Reorientation Measurements in Even Titanium Isotopes

70Ha59 W.Hartmann - Z.Phys. 240, 323 (1970)
Die Hyperfeinstruktur des $3^2P_{1/2}$-Zustandes von Natrium im starken Magnetfeld

70Ha74 J.F.Hague, J.E.Rothberg, A.Schenck, D.L.Williams, R.W.Williams, K.K.Young, K.M.Crowe - Phys.Rev.Lett. 25, 628 (1970)
Precision Measurement of the Magnetic Moment of the Muon

70He09 P.Heinecke, A.Steudel, H.Walther - Phys.Lett. 31B, 295 (1970)
The Isotope Shift of ^{151}Eu, ^{152}Eu, ^{153}Eu and ^{154}Eu. The Signs of the Nuclear Dipole Moment of ^{152}Eu and the Nuclear Quadrupole Moments of ^{152}Eu and ^{154}Eu

70He20 A.Hese - Z.Phys. 236, 42 (1970)
Experimentelle Untersuchung der 5d 6s 6p z $^2F_{5/2,7/2}$-Terme im Lantham I-Spektrum unter Verwendung von Levelcrossing-Spektroskopie

70He26 A.Hese, G.Buldt - Z.Naturforsch. 25a, 1537 (1970)
Hyperfeinstrukture, stark-effekt und Lebensdauern in den angeregten 5d6s6p y $^2D_{3/2,5/2}$-Zustanden des Lanthan I-Spektrums

70Hi12 A.T.Hirshfeld, D.D.Hoppes - Phys.Rev. C2, 2341 (1970)
Transition Mixing Ratios Determined from a Study of the Electron and Gamma-Ray Distributions from Oriented ^{192}Ir

70Hi14 A.T.Hirshfeld, D.D.Hoppes - Bull.Amer.Phys.Soc. 15, No.4, 628, JG12 (1970)
The Beta Distribution for ^{142}Pr Oriented in Iron

70Ho23 J.Hoeft, F.J.Lovas, E.Tiemann, T.Torring - Z.Naturforsch. 25a, 1029 (1970)
Microwave Absorption Spectra of AlF, GaF, InF, and TlF

70Hu05 R.J.Hull, G.O.Brink - Phys.Rev. 1A, 685 (1970)
Hyperfine Structure of Bi^{209}

70Hu19 D.P.Hutchinson, F.L.Larsen, N.C.Schoen, D.I.Sober, A.S.Kanofsky - Phys.Rev.Lett. 24, 1254 (1970)
Magnetic Moment of the Positive Muon

70Jo27 J.O.Jonsson, L.Sanner, B.Wannberg - Phys.Scr. 2, 16 (1970)
Nuclear Spin and Magnetic Moment of the Ground State of ^{49}Cr

70Ka09 R.Kalish, R.R.Borchers, H.W.Kugel - Nucl.Phys. A147, 161 (1970); R.R.Borchers - Priv.Comm. (May 1972)
Electromagnetic Properties of the First 2+ States of the Even Hg Isotopes

70Ka25 J.Kaufmann, F.Sohre - Z.Naturforsch. 25a, 441 (1970)
Nuclear Quadrupole Resonance of ^{35}Cl and ^{37}Cl in Polycrystalline $LiClO_3$

70Ka33 N.I.Kaliteevskii, M.P.Chaika - Izv.Akad.Nauk SSSR, Ser. Fiz. 34, 1646 (1970); Bull.Acad.Sci.USSR,Phys.Ser. 34, 1462 (1971)
Use of Interference of Atomic States for Determing Nuclear Constants

70Ka45 G.Kaspar, W.Knupper, W.Ebert, P.Holleczek, N.Fiebiger - Proc.Intern.Conf.Nucl.Reactions Induced by Heavy Ions, Heidelberg, Germany (1969); R.Bock, W.R.Hering, Eds, North-Holland Publishing Co., Amsterdam, p.471 (1970)
Determination of the Static Quadrupole Moment of the First Excited 2+ State of ^{152}Sm and ^{166}Er by Coulomb Excitation with ^{160}-Ions

70Ke14 D.B.Kenyon, L.Keszthelyi, J.A.Cameron - Can.J.Phys. 48, 2730 (1970)
Nuclear g Factors of Excited 2+ Levels in ^{194}Pt

70Ke18 L.Keszthelyi, I.Demeter, L.Pocs, Z.Szokefalvi-Nagy, L.Varga - Acta Phys. 28, 91 (1970)
Anomalous Hyperfine Field at Rh Nucleus in Fe-Rh Alloy Following Low Energy Coulomb Excitation

70Ki05 R.L.King, C.H.Liu, H.H.Stroke - Phys.Lett. 31B, 567 (1970)
Nuclear Magnetic Moment of ^{203}Hg by Optical Pumping

70Ki13 H.Kiefte, J.S.M.Harvey - Can.J.Phys. 48, 562 (1970)
Electron-Nuclear Double Resonance Measurement of Hyperfine Interactions in $Eu^{2+}:CaWO_4$

70Kl06 A.M.Kleinfeld, R.Covello-Moro, H.Ogata, G.G.Seaman, S.G.Steadman, J.de Boer - Nucl.Phys. A154, 499 (1970)
Reorientation Measurements in ^{116}Sn and ^{124}Sn

70Kl07 M.V.Klimentovskaya, N.A.Lebedev, A.A.Sorokin - Yad.Fiz. 12, 460 (1970); Sov.J.Nucl.Phys. 12, 251 (1971)
Determination of the g Factors of the Second Excited States 11/2- of the Nuclei Eu^{147} and Eu^{149} by the Method of Differential Angular Correlation in an External Magnetic Field

70Kl12 A.M.Kleinfeld, J.D.Rogers, J.Gastebois, S.G.Steadman, J.de Boer - Nucl.Phys. A158, 81 (1970)
Reorientation Effect Measurements in ^{106,114}Cd
70Kl13 J.Klockner, K.E.G.Lobner - Verh.Deut.Phys.Ges. 6, 530 (1970)
Lebensdauer-, g-Faktor- und Koinzidenzmessungen in ^{198}Au
70Ko32 W.Kolbe, N.Edelstein - Quoted by 70Ed01
70La07 D.A.Landman, A.Lurio - Phys.Rev. A1, 1330 (1970)
Hyperfine Structure of the $(6p)^3$ Configuration of Bi^{209}
70Le04 M.Levanoni, F.C.Zawislak, D.D.Cook - Nucl.Phys. A144, 369 (1970)
Magnetic Moments of Excited States in ^{190}Os, ^{192}Os and ^{192}Pt
70Le13 M.Levanoni, F.C.Zawislak - Phys.Rev. C2, 672 (1970)
g Factor of the 50-keV 3/2- State in ^{223}Ra and the Internal Magnetic Fields at Ra Nuclei in Ferromagnets
70Le17 P.M.S.Lesser, D.Cline, J.D.Purvis - Nucl.Phys. A151, 257 (1970)
Static Quadrupole Moments of the First Excited States of ^{58,60,62}Ni
70Le26 H.Lew - Bull.Amer.Phys.Soc. 15, No.6, 795, DE10 (1970)
Hyperfine Structure and Nuclear Magnetic Moment of Pr^{141}
70Li16 R.M.Lieder, N.Buttler, K.Killig, K.Beck - Z.Phys. 237, 137 (1970)
Level Crossing in Hyperfine Interactions Studied by Perturbed γ-γ Angular Correlations
70Li25 I.Lindner, H.Nyqvist, A.Rosen, K.E.Adelroth, C.Ekstrom, M.Olsmats, B.Wannberg - Proc.Int.Conf.Prop.Nuclei Far from Region of Beta-Stability, Leysin, Switzerland, Vol.1, p.387 (1970); CERN 70-30 (1971)
Atomic-Beam Measurements in the Rare-Earth Region
70Lu02 O.Lutz - Phys.Lett. 31A, 384 (1970)
The Hyperfine Structure Anomaly of ^{79}Br and ^{81}Br
70Lu03 O.Lutz - Phys.Lett. 31A, 528 (1970)
The Hyperfine Structure Anomaly of the Stable Chlorine Isotopes
70Lu04 C.-C.Lu, R.D.Present - Phys.Rev. B1, 2025 (1970)
Nuclear Quadrupole Coupling in the LiH Molecule
70Lu09 A.Lurio, D.A.Landman - J.Opt.Soc.Amer. 60, 759 (1970)
Hyperfine Structure of the $(6p)^2$ Configuration of ^{207}Pb
70Ma32 A.L.Mashinskii - Opt.Spektrosk. 28, 3 (1970); Opt.Spectrosc. 28, 1 (1970)
Precise Measurement of Atomic Constants Using Level-Crossing Signals of the $3^2P_{3/2}$ State of ^{23}Na
70Ma39 M.Marmor, S.Cochavi, D.B.Fossan - Phys.Rev.Lett. 25, 1033 (1970)
Hyperfine Fields at Ca^{+2} in Ferromagnetic Metals and the g Factor of the 3.19-MeV 6^+ State
70Mc27 F.K.McGowan, W.T.Milner, R.O.Sayer, R.L.Robinson, P.H.Stelson - ORNL-4513, p.56 (1970)
Electric Quadrupole Moments of States in ^{166,168,170}Er, ^{172,174,176}Yb, And ^{186}W
70Mo40 P.A.Moskowitz, C.H.Liu, H.H.Stroke - Bull.Amer.Phys.Soc. 15, No.12, 1676, DC9 (1970)
Optical Pumping Determination of Nuclear Magnetic Moments of Radioisotopes, ^{193}Hg, ^{193}m-Hg, ^{195}m-Hg, and ^{197}m-Hg
70Na05 K.Nakai, J.L.Quebert, F.S.Stephens, R.M.Diamond - Phys.Rev.Lett. 24, 903 (1970)
Quadrupole Moments of First Excited States in ^{28}Si, ^{32}S, and ^{40}Ar
70Na07 K.Nakai, F.S.Stephens, R.M.Diamond - Nucl.Phys. A150, 114 (1970)
Quadrupole Moments of the First Excited States in ^{20}Ne and ^{22}Ne
70Na11 S.Nagamiya, T.Nomura, T.Yamazaki - Nucl.Phys. A159, 653 (1970)
Stroboscopic Determination of the Magnetic Moment of the 8^+ Isomeric State of ^{208}Po
70Na13 S.Nagamiya, T.Katou, T.Nomura, T.Yamazaki - Phys.Lett. 33B, 574 (1970)
Effective Spin and Orbital Magnetism of the Proton Studied from the g-Factors of the 8^+ States in ^{90}Zr, and ^{92}Mo
70Ne21 R.K.Nesbet - Phys.Rev. A2, 1208 (1970)
Atomic Bethe-Goldstone Calculations of the Hyperfine Structure of B (^{2}P)
70Ni11 L.Niesen, W.J.Huiskamp - Physica 50, 259 (1970)
Nuclear Magnetic Resonance on Oriented Nuclei in a Paramagnetic Crystal ^{52}Mn and ^{54}Mn in $La_2Mg_3(NO_3)_{12}.24H_2O$
70No01 R.Nordhagen, G.Goldring, R.M.Diamond, K.Nakai, F.S.Stephens - Nucl.Phys. A142, 577 (1970)
Perturbed Angular Distributions from ^{120,122,124}Sn(^{40}Ar,4n)^{156,158,160}Er Reaction Products
70Ol02 A.F.Oluwole, S.G.Schmelling, H.A.Shugart - Phys.Rev. C2, 228 (1970)
Nuclear Spins, Nuclear Moments, and Hyperfine Structure of ^{69}Ge and ^{75}Ge and $^3P_2$ Hyperfine Structure of ^{71}Ge
70Or02 B.Orre, A.Linnfors, F.Falk, J.E.Thun, L.Johansson - Nucl.Phys. A148, 516 (1970)
Perturbations of the Alpha-Gamma Angular Correlation in the Decay of ^{226}Ra

70Or08 D.E.O'Reilly, E.M.Peterson - Bull.Amer.Phys.Soc. 15, No.1, 110, SP11 (1970)
Relaxation Rates of Alkali Metal and Chloride Nuclei in Aqueous Solution. Quadrupole Moment of ^{133}Cs

70Pi11 A.R.Pierce, R.G.Summers-Gill - Bull.Amer.Phys.Soc. 15, No.6, 769, BE9 (1970)
Nuclear Moments of ^{147}Nd and ^{149}Nd

70Pr09 R.J.Pryor, J.X.Saladin - Phys.Rev. C1, 1573 (1970)
Determination of the Electric Quadrupole Moment of the First 2+ States of $Os^{188,190,192}$

70Pr13 W.P.Pratt, Jr., R.I.Schermer, J.R.Sites, W.A.Steyert - Phys.Rev. C2, 1499 (1970)
Search for Parity Violation in the Gamma Decay of ^{159}Tb Polarized by Dilution Refrigeration

70Ra18 R.L.Rasera, A.Li-Scholz - Phys.Rev. B1, 1995 (1970)
Perturbed-Angular-Correlation Study of Electric-Quadrupole Interactions in ^{172}Yb in Thulium Metal and Oxide Lattices

70Ra42 U.Ranon, D.N.Stamires - Chem.Phys.Lett. 5, 221 (1970)
Determination of the Nuclear Quadrupole Moment Ratio of $^{155}Gd/^{157}Gd$ by Electron Paramagnetic Resonance

70Re14 O.Redi, H.H.Stroke - Phys.Rev. A2, 1135 (1970)
Level-Crossing Determination of the $(6s6p)\,^3P_1$ hfs of Hg^{203}

70Ro16 S.D.Rosner, F.M.Pipkin - Phys.Rev. A1, 571 (1970) Erratum Phys.Rev. A3, 521 (1971)
Hyperfine Structure of the 2^3S_1 State of He^3

70Ro21 A.Rosen, C.Ekstrom, H.Nyqvist, K.E.Adelroth - Nucl.Phys. A154, 283 (1970)
Nuclear Ground State Spins of Neutron-Deficient Dy Isotopes

70Ro31 M.Rots, R.Coussement, R.Van Esch, M.Boge, S.Dousson - Z.Phys. 240, 396 (1970)
Implantation of Tellurium in Iron and Measurement of the Magnetic Moment of the First Excited State in ^{123}Te

70Ro32 W.M.Roney, H.W.Kugel, G.M.Heestand, R.R.Borchers, R.Kalish - Proc.Intern.Conf.Nucl.Reactions Induced by Heavy Ions, Heidelberg, Germany (1969), R.Bock, W.R.Hering, Eds., North-Holland Publishing Co., Amsterdam, p.419 (1970); R.R.Borchers - Priv.Comm. (May 1972)
Magnetic Moments of Core Excited States of Odd Nuclei Near A = 100

70Ro35 W.M.Roney, R.R.Borchers - Bull.Amer.Phys.Soc. 15, No.12, 1676, DC8 (1970); R.R.Borchers - Priv.Comm. (May 1972)
G-Factors for Two Excited States of ^{125}Te

70Sa08 G.A.Sawatzky, J.Hupkes - Phys.Rev.Lett. 25, 100 (1970); Erratum Phys.Rev. Lett. 25, 489 (1970)
Redetermination of Nuclear Quadrupole Moments from Hyperfine Interactions in Compounds

70Sc07 S.G.Schmelling. V.J.Ehlers, H.A.Shugart - Phys.Rev. C1, 225 (1970)
Nuclear Magnetic Moment, Hyperfine Structure, and Hyperfine Structure Anomaly of ^{196}Au

70Sc11 A.Schwenk - Phys.Lett. 31A, 513 (1970)
^{57}Fe-Nuclear Magnetic Resonance Studies in the Diamagnetic $Fe(Co)_5$

70Sc15 G.Schilling, R.P.Scharenberg, J.W.Tippie - Phys.Rev. C1, 1400 (1970)
Determination of the Quadrupole Moments of First Excited 2+ States in Cd^{114} and Fe^{56} by Coulomb Excitation

70Sc33 R.W.Schmieder, A.Lurio, W.Happer, A.Khadjavi - Phys.Rev. A2, 1216 (1970)
Level-Crossing Measurement of Lifetime and hfs Constants of the $^2P_{3/2}$ States of the Stable Alkali Atoms

70Se11 T.Seo, T.Hayashi, A.Aoki - Nucl.Phys. A159, 494 (1970)
The Magnetic Moments of Three Excited States in ^{149}Pm

70Sh16 R.R.Sharma - Phys.Rev.Lett. 25, 1622 (1970)
Nuclear Quadrupole Moment of Al^{27} in Al_2O_3

70Si17 J.R.Sites, W.A.Steyert - Nucl.Phys. A156, 19 (1970)
Angular Distribution of Gamma Rays Resulting from Polarized ^{124}Sb, ^{192}Ir and ^{194}Ir

70Si20 V.Singh - J.Phys.Soc.Jap. 29, 1111 (1970)
g-Factor of 1127.8 keV, 2'+ Second Excited State in ^{106}Pd

70So09 A.J.Soinski, R.B.Frankel, Q.O.Navarro, D.A.Shirley - Phys.Rev. C2, 2379 (1970)
Nuclear Orientation of ^{253}Es in Neodymium Ethylsulfate

70St17 S.G.Steadman, A.M.Kleinfeld, G.G.Seaman, J.De Boer, D.Ward - Nucl.Phys. A155, 1 (1970)
Reorientation Effect in the Cadmium Isotopes

70St20 P.H.Stelson, F.K.McGowan, R.L.Robinson, W.T.Milner - Phys.Rev. C2, 2015 (1970)
Static Quadrupole Moment of the First 2+ States of the Even Tin Nuclei

70St26 H.L.Stuck, P.Zimmermann - Z.Phys. 239, 345 (1970)
Level Crossing Investigations in the $4d^2D_{5/2,3/2}$-States of the Al I-Spectrum
70Su04 K.Sugimoto, A.Mizobuchi, K.Matuda, T.Minamisono - Phys.Lett. 31B, 520 (1970)
Electric Quadrupole Moment of the Short-Lived Beta-Emitter ^{12}B
70Su11 J.T.Suss, W.Low, M.Foguel - Phys.Lett. 33A, 14 (1970)
ESR Spectrum of Ir^{4+} in Single Crystals of MgO
70Sw05 J.C.Swartz, L.J.Swartzendruber, L.H.Bennett, R.E.Watson - Phys.Rev. B1, 146 (1970)
Nuclear Magnetic Resonance of ^{61}Fe in the Paramagnetic Alloys TiFe(1-x)Co(x)
70Ts04 J.F.Tschanz, R.C.Sapp - Phys.Rev. C2, 2168 (1970)
Nuclear Orientation of Iron-59 in Rare-Earth Double-Nitrate Crystals
70Va10 R.Van Esch, M.Rots, R.Coussement - Z.Phys. 233, 477 (1970)
The Magnetic Moment of the Lowest 3/2$^-$ State in ^{57}Co
70Vo08 F.von Sichart, H.J.Stockmann, H.Ackermann, G.zu Putlitz - Z.Phys. 236, 97 (1970)
Optical Pumping of Free Atomic Ions with Hyperfine Structure
70Wa07 G.Wandel - Z.Phys. 231, 434 (1970)
Doppelresonanzexperimente zur Untersuchung der Hyperfeinstruktur des 6 s 6 p $^3P_1$-Zustandes von ^{171}Yb und ^{173}Yb
70Wa25 H.F.Wagner, J.Lange - Z.Phys. 238, 35 (1970)
Determination of the Quadrupole Ratio Q^{3+}/Q^{2+} in ^{172}Yb
70Wa26 H.F.Wagner, M.Forker, U.Weigand - Z.Phys. 238, 69 (1970)
Investigation of Statistically Perturbed Angular Correlations of ^{154}Gd and ^{156}Gd in Different Liquid Sources
70Wa35 B.Wannberg, J.O.Jonsson, L.Sanner - Phys.Scr. 1, 238 (1970)
Nuclear Magnetic Moment and Hyperfine Structure Anomaly of ^{103}Ag and Nuclear Spin of 13 m ^{102}Ag
70We11 R.E.Weiss, R.H.Lambert, L.C.Balling - Phys.Rev. A2, 1745 (1970)
Temperature Dependence of Hyperfine Pressure Shifts. II. Nitrogen in Helium, Neon, and Molecular Nitrogen
70Wi17 R.L.Williams, Jr., L.Pfeiffer, J.C.Wells, Jr., L.Madansky - Phys.Rev. C2, 1219 (1970)
Nuclear Polarization in the $^{11}B(d,p)^{12}B$ Reaction. III
70Wi22 P.F.Winkler, F.G.Walther, M.T.Myint, D.Kleppner - Bull.Amer.Phys.Soc. 15, No.1, 44, BI1 (1970)
A Precision Determination of the Electron-Proton g-Factor Ratio
70Wo02 H.J.Wolf, P.Steiner, E.Gerdau, W.K.Muller, U.Lewandowski, A.Roggenbuck - Z.Phys. 232, 256 (1970)
Das Quadrupolmoment des 2,3 Mev-Zustandes in ^{120}Sn
70Wo11 G.Wolber, H.Figger, R.A.Haberstroh, S.Penselin - Z.Phys. 236, 337 (1970)
Atomic Beam Magnetic Resonance Investigations in the $2p^2$ ^3P Ground Multiplet of the Stable Carbon Isotopes ^{12}C and ^{13}C
70Wo14 E.F.Worden, R.G.Gutmacher, R.W.Lougheed, J.G.Conway, R.J.Mehlhorn - J.Opt.Soc.Amer. 60, 1297 (1970)
Hyperfine Structure in the ^{253}Es Emission Spectrum. II. Nuclear Spin, Nuclear Magnetic Dipole Moment, and Energy Levels of Es II
70Ya02 T.Yamazaki, T.Nomura, U.Katou, T.Inamura, A.Hashizume, Y.Tendou - Phys.Rev.Lett. 24, 317 (1970)
Core Polarization Effect on the Magnetic Moment of the $(h_{9/2}^2)$ 8+ State of ^{210}Po
70Ya06 T.Yamazaki, T.Nomura, S.Nagamiya, T.Katou - Phys.Rev.Lett. 25, 547 (1970)
Anomalous Orbital Magnetism of Proton Deduced from the Magnetic Moment of the 11$^-$ State of ^{210}Po
70Za03 F.C.Zawislak, J.D.Bowman - Nucl.Phys. A146, 215 (1970)
Nuclear g-Factor Measurements of Two Short-Lived States in ^{206}Pb
70Zi06 P.Zimmermann - Z.Phys. 233, 21 (1970)
Level-Crossing-Experimente zur Untersuchung der Hyperfeinstruktur des $5d^2D_{5/2}$-Terms im Indium I-Spektrum
70Zi07 P.Zimmermann - Z.Phys. 232, 32 (1970)
Resonanzstreuung von Licht in magnetischen und elektrischen Feldern zur Untersuchung der Hyperfeinstruktur des $7d^2D_{3/2}$-Terms im Thallium I-Spektrum
71Am02 M.J.Amoruso, W.R.Johnson - Phys.Rev. A3, 6 (1971)
Relativistic One-Electron Calculations of Shielded Atomic Hyperfine Constants
71Ar07 I.Arens, H.J.Korner - Z.Phys. 242, 138 (1971)
Winkelkorrelations- und Lebensdauer-Messungen am ^{59}Co
71Av06 R.Avida, I.Ben-Zvi, P.Gilad, M.Goldberg, G.Goldring, K.-H.Speidel, A.Sprinzak, Z.Vager - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol. 4, p.1037 (1971)
Quadrupole Moment Ratio of the First Excited States in ^{192}Os and ^{190}Os

71BaA1 C.V.K.Baba, S.K.Bhattacherjee, H.C.Jain - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.4, 1173 (1971)
Halflife and Magnetic Moment of 93 keV ($9/2^+$) Level in ^{103}Rh

71Ba94 F.Bacon, G.Kaindl, H.-E.Mahnke, D.A.Shirley - Phys.Lett. 37B, 181 (1971)
Magnetic Moment of the 12^- Isomer of ^{196}Au

71Be23 R.B.Begzhanov, D.G.Gaffarov, K.T.Salikhbaev - Izv.Akad.Nauk SSSR, Ser.Fiz. 35, 135 (1971); Bull.Acad.Sci.USSR, Phys.Ser. 35, 123 (1972)
Magnetic Moments of Some Excited States in ^{151}Sm, ^{153}Eu, ^{155}Eu, ^{155}Gd and ^{161}Dy

71Be36 Z.Berant, R.A.Eisenstein, J.S.Greenberg, Y.Horowitz, U.Smilansky, P.N.Tandon, A.M.Kleinfeld, H.G.Maggi - Phys.Rev.Lett. 27, 110 (1971)
Investigation of the Reorientation Effect in Cd^{110} and Cd^{114}

71Be69 N.Benczer-Koller - Bull.Amer.Phys.Soc. 16, No.10, 1145, AA1 (1971)
Lifetime and Magnetic Moment Measurements in Even $f_{7/2}$ Shell Nuclei

71Be89 A.J.Becker, F.C.Zawislak - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), H.van Krugten, B.van Nooijen, Eds., Wolters-Noordhoff Publ., Groningen, p.543 (1971)
Magnetic Moments for the 265 keV and 280 keV Levels in ^{75}As

71Be90 M.Becker, H.Bertschat, H.-E.Mahnke, E.Recknagel, D.Riegel, R.Sielemann, B.Spellmeyer, T.Wichert, J.Christiansen, W.Witthuhn - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), H.van Krugten, B.van Nooijen, Eds., Wolters-Noordhoff Publ., Groningen, p.564 (1971)
Magnetic Moments and Lifetimes of a (3^+)-273 keV Level in ^{74}As and the 1^+-45 keV Level in ^{76}As

71Bh05 S.K.Bhattacherjee, H.G.Devare, H.C.Jain, M.C.Joshi, C.V.K.Baba - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.4, 1081 (1971)
Transient Fields on ^{103}Rh in Fe at Low Recoil Energies

71Bl15 J.Bleck, R.Michaelsen, W.Ribbe, W.Zeitz - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, p.110 (1971)
Application of the $5/2^-$-State in ^{63}Ni to hfs-Measurements

71Bl16 D.H.Bloch, D.Frosch, E.J.Jaeschke, H.Pauli, E.Rinsdorf - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, 356 (1971)
Measurement of the g Factor of the 469 keV $11/2^-$ Level in ^{109}Cd by Stroboscopic Observation of the Larmor Precession

71Bo31 J.Bonn, G.Huber, H.J.Kluge, U.Kopf, L.Kugler, E.-W.Otten - Phys.Lett. 36B, 41 (1971)
Optical Pumping of Neutron Deficient ^{187}Hg

71Bo64 E.Bozek, J.Golczewski, A.Z.Hrynkiewicz, G.Polok, M.Rybicka, B.Styczen, J.Styczen - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), H.van Krugten, B.van Nooijen, Eds., Wolters-Noordhoff Publ., Groningen, p.571 (1971)
The Perturbed Angular Correlations for the (596 - 42) keV Cascade in ^{62}Cu

71Bo65 E.Bodenstedt - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), H.van Krugten, B.van Nooijen, Eds., Wolters-Noordhoff Publ., Groningen, p.577 (1971)
Quadrupole Interactions and Quadrupole Moments

71Br03 N.Brauer, D.Focke, B.Lehmann, E.Matthias, D.Reigel - Phys.Lett. 34B, 54 (1971)
In-Beam Nuclear Magnetic Resonance of the 159 μs level in ^{115}Sn

71Br31 N.Brauer, B.Focke, B.Lehmann, K.Nishiyama, D.Riegel - Z.Phys. 244, 375 (1971)
Magnetic Moments of Isomeric Levels in the Br-Isotopes Measured with In-Beam NMR-PAC

71Bu10 S.Buttgenbach, G.Meisel - Z.Phys. 244, 149 (1971)
Hyperfine Structure Measurements in the Ground States $^4F_{3/2}$, $^4F_{5/2}$ and $^4F_{7/2}$ of Ta^{181} with the Atomic Beam Magnetic Resonance Method

71Ch02 W.J.Childs, L.S.Goodman - Phys.Rev. A3, 25 (1971)
Hyperfine and Zeeman Studies of Low-Lying Atomic Levels of La^{139} and the Nuclear Electric-Quadrupole Moment

71Ch10 J.Christiansen, H.-E.Mahnke, E.Recknagel, D.Riegel, W.Witthuhn - Nucl.Phys. A164, 367 (1971)
Lifetime and g-Factor of the 273 keV Level in ^{74}As

71Ch25 J.Charbonneau, N.V.De Castro Faria, J.L'Ecuyer, D.Vitoux - Bull.Amer.Phys.Soc. 16, No.4, 625, JH2 (1971)
Quadrupole Moments of the First Excited State of ^{58,60,62,64}Ni

71Ch28 J.Christiansen, H.Ingwersen, H.G.Johann, W.Klinger, W.Kreische, W.Lampert, G.Schatz, W.Witthuhn - Phys.Lett. 35B, 501 (1971); Priv.Comm. (July 1973)
The g-Factor of the Isomeric 9/2$^+$ State of ^{81}Br

71Ch61 S.Chang, R.Gupta, W.Happer - Phys.Rev.Lett. 27, 1036 (1971)
Hyperfine Structures of Optically Inaccessible Excited Atomic States

71Cl13 D.Cline, P.Jennens, C.W.Towsley, H.S.Gertzman - Bull.Amer.Phys.Soc. 16, No.10, 1156, BC5 (1971)
The Static Quadrupole Moments of the First Excited States of ^{148}Sm, ^{150}Sm and ^{152}Sm

71Co08 S.Cochavi, J.M.McDonald, D.B.Fossan - Phys.Rev. C3, 1352 (1971)
Experimental Study of Electromagnetic Matrix Elements in ^{92}Mo

71Co34 V.W.Cohen, A.Huq, F.M.Pichanick - Bull.Amer.Phys.Soc. 16, No.11, 1352, EB6 (1971)
The Nuclear Magnetic Moment of Na^{23}

71Cr01 P.A.Crowley, J.R.Kerns, J.X.Saladin - Phys.Rev. C3, 2049 (1971)
Coulomb-Excitation Measurements on the Isotopes Nd^{144}, Nd^{146}, and Nd^{148}

71Da01 O.B.Dabbousi, M.H.Prior, H.A.Shugart - Phys.Rev. C3, 1326 (1971)
Nuclear Spins of ^{125}Cs and ^{136}Cs, Hyperfine-Structure Separation and Nuclear Magnetic Moment of ^{125}Cs, ^{127}Cs, and ^{136}Cs

71Da36 S.J.Davis, J.J.Wright, L.C.Balling - Bull.Amer.Phys.Soc. 16, No.1, 85, EH5 (1971)
Hyperfine Structure of the Ground State of Mn^{55}

71De29 N.V.de Castro Faria, J.Charbonneau, J.L'Ecuyer, R.J.A.Levesque - Nucl.Phys. A174, 37 (1971)
L'Effet de Reorientation dans le Premier Etat Excite du ^{46}Ti et du ^{48}Ti

71De55 H.de Vries, G.J.C.Van Niftrik, L.Lapikas - IKO Progr.Rept.70/71, P.I-11 (1971)
Elastic Electron Scattering Through 180° from the Magnetization Distribution of the $1f_{7/2}$-Shell Nuclei Sc, V and Co

71Do17 O.Dorum, B.Selsmark - Nucl.Instrum.Methods 97, 243 (1971)
Measurements on the g-Factor of Short-Lived Excited Nuclear States with the Application of a Sum-Technique

71Dr10 H.Drost, W.Weiss, G.Weyer - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), H.van Krugten, B.van Nooijen, Eds., Wolters-Noordhoff Publ., Groningen, p.549 (1971)
Magnetic Moment and Half-Life of the First Excited State in ^{134}Cs

71Du05 T.W.Ducas, M.S.Feld, L.W.Ryan,Jr., N.Skribanowitz, A.Javan - Bull.Amer.Phys.Soc. 16, No.4, 531, DD4 (1971); Oral Report
Hyperfine Structure of Ne^{21} Using Laser-Induced Line Narrowing

71Ed04 N.Edelstein - J.Chem.Phys. 54, 2488 (1971)
Analysis of the Electron Paramagnetic Resonance Spectrum of Divalent Es in CaF_2

71Ek01 C.Ekstrom, M.Olsmats, B.Wannberg - Nucl.Phys. A170, 649 (1971)
Nuclear Spins of Neutron-Deficient Thulium Isotopes

71Es03 G.Eska, E.Hagn, T.Butz, P.Kienle, E.Umlauf - Phys.Lett. 36B, 328 (1971)
Measurements of NMR on Oriented ^{192}Ir and ^{191}Ir-m in Ni and Fe Host Lattices

71Fi03 H.Figger, G.Wolber, S.Penselin - Phys.Lett. 34A, 21 (1971)
Precision Measurement of the Hyperfine Structure of ^{175}Lu with the Atomic Beam Magnetic Resonance Method

71Fo24 R.A.Fox, P.D.Johnston, C.J.Sanctuary, N.J.Stone - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, 339 (1971)
NMR/ON of ^{110}Ag-m in Fe and Ni and ^{96}Tc in Fe

71Fu18 G.F.Fulop - Thesis, New York Univ. (1971); Diss.Abstr.Int. 32B, 4125 (1971)
Hyperfine Structure and Isotope Shift of 3.5-h Mercury 193 by a New Zeeman-Scanned Optical Pumping Method

71Go39 G.Goldring, R.Kalish, Eds. - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), Gordon and Breach, London, Vol.1-4 (1971)

71Gr60 B.Greenebaum - Bull.Amer.Phys.Soc. 16, No.4, 620, JE13 (1971)
Nuclear Magnetic Moment of Ag^{102m}

71Gr61 B.Greenebaum, W.J.Childs, L.S.Goodman - Bull.Amer.Phys.Soc. 16, No.4, 532, DD6 (1971)
Hyperfine Splitting in the 824-cm^{-1} $^3F_4$ Atomic Level of Pt^{195}

71Gu06 C.Gunther, B.Skaali, R.Bauer, B.Herskind - Nucl.Phys. A164, 321 (1971)
Quadrupole Interaction of Hf in Hafnium Metal Single Crystals after Recoil Implantation

71Ha08 R.P.Harper, A.Christy, I.Hall, I.M.Naqib, B.Wakefield - Nucl.Phys. A162, 161 (1971)
Measurement of the Static Quadrupole Moments of the First 2+ States of ^{108,110}Pd and ^{110}Cd

71Ha67 R.C.Haskell, R.L.Williams,Jr., L.Madansky - Bull.Amer.Phys.Soc. 16, No.12, 1417, FF7 (1971)
Measurement of the Nuclear Magnetic Dipole Moment of ^{8}Li by Implantation in Metal Foils

71Ha70 W.Happer, A.Lurio, W.Nagourney - Bull.Amer.Phys.Soc. 16, No.3, 310, AF10 (1971)
Low-Field Level Crossing Measurements of Lithium^{7} Hyperfine Structures and Lifetimes in the First and Second Excited P States

71He21 R.Hensler, J.W.Tape, N.Benczer-Koller, J.R.MacDonald - Phys.Rev.Lett. 27, 1587 (1971)
Mean Lifetime and Magnetic Moment of the 2.95-MeV (6+) State of ^{54}Fe

71Hi12 A.T.Hirshfeld, D.D.Hoppes, W.B.Mann, F.J.Schima - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, 335 (1971)
Nuclear Orientation of ^{82}Br in Iron

71In04 H.Ingwersen, W.Klinger, W.Kreische, W.Lampert, G.Schatz, W.Witthuhn, E.A.Ivanov - Nucl.Phys. A171, 241 (1971)
Lifetime and g-Factor of the 181 keV Level in ^{78}Br

71Iv04 E.A.Ivanov, G.Pascovici - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.4, 1180 (1971)
g-Factor Measurements for the 160 μs State in ^{115}Sn and 340 μs State in ^{117}Sb Excited by Pulsed Beam Bombardments on Liquid Metallic Targets

71Ka30 J.Kaufmann, W.Sahm, A.Schwenk - Z.Naturforsch. 26a, 1384 (1971)
^{73}Ge Nuclear Magnetic Resonance Studies

71Ka33 E.N.Kaufmann, D.E.Murnick, C.T.Alonso, L.Grodzins - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol. 4, p.1033 (1971)
Implantation Perturbed Angular Correlation Studies of ^{182,184,186}W in Gadolinium Single Crystals

71Ka68 R.Kalish, W.J.Kossler - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, p.123 (1971)
Precession Measurements of 6+ and 8+ Rotational States in Even Dy Isotopes

71Ki13 W.C.King, Z.W.Grabowski, R.P.Scharenberg - Phys.Rev. C4, 1382 (1971); R.P.Scharenberg - Priv.Comm. (April 1972)
Magnetic Dipole Moments of the First 2+ States in Os^{192} and Pt^{192}; Room-Temperature Nuclear-Magnetic-Resonance Measurement of the Os Hyperfine Field in Fe and Ni Hosts

71Kl06 A.M.Kleinfeld, G.Kraft, H.Maggi, D.Werdecker - Bull.Amer.Phys.Soc. 16, No.4, 643, KE11 (1971)
Reorientation Effect Measurement of Q_{2^+} in ^{124}Te, ^{126}Te and ^{128}Te

71Kr15 K.S.Krane, J.R.Sites, W.A.Steyert - Phys.Rev. C4, 1329 (1971)
Electron-Capture and β^- Decay of ^{122}Sb Oriented in Iron

71Kr19 K.S.Krane, C.E.Olsen, J.R.Sites, W.A.Steyert - Phys.Rev. C4, 1942 (1971)
Parity Mixing and Nuclear Structure in the Decays from Oriented ^{153,159}Gd and ^{161}Tb

71La24 S.A.Lane, J.X.Saladin - Bull.Amer.Phys.Soc. 16, No.10, 1157, BC12 (1971)
Determination of Excited State Quadrupole Moments in Even-Even Os-Isotopes

71Le17 P.M.S.Lesser, D.Cline, A.Bahnsen, C.K.Cline, R.N.Horoshko - Bull.Amer.Phys.Soc. 16, No.1, 12, AD1 (1971)
Measurements of Static Quadrupole Moments in ^{48}Ti, ^{56}Fe, ^{58}Ni and ^{60}Ni

71Lu15 O.Lutz, A.Nolle, A.Uhl - Z.Phys. 248, 159 (1971)
The Hyperfine Structure Anomalies of ^{67}Ga, ^{69}Ga, ^{71}Ga, ^{72}Ga, ^{113}In, ^{115}In, and ^{117m}In

71Ma59 K.H.Maier, J.R.Leigh, R.M.Diamond - Nucl.Phys. A176, 497 (1971)
Measurement of the Magnetic Moment and Lifetime of the 13/2+ Level in ^{205}Pb

71Ma70 K.H.Maier, J.R.Leigh, F.Puhlhofer, R.M.Diamond - J.Phys.(Paris) 32, Suppl.No.11-12, Colloq.C6-221 (1971)
Excited Levels in N = 126 Isotones Studied by (HI,xnγ)-Reactions

71Mi06 T.Minamisono, K.Matuda, A.Mizobuchi, K.Sugimoto - J.Phys.Soc.Jap. 30, 311 (1971)
Quadrupole Effects in NMR Spectra on Short-Lived β-Radioactive Nuclei, ^{12}B and ^{12}N

71Na10 K.Nakai, B.Skaali, N.J.S.Hansen, B.Herskind - Phys.Rev.Lett. 27, 155 (1971)
Nuclear Lifetime and g Factor of the 19/2- Isomeric State in ^{43}Sc

71Na14 A.Nakada, Y.Torizuka, Y.Horikawa - Phys.Rev.Lett. 27, 745 (1971); Erratum Phys.Rev.Lett. 27, 1102 (1971)
Determination of the Deformation in ^{12}C from Electron Scattering
71Na16 S.Nagamiya, T.Katou, T.Nomura, T.Yamazaki - J.Phys.Soc.Japan 31, 319 (1971)
Magnetic Moments of the 8^+ Isomeric States of ^{90}Zr and ^{92}Mo
71Ni01 A.K.Nigam, R.Bhattacharyya - Nucl.Phys. A164, 411 (1971)
The g-Factor Measurement of the 206 keV $9/2^-$ State of ^{187}Re
71No06 T.Nomura, T.Yamazaki, S.Nagamiya, T.Katou - Phys.Rev.Lett. 27, 523 (1971)
Magnetic Moment of the Lowest 6^+ State in ^{42}Ca and Effects of the Deformed States
71Ot04 E.W.Otten - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.2, p.363 (1971)
Dynamical Polarization by Optical Pumping
71Ra22 W.L.Randolph,Jr., R.R.Borchers, R.Michaelsen, D.W.Haag, W.Ribbe - Phys.Rev.Lett. 27, 603 (1971)
Magnetic Moments of the $7/2^-$ Mirror States in ^{37}Ar and ^{37}K
71Re01 B.Reuse - Nucl.Phys. A160, 363 (1971)
Messungen von g-Faktoren fur den Fall untrennbarer Energien der $\gamma\gamma$ Kaskade
71Re06 R.C.Reno, M.Fishbein, C.Hohenemser - Nucl.Phys. A163, 161 (1971)
Lifetime and g-Factor of the 74.8 keV State of ^{100}Rh
71Re23 R.J.Reimann, C.C.Chan, M.N.McDermott - Bull.Amer.Phys.Soc. 16, No.4, 532, DD7 (1971); Oral Report (April 1971)
Nuclear Orientation of I = 13/2 Mercury Isomers
71Re24 R.J.Reimann, B.D.Geelhood, M.N.McDermott - Bull.Amer.Phys.Soc. 16, No.8, 848, FB9 (1971)
Level Crossing in ^{199m}-Hg
71Ro17 M.Rots, R.Silverans, R.Coussement - Nucl.Phys. A170, 240 (1971); Priv.Comm. (March 1972)
Magnetic Moments and Mixing Ratios in the γ-Decay of ^{125}Te
71Ro37 W.M.Roney, R.R.Borchers - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.4, p.1182 (1971)
IMPAC Measurement on Levels of ^{125}Te
71Sc30 R.P.Scharenberg, W.R.Lutz, J.A.Thomson - Bull.Amer.Phys.Soc. 16, No.10, 1155, BC3 (1971)
The Quadrupole Moment of the 434 keV 2^+ State in Pd^{108}
71Se12 T.Seo, T.Hayashi - Annu.Rep.Res.Reactor Inst., Kyoto Univ. 4, 77 (1971)
The Magnetic Moments of Two Excited States in ^{182}W
71Si25 S.H.Sie, I.A.Fraser, J.S.Greenberg, A.H.Shaw, R.G.Stokstad, D.A.Bromley - Bull.Amer.Phys.Soc. 16, No.4, 515, BG9 (1971)
Studies of the Excited States g-Factors in $Os^{188,192}$
71Si32 P.Sioshanski, D.A.Garber, Z.W.Grabowski, W.C.King, R.P.Scharenberg, R.M.Wheeler - Bull.Amer.Phys.Soc. 16, No.10, 1156, BC11 (1971)
Comparison of Impact and Radioactivity g-Factor Measurements with Os^{192} in Nickel
71Si33 S.H.Sie - Thesis, Yale Univ. (1971); Diss.Abstr.Int., 32B, 3573 (1972)
Magnetic Moments of Excited States in Os^{188} and Os^{192}
71Sp14 G.D.Sprouse - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970); G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.3, 931 (1971)
Hyperfine Interactions of Fast Recoil Nuclei in Gas
71Sp16 D.Spanjaard, R.A.Fox, J.D.Marsh, N.J.Stone - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, p.113 (1971)
Nuclear Orientation of ^{175}Yb in Fe and Au and ^{137}Ce-m in Fe and Ni Using Ion Implantation
71St12 R.M.Sternheimer, R.F.Peierls - Phys.Rev. A3, 837 (1971)
Quadrupole Antishielding Factors, and the Nuclear Quadrupole Moments of Several Alkali Isotopes
71St44 R.M.Sternheimer, R.F.Peierls - Phys.Rev. A4, 1722 (1971)
Calculation of Fine-Structure Splittings and Quadrupole Antishielding Factors for Atomic States
71St46 N.J.Stone - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, p.237 (1971)
A Review of Recent Developments in Low Temperature Nuclear Orientation
71Su09 A.W.Sunyar, P.Thieberger, W.Gelletly, M.Mariscotti - Bull.Amer.Phys.Soc. 16, No.1, 13, AD5 (1971)
$Ni^{62}(\alpha,np\gamma)Cu^{64}$ Reaction Studies at E = 40 MeV

71Su13 K.Sugimoto, A.Mizobuchi, T.Minamisono - Proc.Int.Conf.Hyperfine Interactions in Excited Nuclei, Rehovot and Jerusalem, Israel (1970), G.Goldring, R.Kalish, Eds., Gordon and Breach, London, Vol.1, p.325 (1971)
Magnetic Moment of β-Emitter ^{29}P
71Th14 J.A.Thomson, R.P.Scharenberg, W.R.Lutz - Phys.Rev. C4, 1699 (1971)
Energy Dependence of the Reorientation Effect and the Static Quadrupole Moment of the 0.847-MeV 2+ State in Fe^{56}
71Va39 H.van Krugten, B.van Nooijen, Eds. - Proc.Int.Conf.Angular Correlations in Nuclear Disintegration, Delft, Netherlands (1970), Wolters-Noordhoff Publ., Groningen (1971)
71Vi01 D.Vitoux, R.C.Haight, J.X.Saladin - Phys.Rev. C3, 718 (1971)
Coulomb Excitation of the First 2+ State of ^{24}Mg
71Vo03 C.von Platen, J.Bonn, U.Kopf, R.Neugart, E.-W.Otten - Z.Phys. 244, 44 (1971)
Spin Exchange Polarization and Hfs Anomaly Measurements of β-Active ^{37}K
71Wa03 H.F.Wagner, J.Lange - Z.Phys. 242, 292 (1971)
Investigation of the Two Quasiparticle Rotational Band at 1172 keV in ^{172}Yb and Determination of the g(R)-Factor of the 3+ 3 Band Head
71Wa07 D.Ward, J.S.Geiger, R.L.Graham - Bull.Amer.Phys.Soc. 16, No.1, 14, AD14 (1971)
Static Quadrupole Moments of the First 2+ Levels in ^{110}Pd, ^{108}Pd, ^{104}Pd
71Wi08 H.Winkler, D.Ruter, E.Gerdau, J.Braunsfurth - Z.Phys. 243, 166 (1971)
The g-Factor of the 181 keV Level of ^{99}Tc and Hyperfine Fields of Tc in Fe, Co, Ni
71Wi09 R.L.Williams,Jr., L.Madansky - Phys.Rev. C3, 2149 (1971)
^{13}B Nuclear Magnetic Dipole Moment
71Wi12 A.Winnacker, H.Ackermann, D.Dubbers, J.Mertens, P.von Blanckenhagen - Z.Phys. 244, 289 (1971)
Relaxation Phenomena and Nuclear Magnetic Resonance of ^{116}In ($T_{1/2}$=14s) Produced by Capture of Polarized Neutrons in the Indium III-V Compounds
71Wi28 R.L.Williams,Jr., R.C.Haskell, L.Madansky - Bull.Amer.Phys.Soc. 16, No.12, 1417, FF5 (1971)
Observation of Quadrupole Splitting of ^{12}B in a Single Crystal
72Ac04 Use Reference 73Ac03
72Ad14 K.-E.Adelroth, C.Ekstrom - Nucl.Phys. A198, 380 (1972)
Hyperfine Structure and Nuclear Moments of ^{166}Tm
72Ao01 A.Aoki, T.Seo, T.Tomiyama - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.187 (1972)
The g-Factor of the 133 keV Excited State of ^{131}Cs
72Av01 R.Avida, I.Ben-Zvi, G.Goldring, S.S.Hanna, P.N.Tandon, Y.Wolfson - Nucl.Phys. A182, 359 (1972)
Magnetic Moment of the First Excited State of ^{10}B
72Ba22 F.Bacon, G.Kaindl, H.-E.Mahnke, D.A.Shirley - Phys.Rev.Lett. 28, 720 (1972)
Nuclear Magnetic Resonance on Oriented Platinum-195m in Iron
72Ba82 Use Reference 73Ba84
72Ba86 Use Reference 73Ba83
72Ba87 Use Reference 73Ba82
72Ba88 A.R.Barnett, S.F.Biagi, D.K.Olsen, W.R.Phillips - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.205 (1972)
Coulomb Excitation of ^{208}Pb with Heavy Ions
72Be43 A.J.Becker, K.S.Krane, R.M.Steffen - Bull.Amer.Phys.Soc. 17, No.1, 138, KE7 (1972)
Perturbations on Thulium-169 Nuclei in Implanted Sources in Iron
72Be60 Use Reference 73Be69
72Be61 Use Reference 73Be70
72Be62 Use Reference 73Be71
72Bl14 Use Reference 73Bl12
72Bo09 J.Bonn, G.Huber, H.-J.Kluge, L.Kugler, E.W.Otten - Phys.Lett. 38B, 308 (1972)
Sudden Change in the Nuclear Charge Distribution of Very Light Mercury Isotopes
72Bo44 Use Reference 73Bo53
72Br42 Use Reference 73Br37
72Ch36 R.C.Chopra, P.N.Tandon - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.229 (1972)
Magnetic Moment of the 265 keV 3/2− Level in ^{75}As
72Ch57 S.Chang, C.Tai, W.Happer, R.Gupta - Bull.Amer.Phys.Soc. 17, No.4, 475, BM6 (1972)
Cascade-Decoupling Measurements of the Hyperfine Structure of the $5^2D_{3/2}$ State of Rb^{85} and Rb^{87}
72Cl12 D.Cline, P.Jennens, C.W.Towsley, H.S.Gertzman - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.213 (1972)
The Static Quadrupole Moments of the First Excited States of ^{148}Sm, ^{150}Sm and ^{152}Sm

72Co12 R.Coussement - Priv.Comm. (March 1972)
72Da38 W.Dankwort, J.Ferch, S.Penselin - Priv.Comm. (1972)
16-Pole-Interaction in Ho^{165} and $Dy^{161,163}$
72Ek01 C.Ekstrom, S.Ingelman, B.Wannberg, I.-L.Lamm - Phys.Lett. 39B, 199 (1972)
Nuclear Ground State Spin of ^{167}Lu
72Ek03 C.Ekstrom, S.Ingelman, M.Olsmats, B.Wannberg - Nucl.Phys. A194, 237 (1972)
Hyperfine Structure and Nuclear Moments of ^{161}Er and ^{163}Er
72Ek04 C.Ekstrom, S.Ingelman, M.Olsmats, B.Wannberg, G.Andersson, A.Rosen - Nucl.Phys. A196, 178 (1972)
Nuclear Spins of Neutron-Deficient Pr and Nd Isotopes
72Ek05 C.Ekstrom, S.Ingelman, M.Olsmats, B.Wannberg - Phys.Scr. 6, 181 (1972)
Nuclear Spins of Neutron-Deficient Promethium, Samarium, Europium and Gadolinium Isotopes
72Fa16 Use Reference 73Fa16
72Fa17 T.Faestermann, F.Feilitzsch, K.E.G.Lobner, C.Signorini, T.Yamazaki, C.V.K.Baba, D.B.Fossan - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.139 (1972)
Lifetime and g-Factor of the 1065-keV (15/2$^-$) State in ^{211}Po
72Fe20 J.Ferch - Thesis, Univ.Bonn (1972); Quoted by 72Ro36
72Fi14 W.Fischer, H.Huhnermann, K.Mandrek, H.Ihle - Phys.Lett. 40B, 87 (1972)
Optical Determination of the Quadrupole Moment of ^{138}La
72Fi19 W.Fischer, H.Huhnermann, K.Mandrek - Z.Phys. 254, 127 (1972)
Optical Determination of the Nuclear Moments of ^{137}La
72Fo19 Use Reference 73Fo21
72Gi20 H.M.Gibbs - Priv.Comm. (April 1972)
72Go06 G.Goldring, D.A.Hutcheon, W.L.Randolph, D.F.H.Start, M.E.Goldberg, M.Popp - Phys.Rev.Lett. 28, 763 (1972)
Hyperfine Interactions of the First Excited 2$^+$ State of ^{18}O in 7$^+$ and 6$^+$ Ions
72Go42 L.S.Goodman, H.Diamond, H.E.Stanton - Priv.Comm. (July 1972)
Nuclear and Atomic Moments and Hyperfine-Structure Parameters of ^{253}Es and ^{254}m-Es
72Gr22 L.Grodzins - Priv.Comm. (July 1972)
72Gu26 R.Gupta, S.Chang, W.Happer - Bull.Amer.Phys.Soc. 17, No.4, 476, BM7 (1972)
Radio Frequency Spectroscopy in the $7^2S_{1/2}$ State of Rb^{85} and Rb^{87}
72Ha45 R.A.Haberstroh, T.I.Moran, S.Penselin - Z.Phys. 252, 421 (1972)
Direct Measurement of the Nuclear Magnetic Dipole Moment of Ho^{165} with The Atomic Beam Magnetic Resonance Method
72Ha66 Use Reference 73Ha73
72Ha67 Use Reference 73Ha74
72Ha68 Use Reference 73Ha71
72Ha69 Use Reference 73Ha72
72He19 R.Hensler - Priv.Comm. (July 1972)
72He26 Use Reference 73He32
72Hu08 G.K.Hubler, H.W.Kugel, D.E.Murnick - Phys.Rev.Lett. 29, 662 (1972)
Magnetic Moment of the 1.409-MeV 2$^+$ State of ^{54}Fe
72In03 H.Ingwersen, W.Klinger, G.Schatz, W.Witthuhn, R.Maschuw - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.161 (1972)
Measurement of the g-Factor of the 21/2$^-$ State in ^{211}At
72Jo06 K.Johansson, E.Karlsson, L.-O.Norlin, R.A.Windahl, M.R.Ahmed - Nucl.Phys. A188, 600 (1972)
g-Factor Experiments on the First Excited 2$^+$ States in ^{102}Ru, ^{106}Pd and ^{110}Cd
72Jo18 W.R.Johnson - Priv.Comm. (April 1972)
Internal Diamagnetic Fields in Free Atoms
72Ka13 E.Karlsson - Priv.Comm. (April 1972)
72Ke22 Use Reference 73Ke28
72Kl02 A.M.Kleinfeld, G.Maggi, W.Werdecker - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.221 (1972)
Measurements of the Quadrupole Moments of $^{124,126,128}Te$
72Kl05 Use Reference 73Kl17
72Kr05 K.S.Krane, J.R.Sites, W.A.Steyert - Phys.Rev. C5, 1104 (1972)
Nuclear Structure and Parity Mixing in the Decays from Oriented ^{182}Ta
72Kr15 K.S.Krane, W.A.Steyert - Phys.Rev. C6, 2268 (1972)
Nuclear Orientation Study of the Decays of $^{126,127,128}Sb$
72Kr18 K.S.Krane, C.E.Olsen, W.A.Steyert - Nucl.Phys. A197, 352 (1972); Erratum Nucl.Phys. A224, 596 (1974)
Nuclear Orientation and Parity-Mixing Studies of the Decays of ^{171}Er and $^{169,175}Yb$

72Ku10 H.W.Kugel, R.R.Borchers, R.Kalish - Nucl.Phys. A186, 513 (1972)
Magnetic Moment Measurements of the First (2^+) and Second (4^+) States of Even Nd and Sm Nuclei
72Le32 T.V.Ledebur, R.Eichler - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.89 (1972)
Measurement of the g-Factor of the 188 keV Level in ^{125}I Using a High-Density Gaseous Source
72Li12 J.W.Lightbody, Jr. - Phys.Lett. 38B, 475 (1972)
Electron Scattering from One- and Two-Phonon Vibrational States
72Ma24 K.H.Maier, K.Nakai, J.R.Leigh, R.M.Diamond, F.S.Stephens - Nucl.Phys. A186, 97 (1972)
Stroboscopic Measurement of the g-Factors of the 7^- Isomer in ^{206}Pb and the $21/2^+$ Isomer in ^{207}Bi
72Me15 J.Menet, P.De Saintignon, J.M.Loiseaux, A.Boudard - Phys.Lett. 40B, 192 (1972)
g-Factor of an Isomeric Level in ^{117}Sb
72Me16 G.Merzyn, S.Penselin, G.Wolber - Z.Phys. 252, 412 (1972)
The Hyperfine Structure of the Ground State of Ho^{165}
72Me25 R.W.Mebs, G.C.Carter, B.J.Evans, L.H.Bennett - Solid State Commun. 10, 769 (1972)
NMR Chemical Shifts in Cuprous Salts: The Magnetic Moment of Cu
72Mi19 Use Reference 73Mi26
72Mi20 Use Reference 73Mi25
72Mi21 T.Miyokawa, I.Katayama, S.Morinobu, H.Ikegami - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.247 (1972)
The Magnetic Moment of the 4^+ Ground-Rotational State in ^{166}Er
72Mo48 G.W.Moe, M.N.McDermott - Bull.Amer.Phys.Soc. 17, No.1, 150, KJ8 (1972)
Level Crossing Measurements in the $5^2P_{3/2}$ State of ^{109}Ag
72Na16 Use Reference 73Na33
72Na17 Use Reference 73Na31
72Na18 Use Reference 73Na34
72Ni01 L.Niesen, W.J.Huiskamp - Physica 57, 1 (1972)
Nuclear Magnetic Resonance on Oriented Nuclei in a Dilute Paramagnetic Crystal; ^{57}Co, ^{58}Co and ^{60}Co in $La_2Mg_3(NO_3)_{12}.24H_2O$
72Ni03 A.K.Nigam, R.Bhattacharyya - Nucl.Phys. A181, 298 (1972)
Measurement of the Gyromagnetic Ratio of the 316 keV $7/2^+$ State of ^{169}Tm
72Ot03 E.W.Otten - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.36 (1972)
Determination of Nuclear Spin, Moments and Charge Volume Far from Stability by Optical Pumping
72Pe22 S.Penner, J.W.Lightbody,Jr. - Priv.Comm. (1972)
72Pr21 Program Committee, Eds. - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972)
72Ra27 R.S.Raghavan, P.Raghavan - Phys.Rev.Lett. 28, 54 (1972)
Quadrupole Moment of the 660-keV 'Rotational' Level of ^{117}In
72Ri13 Use Reference 73Ri17
72Ro30 R.Rougny, M.Meyer-Levy, I.Berkes, G.Lhersonneau, A.Troncy - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.219 (1972)
Electromagnetic Properties of 2^+ and $2^{+\prime}$ States of ^{192,194,196}Pt
72Ro36 A.Rosen, H.Nyqvist - Phys.Scr. 6, 24 (1972)
Hyperfine Structure Investigation of ^{153}Dy, ^{155}Dy and ^{157}Dy
72Ro37 A.Rosen - Phys.Scr. 6, 37 (1972)
Hyperfine Structure Analysis for the Ground Configuration of Bismuth
72Sc35 Use Reference 73Sc36
72Sc36 Use Reference 73Sc38
72Se15 T.Seo, T.Hayashi - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.239 (1972)
The Magnetic Moments of the $K_\pi = 2^-$ Band in ^{182}W
72Sh01 D.A.Shirley - Priv.Comm. (January 1972)
72Si21 R.E.Silverans, R.Coussement, G.Dumont, H.Pattyn, I.Vanneste - Nucl.Phys. A193, 367 (1972)
Magnetic Moment of the $11/2^-$ Isomer of ^{125}Te
72Si31 R.E.Silverans, R.Coussement, E.Schoeters, L.Vanneste - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.231 (1972)
Magnetic Moments of ^{127}g-Te and ^{129}g-Te
72Su05 Use Reference 73Su09
72To12 C.W.Towsley, D.Cline, R.N.Horoshko - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.189 (1972)
Measurements of Quadrupole Deformation in ^{50,52,54}Cr

72To13 C.W.Towsley, R.Cook, D.Cline, R.N.Horoshko - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.209 (1972); Priv.Comm. (August 1973)
Measurement of the Shapes of ^{130,134,136}Ba

72Va25 L.Vanneste, R.Coussement, G.Dumont, H.Pattyn, E.Schoeters, R.E.Silverans - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.235 (1972)
Study of the Magnetic Moments of the Tellurium Iscmers by Nuclear Orientation

72Va26 L.Vanneste, R.E.Silverans, E.Schoeters, H.Hubel, C.Gunther - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.233 (1972)
Magnetic Moments of ^{183}Re, ^{184}Re and ^{184}m-Re Measured by Nuclear Orientation

72Ya08 Y.Yamazaki, S.Nagamiya, T.Nomura, K.Nakai, T.Yamazaki - Contrib.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan, p.153 (1972)
Magnetic Moment of the Core Excited Isomer of [$(\pi h^2_{9/2})8^+$ x 5$^-$(^{208}Pb)] 13$^-$ in ^{210}Po

73Ab03 M.M.Abraham, L.A.Boatner, C.B.Finch, R.W.Reynolds, W.P.Unruh - Phys.Lett. 44A, 527 (1973)
EPR Determination of the Nuclear Spins and Magnetic Moments of ^{243}Cm And ^{247}Cm

73Ac03 H.Ackermann, D.Dubbers, M.Grupp, P.Heitjans, G.zu Putlitz, H.-J.Stockmann - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.215 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Nuclear Electric Quadrupole Moment of the β-Emitter ^{20}F

73An12 G.Andersson, A.Rosen - Priv.Comm. (September 1973)

73Ba82 C.V.K.Baba, D.B.Fossan, T.Faestermann, F.Feilitzsch, P.Kienle, C.Signorini - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.239 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
g($\pi h^2_{9/2}$, J) Difference for 6^+_1 and 8^+_1 States in ^{210}Po

73Ba83 F.Bacon, G.Kaindl, H.-E.Mahnke, D.A.Shirley - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.243 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of the 12$^-$ States in ^{196,198,200}Au

73Ba84 C.V.K.Baba, D.B.Fossan, T.Faestermann, F.Feilitzsch, M.R.Maier, P.Raghavan, R.S.Raghavan, C.Signorini - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.260 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
g and τ Results for High-Spin Isomers in ^{91}Nb and ^{91}Zr

73Be69 Z.Berant, G.Goldring, M.Hass, Y.S.Horowitz - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.185 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
The Magnetic Moment of the 3$^-$, 5.83 MeV Level in ^{14}N and the Blume-Scherer Model of PAC in Gas with an Arbitrary Correlation Time

73Be70 H.Bertschat, H.Haas, W.Leitz, U.Leithauser, K.H.Maier, H.-E.Mahnke, E.Recknagel, W.Semmler, R.Sielemann, B.Spellmeyer, T.Wichert - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.217 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of Excited 9/2$^+$ States Around A = 70 Experimental Values for ^{67}Zn and ^{67}Ge

73Be71 H.Bertschat, H.Kluge, U.Leithauser, E.Recknagel, B.Spellmeyer - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka Japan (1972), H.Horie, K.Sugimoto, Eds., p.258 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)

Magnetic Moment and Half Life of the 215-keV, 3$^+$ State in ^{72}As

73Bl12 J.Bleck, R.Butt, K.H.Lindenberger, W.Ribbe, W.Zeitz - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.254 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of Isomeric 6$^-$ States in ^{64}Cu and ^{66}Cu

73Bo53 M.Borsaru, B.Herskind, R.Kalish, K.Nakai - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.262 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
The g-Factors of High Spin Isomeric States in ^{114}Sn and ^{118}Sn

73Br37 N.Brauer, A.Goldmann, J.Hadijuana, M.v.Hartrott, K.Nishiyama, D.Quitmann, D.Riegel, W.Zeitz - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.281 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of [$(\pi h_{9/2})^2$]8$^+$ States in ^{206}Po and ^{204}Po

73Bu15 S.Buttgenbach, M.Herschel, G.Meisel, E.Schrodl, W.Witte, W.J.Childs - Z.Phys. 263, 341 (1973)
Hyperfine Structure Investigations in the $^4F_{9/2}$ Atomic Ground State of ^{191}Ir and ^{193}Ir

73Bu25 S.Buttgenbach, M.Herschel, G.Meisel, E.Schrodl, W.Witte - Z.Phys. 260, 157 (1973)
Ground State Hyperfine Structure and Nuclear Magnetic Dipole Moments of ^{177}Hf and ^{179}Hf
73CoTa E.R.Cohen, B.N.Taylor - J.Phys.Chem.Ref.Data 2, 663 (1973)
The 1973 Least-Squares Adjustment of the Fundamental Constants
73Co35 V.W.Cohen - Priv.Comm. (December 1973)
73Co36 V.W.Cohen - Priv.Comm. (December 1973)
73Ek03 C.Ekstrom - Priv.Comm. (September 1973)
73Fa16 T.Faestermann, F.Feilitzsch, R.S.Raghavan, C.Signorini, T.Yamazaki, C.V.K.Baba, D.B.Fossan, D.Proetel - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.261 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
g-Factor Measurement of the 2953-keV State in ^{94}Mo
73Fi08 H.Figger, G.Wolber - Z.Phys. 264, 95 (1973)
Precision Measurement of the Hyperfine Structure of Lu^{175} with the Atomic Beam Magnetic Resonance Method
73Fo21 B.Focke, A.Goldmann, M.v.Hartrott, K.Nishiyama, D.Riegel - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.282 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Magnetic Moment of the $13/2^+$, 47 μs State in ^{207}Po
73Go47 K.P.Gopinathan, A.P.Agnihotry, S.B.Patel, M.S.Bidarkundi - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.430 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Electromagnetic Properties of the 249.7 keV Level in ^{177}Hf
73Ha71 R.C.Haskell, L.Madansky - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.167 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
A Value for the Ratio of Q(^{12}B) to Q(^{13}B) Deduced from Quadrupole Couplings in a Mg Single Crystal
73Ha72 H.Haas, W.Leitz, H.-E.Mahnke, W.Semmler, R.Sielemann, T.Wichert - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.221 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Quadrupole Interactions of Ge-Nuclei in Zn and Ga Following Nuclear Reactions
73Ha73 O.Hashimoto, T.Nomura, T.Yamazaki, K.Miyano, M.Ishihara - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.259 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Magnetic Moment of the 8^+ $[(\nu g_{9/2})^{-2}]$ State in ^{86}Sr
73Ha74 O.Hashimoto, A.Sumi, T.Nomura, S.Nagamiya, K.Nakai, T.Yamazaki, K.Miyano - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.269 (1973); J.Phys.Soc.Jap. (1973)
The g Factor of the 7+ Isomeric State in ^{202}Tl
73He32 P.Heubes, H.Ingwersen, H.G.Johann, W.Klinger, W.Lampert, W.Loeffler, G.Schatz, W.Witthuhn - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.264 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
The Magnetic Moment of the 1.8 μs State in ^{122}Sb
73In04 S.Ingelman, C.Ekstrom, M.Olsmats, B.Wannberg - Phys.Scr. 7, 24 (1973)
Nuclear Spins of Neutron-Deficient Lanthanum and Cerium Isotopes
73Ke28 R.G.Kerr, R.D.Larsen, W.R.Lutz, J.A.Thomson, R.P.Scharenberg - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.144 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Experimental Foundations of the Reorientation Effect
73Kl17 B.Klemme, H.Miemczyk - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.265 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
The Electric Quadrupole Moment of the 2.083 MeV State of ^{140}Ce Derived From a TDPAC-Measurement
73Kr01 K.S.Krane, C.E.Olsen, W.A.Steyert - Phys.Rev. C7, 263 (1973)
Parity Mixing and the Nuclear Structure of ^{183,184}W and Nuclear Spin-Lattice Relaxation Following the Decays of Oriented ^{183,184g,184m}-Re
73Mi25 T.R.Miller, P.D.Bond, W.A.Little, S.M.Lazarus, M.Takeda, G.D.Sprouse, S.S.Hanna - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.107 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of Short-Lived States by Use of a Stopper in the Recoil-into-Gas Method

73Mi26 T.Minamisono, Y.Nojiri, A.Mizobuchi, K.Sugimoto - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.156 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Magnetic Moment of β-Emitter ^{8}B

73Na31 K.Nagamine, H.Koyama, N.Nishida, M.Takizawa, K.Nakai, T.Yamazaki - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.113 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Nuclear Structure Studies with Polarized ^{207}Bi, ^{210}Bi(RaE) and Polarized ^{209}Bi Targets

73Na33 K.Nakai, B.Herskind, I.Bergstrom, J.Blomqvist, A.Filevich, K.-G.Rensfelt, J.Sztarkier, S.Nagamiya - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.274 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
The g Factor of the 12^{+} Isomeric State in ^{206}Pb and the Effective Orbital g Factor of the Neutron

73Na34 S.Nagamiya, Y.Yamazaki, O.Hashimoto, T.Nomura, K.Nakai, T.Yamazaki - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.283 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
Magnetic Moments of High-Spin Isomeric States in Po Isotopes

73Ri17 D.Riegel, N.Brauer, B.Focke, K.Nishiyama - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.181 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Measurement of the Quadrupole Interaction of Long-Lived States in Liquid Metals

73Sc36 H.Schweickert, J.Dietrich, R.Neugart, E.W.Otten - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.164 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Measurement of the Spin and Nuclear Magnetic Moment of the 345 msec ^{36}K

73Sc38 F.J.Schroeder, H.Toschinski - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.271 (1973); J.Phys.Soc.Jap. 34 Suppl. (1973)
The Magnetic Moments of the First Excited States of ^{207}Pb and ^{208}Pb

73Su09 K.Sugimoto, A.Mizobuchi, T.Minamisono, Y.Nojiri - Proc.Int.Conf.Nuclear Moments and Nuclear Structure, Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., p.158 (1973); J.Phys. Soc.Jap. 34 Suppl. (1973)
Magnetic Moment of β-Emitter ^{41}Sc

74EkZX C.Ekstrom - Priv.Comm. (March 1974)

74Hu01 G.K.Hubler, H.W.Kugel, D.E.Murnick - Phys.Rev. C9, 1954 (1974)
Nuclear Magnetic Moments of Very Short-Lived States via the Transient-Field Implantation Perturbed-Angular-Correlation Technique

74Lo12 P.R.Locher - Phys.Rev. B10, 801 (1974)
Ratio of the Magnetic Dipole Moments of ^{63}Cu and ^{65}Cu and the Hyperfine-Structure Anomalies $^{63}\Delta^{65}$