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Ernest O. Lawrence Radiation Laboratory

TABLE OF NUCLEAR MOMENTS

Virginia S. Shirley

December 1967

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Introduction

This table is an extension of the Table of Nuclear Spins and Moments published in 1965 (Li65), and contains the nuclear magnetic and quadrupole moments known as of August 1967. Major changes made in the present revision are the omission of spin values (except for identification purposes), the addition of lifetime- or field-dependent quantities or both, the omission of magnetic octupole moments, and the addition of a tabulation of nuclear moment ratios. Throughout this table, values which have been superseded by more accurate results have been omitted unless they are important for sign determinations or unless they show a discrepancy possibly due to differing experimental methods.

The magnetic dipole moments are given in nuclear magnetons and are related to an uncorrected proton moment of 2.79268 nm (CD65). This value is slightly larger (10^{-5} nm) than the value used in the 1965 table, and leads to a small change in the most accurately measured moments from that table. The magnetic moments have been corrected for the diamagnetic effect with the shielding constants calculated by Bonham and Strand (BS64, SB64, BS63) for Z=2 through Z=100. For Z=1, the shielding constant was obtained from Ra56. Part 4 gives a description of these constants and a list of the values used for each element. The diamagnetic corrections were consistently made only for the magnetic moments measured by the following methods (see Part 1 of this table for definitions of these method symbols): A, Ad, E, End, Ld, M, Mc, N, Od, Ol, Op, ORF, and Q. The moments measured by the other methods are too inaccurate to justify a diamagnetic correction or are subject to larger and less certain corrections. Their values are quoted in the table exactly as given by the original authors. In several of these cases, the authors did, in fact, make diamagnetic corrections along with their other corrections.

The lifetime-dependent magnetic moments are consistent with the half-life values listed in the table. The ground-state half-lives were taken from the Table of Isotopes (LHP67) and the excited-state half-lives from Appendix D of this book (MSS68). In several cases, the moments have been recalculated, with a better lifetime value, in order to obtain consistency. The field values used in many of the moment

determinations, as well as the field-dependent quantities, are listed but no corrections have been made beyond those made by the original authors. In cases where "effective" fields are applicable because of the paramagnetic effect, the field values are given as products of the applied fields and correction factors used by the authors. The spin values listed in the table were obtained from the Table of Isotopes (LHP67) except when more recently determined spins were available. The spins of the levels are used purely for identification purposes, and no attempt has been made to analyze them or to give references for them. The magnetic moments calculated from measured g-factors are consistent with the listed spin values.

The electric quadrupole moments are given in barns (10^{-24} cm^2) and have not been corrected for the "Sternheimer effect" (St54). In many cases the errors quoted by the authors allow for a correction due to this polarization effect.

The estimated uncertainties in the magnetic and quadrupole moment values are given parenthetically as positive or negative changes in the last digits. These uncertainties are the ones quoted by the original authors except in cases where moments have been recalculated due to different half-life values or to better "reference" moments (applicable when a moment ratio and one moment have been measured). The errors for the recalculated moments have been revised, by use of standard statistical methods. The errors for the nuclear magnetic resonance magnetic moments taken from Li65 are specifically stated to be "minimum errors." No additional estimates were made for errors arising from hyperfine structure anomalies, or uncertainties in the proton moment and in the diamagnetic correction factors. Throughout this table, signs are given as reported by the original authors. The absence of a sign does not necessarily imply a positive value.

The table of nuclear moment ratios (Part 3) lists magnetic moment, quadrupole moment, and g-factor ratios determined for two isotopes of the same element and for two levels of the same isotope. Interelement ratios, such as those involving a well-known "standard" moment, have not been included. Since moment ratios were not included in the 1965 Table of Nuclear Spins and Moments (Li65), the current tabulation is based instead on values given in Nuclear Moments, Appendix 1 to Nuclear Data Sheets (FC65). Many of the ratios have been used in Part 2, along with a "reference" moment, to calculate other moments.

The experimental methods used in measuring the nuclear moments are identified by brief symbols which are defined in Part 1 of this table. Part 2 is the table of magnetic and quadrupole moments, Part 3, the table of nuclear moment ratios, and Part 4, the list of magnetic shielding constants used for each element. References for all parts of the table are given at the end.

Part 1. Definition of Symbols for Experimental Methods

A	Atomic beam magnetic resonance (hyperfine structure)
Ad	Atomic beam magnetic resonance ("direct" moment determination by double resonance or other method)
CDPAC	Constant-delay perturbed angular correlations of nuclear radiations
Ce	Angular distribution of γ rays after Coulomb excitation
CeTD	Time differential angular distribution of γ rays after Coulomb excitation
CeR	Coulomb excitation reorientation effect
DPAC	Differential perturbed angular correlations of radiations
DPAD	Differential perturbed angular distributions following reactions
E	Electron spin resonance (esr)
EES	Elastic electron scattering
End	Electron-nuclear double resonance ("ENDOR"), detected by the enhancement of the esr signal
IPAC	Integral perturbed angular correlations of radiations
IPAD	Integral perturbed angular distributions following reactions
Ld	Laser double resonance
M	Microwave absorption in gases
Mb	Molecular (or diamagnetic atomic) beam magnetic resonance
Mc	Miscellaneous
Mö	Mössbauer effect
N	Nuclear magnetic resonance (nmr)
Nod	Dynamic nuclear orientation, detected by the anisotropy in the nuclear radiations
N/ON	Radiative detection of nmr in oriented nuclei
Nos	Static (low-temperature) nuclear orientation, detected by the anisotropy in the nuclear radiations
NRF	Nuclear resonance fluorescence (integral angular distribution measurement)
O	Optical spectroscopy (hyperfine structure or band spectra)
Od	Optical double resonance
Ol	Optical level crossing
Op	Optical pumping
ORF	Optical resonance fluorescence
Q	Quadrupole resonance
R	Recalculation

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
0	n	1		12 m	1/2	-1.91315(5)			Mc, N	Li65			
1	H	1			1/2	+2.792777(5)			N	ST63			
						2.79276(2)			R	CD65			
						2.79276(2)			Ld	MKR66			
		2			1	+0.857409(1)			N	Li65	+0.00282	R	Au61
		3		12.3 y	1/2	+2.97885(1)			N	Du59			
2	He	3			1/2	-2.12756(1)			N	KH57			
		6		0.8 s	0	< 0.16			Mc	CK58			
3	Li	6			1	+0.822013(8)			N	Li65	-0.008(1)	Mb	WGK64
		7			3/2	+3.25629(4)			N	Li65	-0.03(2)	ORF	BEW67
											-0.045(5)	Mb	WGK64
												R	KN61
		8		0.84 s	2	+1.6532(8)			Nod	Co69			
									Nod	CT62			
4	Be	9			3/2	-1.17744(4)			N	Li65	+0.049(3)	A	BL67
											+0.038	EES	BSV67
											+0.029	N, R	PD59
5	B	10			3	+1.80068(5)			N	BP58	0.0745(150)	EES	SGI66
		11			3/2	+2.68864(7)			N	BP58	0.0372(74)	EES	SGI66
		12			1	+1.003(1)			N/ON	Su68			
									N/ON	SNM67			
6	C	11		20.3 m	3/2	-1.027(10)			A	HKA64	+0.0308(6)	A	HKA64
		13			1/2	+0.702384(2)			N	Li65			
7	N	13		10.0 m	1/2	-0.32212(36)			A	BHH64			
		14			1	0.403562(10)			R	BAR64	+0.016(7)	M, R	Li60
						+0.40361(2)			N	BHS61	+0.0108	M, R	KN59
									N	APB59	+0.007	M, R	Ba57
		15			1/2	-0.283049(7)			R	BAR64			
						-0.28309(2)			N	BHS61			
									N	APB59			
8	O	15		124 s	1/2	0.7189(8)			A	CF63			
		17			5/2	-1.89371(9)			N	Li65	-0.0265(30)	E, M	Li65
9	F	17		66 s	5/2	+4.7222(12)			N/ON	Su68			
									N/ON	SMN66			
		18	1120	$1.53(15)\times10^{-7}$ s	5	+2.86(3)		$H_{ext} = 1.571\times10^{4}$	DPAD	SMK67			
						+2.840(65)		$H_{ext} = 6100(60)$	DPAD	PF67			
		19			1/2	+2.628353(5)			R	BAR64			
						+2.6287(1)			N	Li65			
						2.6289(9)*			Mb	BGL64			
			197	$1.287(18)\times10^{-7}$ s	5/2	+3.590(18)		$H_{ext} = 10465$	DPAD	BMS67	0.11(2)	DPAD	SMN64
									DPAD	SMK67			
						+3.69(4)			DPAD	Fr61			
		20		11.4 s	2	+2.094(2)			Nod	TC63			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$(radians), μH(ergs), $a\tau$(radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
10	Ne	19		17.5 s	1/2	-1.886(1)			N/ON	CD63			
		20			0	$< 2\times10^{-4}$			A	Li65			
		21			3/2	-0.661762(5)			Mb	LQR57	+0.093(10)	A	GBL58
11	Na	21		23 s	3/2	+2.38614(10)			A	APG65			
		22		2.60 y	3	+1.746(3)			A	Li65			
			583	$2.43(2)\times10^{-7}$ s	1	+0.535(10)		H_{ext} = 6110(30)	DPAC	ST66			
						+0.555(17)			DPAD	SMK67			
		23			3/2	+2.21752(2)			N	Li65	+0.146(20)	Od	Ac66
											+0.138(25)	Od	BHK66
											+0.097(13)	Od	DK60
		24		15.0 h	4	+1.6902(5)			A	CCL66			
12	Mg	25			5/2	-0.85512(8)			N	Li65	+0.22	A	Lu62
13	Al	27			5/2	+3.64141(12)			N	Li65	0.146	EES	SVB67
14	Si	29			1/2	-0.55525(3)			N	Li65	$< 10^{-4}$	M	WT53
15	P	31			1/2	+1.13166(5)			N	Li65			
		32		14.3 d	1	-0.2523(3)			End	FFG57			
16	S	33			3/2	+0.64327(8)			N	Li65	-0.064(10)	M	Li65
											-0.11	M, R	OMM58
		34									$< 2\times10^{-3}$	M	Li65
		35		88 d	3/2	1.00(4)			M	Li65	+0.054(10)	M	Li65
		36			0						< 0.01	M	Li65
17	Cl	35			3/2	+0.82183(2)			N	Li65	-0.080(2)	M, A	Li65
		36		3.1×10^{5} y	2	+1.28538(6)			N	Li65	-0.017(1)	M	Li65
		37			3/2	+0.68409(2)			N	Li65	-0.063(2)	M, A	Li65
18	Ar	35		1.83 s	3/2	+0.632(2)*			N/ON	CCD65			
		37		35 d	3/2	+0.95(20)			O	RMC65			
19	K	38		7.71 m	3	+1.3735(10)			A	PAG65			
		39			3/2	+0.39141(2)			N	Li65	+0.09(2)	A, Od	Li65
		40		1.26×10^{9} y	4	-1.2981(4)			Ad	Li65	-0.093(25)	Od	BKN62
						-1.2978(3)			N	Li65			
		41			3/2	+0.21488(2)			N	LS67	+0.11(2)	A	Li65
						+0.21483(2)			N	Li65			
		42		12.4 h	2	-1.1410(20)			Ad	KBB64			
		43		22.4 h	3/2	0.163(2)			A	PEE59			
20	Ca	41		8×10^{4} y	7/2	-1.59464(2)			N	BKP62a			
		43			7/2	-1.3172(2)			N	Li65			
						1.317(3)			Mb	KSG59			
21	Sc	43		3.92 h	7/2	+4.62(4)			N	CHM66	-0.26(6)	N	CHM66
		44		3.92 h	2	+2.56(3)			R	CHM66	+0.10(5)	R	CHM66
						2.56(3)			A	HM63	+0.14(8)	A	HM63
			67.8	1.5×10^{-5} s	1	0.342(6)		H_{ext} = 7550(75)	DPAC	RS67			
						+0.35(2)		H_{ext} = 5563(11)	DPAC	BT62			
								H_{ext} = 2648(5)					

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$(radians), μH(ergs), $a\tau$(radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
21	Sc	44	271	2.44(2) d	6	+3.88(1)			R	CHM66	-0.19(2)	R	CHM66
						3.96(15)			A	HM63	0.37(29)	A	HM63
		45			7/2	+4.75633(10)			N	Li65	-0.22(1)	A	FKP59
		46		83.9 d	4	+3.04(2)			A	PS62b	+0.119(6)	A	PS62b
		47		3.43 d	7/2	+5.34(2)			N	CHM66	-0.22(3)	N	CHM66
			760	$2.69(12)\times10^{-7}$ s	3/2	0.35(7)		$H_{ext} = 6100(60)$	DPAD	FP68			
22	Ti	45		3.09 h	7/2	0.095(2)			N	CM66	0.015(15)	N	CM66
						$\mu/Q > 0$					$\mu/Q > 0$		
		47			5/2	-0.7881(2)			N	Li65	+0.29(1)	A	CP65
		49			7/2	-1.1036(2)			N	Li65	+0.24(1)	A	CP65
23	V	48		16.0 d	4	1.63(10)	$\mu H = 6.77(40)\times10^{-19}$	$H_{eff} = 8.2\times10^{4}$	Nos	CCL66a			
			305	$7.09(7)\times10^{-9}$ s	2	+0.376(34)	$\omega\tau = 0.364$	$H_{ext} = 3.640\times10^{4}$	IPAC	ABM67			
							$\omega\tau = 0.428$	$H_{ext} = 4.660\times10^{4}$					
		49		330 d	7/2	4.46(5)			E	Li65			
		50		6×10^{15} y	6	+3.347(1)			N	Li65	0.07	N	HR64
												A	CG67
												R	Sh67
		51			7/2	+5.148(1)			N	Li65	-0.052(10)	A	CG67
											-0.04	O	Mu66
			320	$1.9(3)\times10^{-10}$ s	5/2	3.78(81)	$\omega\tau = 0.0503(8)$	$H_{ext} = 2.470\times10^{4}$	NRF	Kr63			
									R	MSS68			
										Sh67			
24	Cr	49		41.9 m	5/2	0.476*			A	JOS67			
		51		27.8 d	7/2	0.933*			A	JOS67			
		53			3/2	-0.47436(5)			N	Li65	0.026	R	Ar66
											0.022	N	RSK64
											-0.03	End	TLK61
25	Mn	51		45 m	5/2	3.583*			A	JOS67			
		52		5.7 d	6	3.075(1)			A	ALD66			
									N	Li65			
						3.00(15)			Nod	Je61			
			383	21 m	2	0.0077(3)			A	SDJ65			
						0.0077(4)			A	PHM65			
									N	Li65			
		53		2×10^{6} y	7/2	5.046(7)			E	Li65			
		54		303 d	3	3.302(5)			N/ON	TS67			
		55			5/2	3.4438(20)*			End	MDG67	+0.35(5)	O	Wa62b
						+3.4680(2)			N	Li65			
		56		2.576 h	3	+3.2405(2)			A	CGK61			
26	Fe	56	847	$7.8(2)\times10^{-12}$ s	2	+1.06(32)	$\omega\tau = 0.00846$	$H_{eff} = 3.17\times10^{5}$	NRF	Me61			
						+1.16(34)	$\omega\tau = 7.9(3.7)\times10^{-3}$	$H_{hf} = 3.3(1)\times10^{5}$	IPAC	AM63			
		57			1/2	+0.09024(7)*			End	LG65	+0.28	Mö	VD66
											0.25	R	Wi67

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
26	Fe	57	14.4	$9.77(2)\times10^{-8}$ s	3/2	-0.15463(20)			Mö	PJM65	+0.300(35)	Mö	MWA68
									End	LG65	+0.20	R	NK67
									R	Sh67	+0.18	Mö	Jo68
						-0.1544(24)			Mö	EST67			
									End	LG65			
									R	Sh67			
			136	$8.8(3)\times10^{-9}$ s	5/2	+0.915(45)		$H_{hf} = 3.33\times10^5$	DPAC	KBN64			
						+0.83(12)		$H_{ext} = 1.100\times10^4$	Ce	SH68			
			367	1.1×10^{-11} s	3/2	< 0.54		$H_{hf} = 3.33\times10^5$	Ce	SH68			
27	Co	55		18.2 h	7/2	4.3(3)			Nos	CGH61			
		56		77 d	4	3.803(7)			E	Li65			
		57		270 d	7/2	4.58(5)			E	Li65			
									N, R	FMR57			
			1378	$1.9(4)\times10^{-11}$ s	3/2	2.8(9)	$\omega\tau = 0.073(18)$	$H_{hf} = -2.906(9)\times10^5$	IPAC	BBM67			
		58		71.3 d	2	3.996(11)			E	DJ57			
									N, R	FMR57			
		59			7/2	4.616(9)*			N	WWJ67	+0.404(40)	A	EKP60
						+4.583(5)			N, R	FMR57		A	Eh61
						+4.679(10)			N	Li65			
			1292	$6.0(5)\times10^{-10}$ s	3/2	1.90(35)		$H_{ext} = 1.820\times10^4$	IPAC	ABB67			
		60		5.26 y	5	3.754(8)			E	Li65			
									N, R	FMR57			
28	Ni	61			3/2	-0.74868(4)*			N	Dr64	0.134(25)	A	GC67
						0.746(7)*			End	LG63			
			67.4	$5.2(4)\times10^{-9}$ s	5/2	+0.419(10)			Mö	LCS68			
									N	Dr64			
						+0.432(19)			Mö	EQ68			
									N	Dr64			
29	Cu	61		3.32 h	3/2	+2.14(4)			A	DS66			
		63			3/2	+2.2262(2)			N	Li65	-0.24(9)	ORF	Ne66
						2.231(7)			Q	Li65	-0.20(4)	O	Fi61
											+0.16(3)	O, E	Li65
		64		12.8 h	1	-0.217(2)			A	DS66			
		65			3/2	+2.3850(3)			N	Li65	-0.22(4)	ORF	Ne66
						2.382(7)			Q	Li65	-0.16(1)	O	FHK67
											+0.15(3)	O, E	Li65
		66		5.1 m	1	0.283(5)*			A	RS64			
30	Zn	65		245 d	5/2	+0.7688(2)*			Od	BMN64	-0.024(2)	Od	BMN64
									Op	SM67		A	Lu62
									R	Sh67			
		67			5/2	+0.87524(10)*			Op	SM67	+0.18(2)	Od	Li65
						+0.87556(1)			N	Li65	+0.16	A	Lu62

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
30	Zn	67	184	$1.01(5)\times10^{-9}$ s	3/2	+0.38(12)	$\omega\tau = 0.0541$	$H_{ext} = 3.120\times10^{4}$	IPAC	LFK68			
31	Ga	66		9.4 h	0	$< 4\times10^{-5}$			A	WNM57			
		67		78 h	3/2	+1.850(1)			A	EN59	+0.217(9)	A	EN59
		68		68.3 m	1	0.01176(6)			A	ES62	0.0313(16)	A	ES62
		69			3/2	+2.01613(2)			N	Li65	+0.19(1)	O, A	Li65
		71			3/2	+2.56175(2)			N	Li65	+0.12(1)	O, A	Li65
		72		14.10 h	3	-0.13221(2)			A	CGK60	+0.59(3)	A	CGK60
32	Ge	71		11.4 d	1/2	0.546(5)			A, R	CG66			
		73			9/2	-0.8788(4)			N	Li65	-0.285(43)	A	CG66
											+0.2(1)	M	Li65
33	As	73	65.8	$5.0(1)\times10^{-9}$ s	5/2	+1.62(10)		$H_{ext} = 3.660\times10^{4}$	DPAC	Bo63			
		75			3/2	+1.4391(1)			N	Li65	+0.3(2)	O, M	Li65
			280	$2.8(2)\times10^{-10}$ s	5/2	0.82(15)	$\omega\tau = 0.0136(22)$		IPAC	AB66			
									R	MSS68			
										Sh67			
						+0.88(19)	$\omega\tau = -0.0172(34)$	$H_{ext} = 1.300\times10^{4}$	IPAC	MR60			
									R	MSS68			
										Sh67			
		76		26.5 h	2	-0.906(5)			Nod	PC58			
34	Se	75		120.4 d	5/2						+1.1(2)	M	Li65
		76	559	$1.0(1)\times10^{-11}$ s	2	+0.89(24)	$\omega\tau = 0.020(3)$	$H_{eff} = +6.5(1.5)\times10^{5}$	IPAC	MMC67a			
									R	MSS68			
										Sh67			
		77			1/2	+0.5344(4)			N	Li65			
			250	$9.4(4)\times10^{-9}$ s	5/2	+1.20(15)		$H_{ext} = 3.300\times10^{4}$	DPAC	EDW64			
		79		$\leq 6.5\times10^{4}$ y	7/2	-1.018(15)			M	Li65	+0.9(2)	M	Li65
35	Br	76		16.1 h	1	0.5480(1)			A	LGG60	0.26(1)	A	LGG60
		79			3/2	+2.1058(1)			N	Li65	+0.33(2)	A	Li65
		80		17.6 m	1	0.5138(6)			A	WLA64	0.191(8)	A	WLA64
						$Q/\mu > 1$					$Q/\mu > 1$		
			86	4.38 h	5	1.3173(6)			A	WLA64	0.73(3)	A	WLA64
		81			3/2	+2.2698(1)			N	Li65	+0.28(2)	A	Li65
		82		35.34 h	5	1.6265(5)			A	GGL59	0.73(3)	A	GGL59
36	Kr	83			9/2	-0.97025(4)			N	Li65	+0.251(5)	A	Ku61
											+0.270(13)	A	FC63
			9.3	$1.44(2)\times10^{-7}$ s	7/2						0.459(6)	Mö	RS66
												A	FC63
		85		10.76 y	9/2	-1.004(2)			O	Li65	+0.45(3)	O	Li65
37	Rb	81		4.7 h	3/2	+2.05(2)			A	HNS57a			
									A	Fa62			
		82	280	6.3 h	5	+1.51(2)			A	HNS57a			
		83		83 d	5/2	+1.42(2)			A	HNS57a			
		84		33.0 d	2	-1.32(2)			A	HNS57a			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
37	Rb	85			5/2	+1.35289(3)			Ad	PMC62	+0.286(1)	Od	BKM61
						+1.35289(5)			N	Li65	+0.298(1)	Od	Sc65
									Ad, R	Pe63			
		86		18.66 d	2	-1.6915(14)			Ad	BBK61			
		87		5×10^5 y	3/2	+2.75095(6)			Ad	PMC62	+0.138(1)	Od	PS65
									Ad, R	Pe63	+0.144(1)	Od	Sc65
						+2.7509(2)			N	Li65	+0.140(1)	Od	BKM61
		88		17.8 m	2	0.508(5)			A	Pr67			
38	Sr	87			9/2	-1.0932(2)			N	Li65	0.154(60)	E	CHK65
						-1.0926(9)			Mb	KSG59	+0.36(3)	Od	BKP62
													Pu63
39	Y	86	243	$2.85(21)\times10^{-8}$ s	2	-1.06(6)		$H_{ext} = 4.100\times10^4$	DPAC	TM68			
								$H_{ext} = 4.150\times10^4$					
		89			1/2	-0.137339(3)			N	Li65			
		90		64 h	2	-1.629(8)			A	PS62	-0.155(3)	A	PS62
		91		58.8 d	1/2	0.1640(8)			A	PS62b			
40	Zr	91			5/2	-1.30305(3)			N	BOS57			
41	Nb	93			9/2	+6.1681(3)			N	Li65	-0.2(1)	O	Li65
		95		35 d	9/2	6.3(6)	$\mu H = 8.0(8)\times10^{-18}$	$H_{eff} = 2.55(5)\times10^5$	Nos	CCC67			
42	Mo	95			5/2	-0.9134(2)			N	Li65	+0.12(3)	N	NA66
			204	$7.55(15)\times10^{-10}$ s	3/2	-0.55(5)	$\omega\tau = -0.044(3)$	$H_{ext} = 2.25(3)\times10^4$	IPAC	AMR66			
									R	MSS68			
										Sh67			
		97			5/2	-0.9326(1)			N	Li65	+1.1(2)	N	NA66
43	Tc	99		2.12×10^5 y	9/2	+5.6813(4)			N	Li65	+0.34(17)	O	Li65
			140	$2.77(14)\times10^{-10}$ s	7/2	2.6(9)	$\omega\tau = 0.03(1)$	$H_{ext} = 20(1)\times10^3$	IPAC	ZR68			
									R	MSS68			
										Sh67			
			181	$3.57(5)\times10^{-9}$ s	5/2	+3.60(30)		$H_{ext} = 1.600(25)\times10^4$	IPAC	AMM65			
						+3.60(33)		$H_{ext} = 1.555\times10^4$	IPAC	BMK59			
						+3.68(50)			IPAC	RK58			
									R	MSS68			
										Sh67			
44	Ru	99			5/2	-0.623(19)			Mö	Ki66	$\geq$ 0.05	Mö	Ki66
									R	MRS65		R	Sh67
			90	$2.07(3)\times10^{-8}$ s	3/2	-0.284(6)		$H_{ext} = 4.15(4)\times10^4$	DPAC	MRS65	$\geq$ 0.15	Mö	Ki66
		100	540	$1.1(8)\times10^{-11}$ s	2	+1.10(14)	$\omega\tau = -0.0178(12)$	$H_{hf} = 4.42(31)\times10^5$	IPAC	ASW66			
		101			5/2	-0.68(3)			O	Li65			
									E	GO52			
									Mö	Ki66			
									DPAC	MRS65			
			127	$5.5(3)\times10^{-10}$ s	3/2	-0.311(26)	$\omega\tau = +0.336(13)$	$H_{hf} = 4.42(3)\times10^5$	IPAC	ASW66			
							$\omega\tau = +0.130(4)$	$H_{hf} = -1.78(8)\times10^5$					

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
44	Ru	102	475	$1.6(1)\times10^{-11}$ s	2	+0.88(20)	$\omega\tau = -0.0209(42)$	$H_{hf} = 4.42(31)\times10^{5}$	IPAC	ASW66			
		104	358	$5.4(4)\times10^{-11}$ s	2						-0.63(20)	CeR	DE67
45	Rh	100	74.8	$2.35(3)\times10^{-7}$ s	2	+4.302(8)		$H_{ext} = 4996(10)$ $H_{ext} = 7636(7)$	DPAC	MS66			
		103			1/2	-0.0883			N	Li65			
46	Pd	105			5/2	-0.6156(6)			N	GJ62	+0.8(1)	A	CP65
		106	512	$1.20(8)\times10^{-11}$ s	2	+0.74(6)	$R = 5.68(16)\times10^{-12}$	$H_{hf} = 5.8(2)\times10^{5}$	IPAC	MMC67b			
						+0.80(8)	$\omega\tau = -0.0176(3)$	$H_{hf} = 5.4(4)\times10^{5}$	IPAC	ASW66			
							$\omega\tau = -0.0116(7)$	$H_{hf} = 3.61(50)\times10^{5}$					
							$\omega\tau = -5.0(9)\times10^{-3}$	$H_{hf} = 1.62(35)\times10^{5}$					
						0.76(10)**			IPAC	JN68			
						+0.86(10)		$H_{ext} = 5.562\times10^{4}$	IPAC	KAB64			
						+0.90(12)	$\omega\tau = 2.06(20)\times10^{-3}$	$H_{ext} = 5.562\times10^{4}$	IPAC	JKS66a			
										KO65			
		110	374	$4.5(3)\times10^{-11}$ s	2						-0.82(18)	CeR	DE67
47	Ag	103		66 m	7/2	4.45*			Ad	JOS67			
		104		67 m	5	+4.0(2)			A	ABB61			
			≈ 20	29.8(5) m	2	+3.7(2)			A	ABB61			
		105		40 d	1/2	0.1012(10)			A	ES63			
		107			1/2	-0.113561(6)			N	Li65			
		108		2.42 m	1	4.2(5)			A	RS64			
		109			1/2	-0.130552(7)			N	Li65			
		110	120	253(1) d	6	+3.604(4)			Ad	SES67			
		111		7.5 d	1/2	-0.146(1)			A	Li65			
		112		3.2 h	2	0.055(1)			A	CEN64			
		113		5.3 h	1/2	0.159(2)			A	CEN64			
48	Cd	107		6.5 h	5/2	-0.6163(8)			Od	BMN63	+0.77(10)	Od	BMN63
												Od	MN63
		109		453 d	5/2	-0.8287(15)			Od	MN63	+0.78(10)	Od	MN63
		110	658	$4.6(4)\times10^{-12}$ s	2	0.59(24)	$R = 3.8(14)\times10^{-3}$	$H_{hf} = -3.48\times10^{5}$	IPAC	KDD68			
									R	MSS68			
										Sh67			
		111			1/2	0.594342(2)			Op	LBL66			
										LL66			
						-0.59507(6)			N	Li65			
									N	KW59			
			247	$8.41(5)\times10^{-8}$ s	5/2	-0.794(6)		$H_{ext} = 10337(50)$	DPAC	BH63	+0.9	IPAC	BB62
						-0.795(18)		$H_{ext} = 3.260\times10^{4}$	DPAC	MBM63			
						-0.783(23)			CDPAC	SZ56			
		112	617	$6.2(4)\times10^{-12}$ s	2						+0.12(35)	CeR	DE67
		113		$> 10^{15}$ y	1/2	0.621732(2)			Op	LBL66			
										LL66			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$(radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
48	Cd	113		$> 10^{15}$ y	1/2	-0.62249(6)			N	Li65			
									N	KW59			
			265	14 y	11/2	-1.08901(13)			Od	BMN64a	-0.79(10)	Od	BMN64a
												Od	MN63
		114	558	$9.2(6)\times10^{-12}$ s	2	0.88(12)	$\omega\tau = 9.69(1.06)\times10^{-3}$	$H_{hf} = 3.48(10)\times10^{5}$	IPAC	BBK67	-0.60(15)	CeR	DE67
											-0.64(19)	CeR	SST67
											-0.54(28)	CeR	GS67
		115		53.5 h	1/2	-0.6470(3)			Od	MNP64			
									N	Li65			
			180	44(1) d	11/2	-1.0438(10)			Od	MNP64	-0.61(8)	Od	MNP64
									N	Li65		Od	MN63
		116	513	$1.2(1)\times10^{-11}$ s	2						-0.78(14)	CeR	DE67
49	In	109		4.3 h	9/2	+5.54(6)			A	Ma59	+1.20	A	Ma59
		111		2.81 d	9/2	+5.53(6)			A	Ma59	+1.18	A	Ma59
		113			9/2	+5.5239(7)			N	Li65	+1.14(5)	A	Li65
									N	RP57			
			393	99.8 m	1/2	-0.21053(2)			A	CG60			
		114		72 s	1	+1.7(4)		$H_{eff} \geq 2.5\times10^{5}$	Nos	KKN62			
			192	50.1(3) d	5	+4.75(10)			A	GW57			
		115		6×10^{14} y	9/2	+5.5357(7)			N	Li65	+1.16(5)	A	Li65
									N	RP57			
			335	4.50(2) h	1/2	-0.24378(5)			A	CKE62			
		116		14 s	1	1.12			DPAD	Ra66	0.03	DPAD	Ra66
			60	54.0(1) m	5	+4.25(8)			A	Li65			
						+4.41(10)			A	GW57			
		117	314	1.93(3) h	1/2	0.2510(1)			A	CS62			
50	Sn	115			1/2	-0.91790(8)			N	Li65			
		116	1293	$4.2(3)\times10^{-13}$ s	2						+0.6(3)	CeR	DE67
			2369	$3.5(2)\times10^{-7}$ s	5	-0.325(25)		$H_{ext} = 3.020\times10^{4}$	DPAC	Co66			
		117			1/2	-0.99993(6)			N	Li65			
		118	2319	$2.17(2)\times10^{-8}$ s	5	-0.300(25)**				BDG63			
						-0.340(35)	$\omega\tau = 0.417(38)$	$H_{ext} = 4.095\times10^{4}$	IPAC	Bo62c			
		119			1/2	-1.04632(6)			N	Li65	-0.06(2)	R	RKB67
			23.8	$1.85(10)\times10^{-8}$ s	3/2	+0.685(15)			Mö	BPK66	0.05(3)	Mö	Co64
						+0.67(1)			Mö	GTD65			
						+0.672(25)			Mö	KSS61			
						+0.83(3)			Mö	BBE61			
						+0.75(4)			Mö	BDS62			
		120	2280	$5.53(6)\times10^{-9}$ s	5	-0.280(25)**				BDG63			
						-0.37(5)	$\omega\tau = 0.150(20)$	$H_{ext} = 5.320\times10^{4}$	IPAC	Bo62c			
		121		27 h	3/2	0.703(7)			A	Pr67	0.08(4)	A	Pr67
		124	1131	$7.9(9)\times10^{-13}$ s	2						-0.46(25)	CeR	DE67

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51	Sb	117		2.8 h	5/2	+2.672(10)*			A	Ja67	-0.29(3)	A	Ja67
		118		3.5 m	1	2.45(12)*			A	Ja67			
		121			5/2	+3.3593(2)			N	Li65	-0.26(10)	Mö	RKB67
						+3.3603(15)			End	EF58			
			37.2	$3.5(2)\times10^{-9}$ s	7/2	+2.51(3)			Mö	RK67	-0.36(10)	Mö	RKS66
									R	Ru67		Mö	RKB67
												R	Sh67
		122		2.80 d	2	-1.904(20)			Nod	Pi58	+0.47(3)	A	FRS60a
		123			7/2	+2.5469(1)			N	Li65	-0.68(10)	O, M	Li65
						+2.5487(11)			End	EF58	-0.26(4)	A	FRS60
											-0.69(10)	O	Le61
52	Te	119		15.9 h	1/2	0.25(5)*			A	ALO65			
		120	562	$1.0(2)\times10^{-11}$ s	2	0.814(230)	$\omega\tau = -0.0175(36)$	$H_{int} = 6.11(20)\times10^5$	Ce	BBM66			
									R	MSS68			
										Sh67			
		122	564	$7.6(6)\times10^{-12}$ s	2	+0.62(6)	$\omega\tau = 0.0102(11)$	$H_{int} = 6.20(20)\times10^5$	IPAC	BBK67a	-0.50(22)	CeR	DE67
						+0.79(10)	$\omega\tau = 0.0132(13)$	$H_{eff} = 6.37(21)\times10^5$	IPAC	JKS66			
									R	MSS68			
										Sh67			
						+0.91(12)	$\omega\tau = 0.0154(15)$	$H_{eff} = +6.20(20)\times10^5$	IPAC	AHS66			
									R	MSS68			
										Sh67			
						+0.70(14)	$\omega\tau = 0.0115(20)$	$H_{eff} = +6.00(25)\times10^5$	IPAC	MMC67a			
						1.082(72)	$\omega\tau = -0.0177(12)$	$H_{int} = 6.11(20)\times10^5$	Ce	BBM66			
		123		$\approx 1.2\times10^{13}$ y	1/2	-0.73592(3)			N	Li65			
		124	603	$4.3(3)\times10^{-12}$ s	2	+1.07(17)	$\omega\tau = 0.0097(13)$	$H_{int} = 6.10(25)\times10^5$	IPAC	MMB67			
									R	MSS68			
										Sh67			
						+0.60(20)	$\omega\tau = 0.0057(18)$	$H_{int} = 6.20(20)\times10^5$	IPAC	BBK67a			
										MSS68			
										Sh67			
						1.60(16)	$\omega\tau = -0.0148(9)$	$H_{int} = 6.11(20)\times10^5$	Ce	BBM66			
									R	MSS68			
										Sh67			
						0.80(46)	$\omega\tau = 0.0075(44)$	$H_{int} = 6.20(20)\times10^5$	IPAC	BBG68			
		125			1/2	-0.88723(3)			N	Li65			
			35.5	$1.54(8)\times10^{-9}$ s	3/2	+0.60(2)			Mö	HFS64	0.20(3)	Mö	VBW63
						~+0.7			Mö	FHM65	~ 0.2	Mö	Sh63
									IPAC				
									Mö	Sh63			
		126	667	$3.8(3)\times10^{-12}$ s	2	1.85(34)	$\omega\tau = -0.0151(25)$	$H_{int} = 6.11(20)\times10^5$	Ce	BBM66	-0.33(17)	CeR	DE67
									R	MSS68			SH67a
										Sh67			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
52	Te	128	743	$2.9(2)\times10^{-12}$ s	2	1.94(35)	$\omega\tau = -0.0121(20)$	$H_{int} = 6.11(20)\times10^5$	Ce	BBM66	-0.20(20)	CeR	DE67
									R	MSS68			Sh67a
										Sh67			
53	I	125		60 d	5/2	3.0(10)			M	FA58	-0.88(5)	M	Li65
											-0.66	M	FA58
		127			5/2	+2.8094(2)			N	Li65	-0.78(5)	O, A	Li65
											-0.62	O	Mu64
			57.6	$1.95(7)\times10^{-9}$ s	7/2	2.02(15)	$\omega\tau = 0.216(15)$	$H_{ext} = 2.810\times10^4$	IPAC	SSN67	-0.70(5)	Mö	PR64
						1.67(40)	R = 0.068(11)	$H_{ext} = 1.280\times10^4$	IPAC	TD65		O, A	Li65
									R	MSS68			
										Sh67			
			203	$3.3(2)\times10^{-10}$ s	3/2	1.15(8)	$\omega\tau = 0.088(15)$	$H_{ext} = 5.120\times10^4$	IPAC	SSN67			
		129		1.7×10^7 y	7/2	+2.6175(3)			N	Li65	-0.55(4)	Q	Li65
			27.8	$1.44(5)\times10^{-8}$ s	5/2	+2.84(5)			Mö	DH64	-0.68	Mö	HDD64
									N	Li65		Mö	PSH65
												Q	Li65
		131		8.05 d	7/2	+2.738(1)			A	LGG60a	-0.40(1)	A	LGG60a
			150	$9.5(5)\times10^{-10}$ s	5/2	2.6(6)	R = 0.0155(26)	$H_{ext} = 1.330\times10^4$	IPAC	TD65			
		132		2.3 h	4	3.084(7)			A	WAG60	0.09	A	WAG60
		133		21 h	7/2	2.837(5)			A	ALW60	0.26(1)	A	ALW60
54	Xe	129			1/2	-0.776883(12)			N	Br63			
						-0.77693(3)			N	Li65			
			39.6	$1.01(4)\times10^{-9}$ s	3/2	+0.68(30)			Mö	CPS68	-0.41	Mö	Pe64
									N	Li65		A	FM61
		131			3/2	+0.690889(9)			N	Br63	-0.120(12)	A	FM61
						+0.69072(1)			N	Li65			
55	Cs	127		6.2 h	1/2	+1.43(4)			A	NSS58			
		129		32 h	1/2	+1.48(1)			A	Ka63			
		130		30 m	1	+1.37(8) or -1.45(8)			A	NSS58			
		131		9.70 d	(3,5)/2	+3.538(2)			A	WEN65			
						+3.53(4)			A	Li65			
			134	$9.3(3)\times10^{-9}$ s	3/2	g = +0.99(6)		$H_{ext} = 2.91(3)\times10^4$	DPAC	BKM64			
		132		6.5 d	2	+2.22(2)			A	NSS58			
		133			7/2	+2.5791(2)			N	Li65	-0.0036(13)	Od	BKO59
											-0.0024(20)	Od	BO62e
		133	81.0	$6.31(5)\times10^{-9}$ s	5/2	3.44(4)			Mö	CPS68			
									N	Li65			
						3.25(15)			CDPAC	ABB64			
			161	$8.5(16)\times10^{-11}$ s	5/2	3.3(8)	$\omega\tau = 0.0113(36)$	$H_{ext} = 1.516\times10^4$	IPAC	ABB65			
							$\omega\tau = 0.0178(34)$	$H_{ext} = 2.117\times10^4$					
						+3.8(13)			IPAC	BKM59			
									IPAC, R	FS63			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
55	Cs	134		2.05 y	4	+2.9902(9)			Ad	SJE57	+0.43(4)	Od	HZS66
			138	2.90 h	8	+1.0965(2)			Ad	CMP62			
		135		3×10^{6} y	7/2	+2.7292(3)			Ad	SJE57	+0.049(2)	Od	BKO59
		136		13 d	5	+3.70(4)			A	DPS66			
		137		30.0 y	7/2	+2.8384(3)			Ad	SJE57	+0.050(2)	Od	BKO59
56	Ba	130	356	$6.3(16)\times10^{-11}$ s	2						-1.10(34)	CeR	DE67
		135			3/2	0.83651(6)*			Op	OO66	+0.18(2)	Od	Pu63
						+0.83725(2)			N	Li65	0.25(12)	O	KFC60
		137			3/2	0.93573(6)*			Op	OO66	+0.28(3)	Od	Pu63
						+0.93662(5)			N	Li65	0.2(1)	O	KFC60
			662	2.55 m	11/2						negative	Nos	LMH65
57	La	138		1.12×10^{11} y	5	+3.7074(3)			N	Li65	0.80(12)	N	SJ55
													SW51
												A	Ti57
		139			7/2	+2.7783(2)			N	Li65	0.21	N, R	TB64
											+0.23(1)	A	Ti57
		140		40.22 h	3						+0.127(13)	Nos	BS66
58	Ce	137		9.0 h	3/2	0.90(15)			Nos	HST63			
			255	34.4(3) h	11/2	+0.69(3)			Nos	BSS66			
		139		140 d	3/2	0.95(20)			Nos	HST63			
						0.85(20)			Nos	GJS62			
		140	2083	$3.4(4)\times10^{-9}$ s	4	+4.056(152)		$H_{eff} = 1\times H_{ext}$	DPAC	LS65			
						+4.44(16)		$H_{eff} = 1\times3.95\times10^{4}$	DPAC	Kö63			
						+4.60(32)		$H_{ext} = 2.007(20)\times10^{4}$	DPAC	KOR63			
						+3.80(40)		$H_{eff} = 1\times H_{ext}$	DPAC	SWG64			
		141		33 d	7/2	0.968(30)			E	KAJ57			
									E, R	B164			
						1.30(20)			Nos	HST63			
						0.9(1)			Nos	GJS62			
		143		33 h	3/2	1.0(3)			Nos	HST63			
59	Pr	141			5/2	4.136(4)*			A	Le67	-0.0589(42)	A, R	B164
						+4.09(6)*			O	RS65			
						+4.28(8)			A, R	B164			
						+4.24(10)			E	BB58			
									E, R	B164			
		142		19.2 h	2	0.250(5)			A	CLM62	0.0297(85)	A	CLM62
									A, R	B164		A, R	B164
		143	57.4	$4.17(9)\times10^{-9}$ s	5/2	+3.25(13)			DPAC	KAB64			
						+2.58(20)	$\omega\tau = 0.377(26)$	$H_{eff} = 1.1\times5.30(20)\times10^{3}$	IPAC	ZOR66			
						2.68(28)**			IPAC	TD68			
60	Nd	143			7/2	-1.0644(40)			Ad	B164	-0.482(5)	A, R	B164
						-1.063(5)			Ad	SU65	-0.484(20)	A	SU65
						-1.085(60)			End	Ha62	+0.0206(30)	End	Ha62
											-0.57(6)	A	Sp63

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
60	Nd	144	695	$4.2(2)\times10^{-12}$ s	2	0.71(23)	$\omega\tau = 0.016(4)$	$H_{int} = 1.90(40)\times10^{6}$	IPAC	BGG67			
									R	BGG67a			
			1310	$9(3)\times10^{-11}$ s	4	0.18(19)	P = 1.0023(26)	$H_{eff} = 2.25\times5.18(5)\times10^{4}$	IPAC	JJK67			
		145			7/2	-0.6534(40)			Ad	B164	-0.255(2)	A, R	B164
						-0.654(4)			Ad	SU65	-0.253(10)	A	SU65
						-0.675(40)			End	Ha62	+0.0105(20)	End	Ha62
											-0.30(3)	A	Sp63
		146	453	$2.08(7)\times10^{-11}$ s	2	0.67(12)	$\omega\tau = 0.078(4)$	$H_{int} = 1.90(40)\times10^{6}$	IPAC	BGG67			
									R	BGG67a			
		147		11.1 d	5/2	0.577(3)			E	KAJ57			
		148	300	$1.16(12)\times10^{-10}$ s	2	0.48(10)	$\omega\tau = 0.0069(12)$	$H_{eff} = 2.17\times1.660\times10^{4}$	IPAC	BGG67			
		150	132	$1.45(5)\times10^{-9}$ s	2	0.50(6)	$\omega\tau = 0.094(5)$	$H_{eff} = 2.25\times1.600\times10^{4}$	Ce	GS58			
									R	MSS68			
										Sh67			
61	Pm	143		0.73 y	7/2	3.9(5)			Nos	GS63			
		144		1.1 y	6	1.75(14)			Nos	SSR61			
		147		2.62 y	7/2	2.55(6)			E	SJS61	+0.74(20)	O	Re66
									E, R	B164	0.95(35)	A	BM63
						+2.58(7)*			O	Re66			
						2.77(8)			A	BM63			
									A, R	B164			
			91.1	$2.59(2)\times10^{-9}$ s	5/2	+3.9(6)	$\omega\tau = +0.79(11)$	$H_{eff} = 2.16\times1.500\times10^{4}$	IPAC	BKF60			
									R	MSS68			
										Sh67			
		148		5.4 d	1	1.82(19)			Nos	GS63	+0.2(2)	A	AMM65a
						+2.07(21)*			A	AMM65a			
			137	42 d	6	1.80(18)			Nos	GS63			
		149		53.1 h	7/2	3.3(5)			Nos	CGG60			
									Nos, R	GS63			
		149	114	$2.52(12)\times10^{-9}$ s	5/2	2.40(30)	$\omega\tau = 0.377(66)$	$H_{eff} = 1.92\times1.390(14)\times10^{4}$	IPAC	SBJ66			
							$\omega\tau = 1.81(16)$	$H_{eff} = 1.92\times5.16(5)\times10^{4}$					
						1.94(28)	R = 0.043(3)	$H_{ext} = 1.92\times1.330\times10^{4}$	IPAC	TD65			
		151		28 h	5/2	1.8(2)			A	BM63	1.9(3)	A	BM63
62	Sm	147		1.05×10^{11} y	7/2	-0.813($\frac{4}{7}$)			A, Ad	Wo66	-0.208(4)	A	WPS62
						0.812(22)			E, R	B164		A, R	B164
			122	$3.3(3)\times10^{-10}$ s	5/2	-0.65(43)		$H_{eff} = 1.16\times1.83(3)\times10^{4}$	IPAC	BBG68			
			198	$1.31(5)\times10^{-9}$ s	3/2	-0.29(11)		$H_{eff} = 1.61\times1.83(3)\times10^{4}$	IPAC	BBG68			
		148	551	B(E2)↑=0.70(7)	2						-0.73(38)	CeR	DE67
		149			7/2	-0.670($\frac{4}{7}$)			A, Ad	Wo66	+0.060(1)	A	WPS62
						0.656(18)			E, R	B164			
			22.5	$7.6(5)\times10^{-9}$ s	5/2	-0.623(9)			Mö	ON67			
									A, Ad	Wo66			
									R	Sh67			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
62	Sm	150	334	4.9×10^{-11} s	2	0.94(12)**	$\omega\tau = -0.219(4)$	$H_{hf} = 1.4\times10^{6}$	Ce	MGB67	-1.22(22)	CeR	DE67
		152	122	$1.42(2)\times10^{-9}$ s	2	0.554(56)			CeTD	WS67	-1.8(6)	CeR	DE67
						+0.70(6)			IPAC	BD62			
						+0.66(11)			IPAC	DK60a			
									R	Li65			
						+0.62(12)	$\omega\tau = 0.0568(4)$	$H_{eff} = 1.7\times1.60(3)\times10^{4}$	Ce	GS58			
									R	Li65			
						+0.55(14)	$\omega\tau = 0.037(9)$	$H_{eff} = 1.15\times1.20\times10^{4}$	IPAC	MR60a			
									R	MSS68			
										Sh67			
		153		47 h	3/2	(-) 0.04			A	SE63	(+)0.7	A	SE63
		154	82.0	$3.0(2)\times10^{-9}$ s	2	0.576(58)			CeTD	WS67			
						+0.62(12)	$\omega\tau = 0.110(8)$	$H_{eff} = 1.7\times1.60(3)\times10^{4}$	Ce	GS58			
									R	Li65			
63	Eu	151			5/2	3.4630(6)*			Ad	ESW65	1.16(8)	O	MSW65
						+3.465(1)			End	BW62	+1.15(9)	O	Wi65
											+0.95(10)	O	KW60
			21.6	$9.5(5)\times10^{-9}$ s	7/2	+2.58(3)			Mö	Ki64	+1.5(6)	Mö	NO63
									Ad	ESW65		O	Wi65
		152		12 y	3	+1.910(4)			A	Al63	2.4(3)	O	Ga64
						1.93(2)			E	AKJ57	3.2(4)	A	Al63
									Ad	ESW65		O	Wi65
		153			5/2	1.5292(8)*			Ad	ESW65	2.92(20)	O	MSW65
						+1.531(2)			End	BW62	+2.42(20)	O	KW60
											+2.94(23)	O	Wi65
			97.4	$1.58(13)\times10^{-10}$ s	5/2	+3.21(22) or -0.52(22)			Mö	AO66			
			103	$3.80(2)\times10^{-9}$ s	3/2	+2.04(8)			Mö	AMO64			
									Ad	ESW65			
									R	Sh67			
		154		16 y	3	1.971(7)			E	AKJ57	+3.29(37)	Nos	JLS62
64	Gd	154	123	$1.17(2)\times10^{-9}$ s	2	+0.74(8)	$\omega\tau = 0.0816(77)$	$H_{eff} = 1.042\times2.600\times10^{4}$	IPAC	BD62			
						+0.72(12)	$\omega\tau = 0.045(6)$	$H_{eff} = 1.04\times1.500\times10^{4}$	IPAC	SD61			
		155			3/2	0.242(2)			E	MP57	+1.1	O	Li65
									E	LS59	+1.6	O	KCP59
						-0.254(3)			End	Hu65			
									E	LS59			
			86.5	$6.35(9)\times10^{-9}$ s	5/2	-0.960(75)		$H_{eff} = 1.04\times2.370\times10^{4}$	DPAC	HOS66	0.38(10)	Mö	TB68
						-1.02(23)	$\omega\tau = 0.442(97)$	$H_{eff} = 1.04\times2.2370\times10^{4}$	IPAC	HOS66		O	Li65
									R	MSS68		R	Sh67
										Sh67			
						g = -0.220(10)			Mö	TB68	0.20(10)	Mö	BBB68
									E	MP57		O	Li65
									E	LS59			

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64	Gd	155	86.5	$6.35(9)\times10^{-9}$ s	5/2	+0.85(13)			Mö	DES66			
									E	MP57			
									E	LS59			
			105	$1.12(5)\times10^{-9}$ s	3/2						1.1(4)	Mö	BBB68
												O	Li65
		156	89.0	$2.22(6)\times10^{-9}$ s	2	0.592(36)			CeTD	WS67	1.3(3)	Mö	TB68
						0.64(6)	$\omega\tau = 0.133(5)$	$H_{eff} = 1.042\times2.600\times10^4$	IPAC	BD62		O	Li65
												R	Sh67
											1.2(3)	Mö	SER67
												O	Li65
			288	$1.15(3)\times10^{-10}$ s	4	+1.48(20)		$H_{eff} = -3.12(15)\times10^5$	IPAC	WW68			
						1.32(48)	$\omega\tau = 0.087(20)$	$H_{hf} = -2.10(70)\times10^5$	Ce	BH67			
									IPAC	BD62			
			1511	$1.90(6)\times10^{-10}$ s	4	+3.12(20)		$H_{eff} = -3.12(15)\times10^5$	IPAC	WW68			
		157			3/2	0.3225(10)			E	MP57	+1.0	O	Li65
						-0.339(3)			End	Hu65	+2	O	KCP59
		158	79.5	$2.34(10)\times10^{-9}$ s	2	0.630(50)			CeTD	WS67	1.3(3)	Mö	SER67
												O	Li65
		160	75.3	$2.52(15)\times10^{-9}$ s	2	0.606(52)			CeTD	WS67	1.3(3)	Mö	SER67
												O	Li65
65	Tb	156		5.4 d	3	1.41(18)			Nos	LS62	+1.40(45)	Nos	LS62
									Nos, R	B164		Nos, R	B164
		157		150 y	3/2	2.0(1)			E	EBS67			
		158		1200 y	3	1.740(7)*			E	EBS67	+2.7(5)	Nos, E	EBS67
		159			3/2	+1.994(4)*			E, End	BCG65	+1.32(13)	O	AG66
			58.0	$1.3(4)\times10^{-10}$ s	5/2	+1.60(9) or +2.30(13)			Mö	ABO66			
									E, End	BCG65			
		160		72.1 d	3	1.685(8)*			E	EBS67	+3.0(5)	Nos, E	EBS67
66	Dy	155		10.2 h	3/2	0.21(5)			Nos	NS61			
		157		8.1 h	3/2	0.32(2)			Nos	NS61			
		160	86.8	$2.05(2)\times10^{-9}$ s	2	+0.728(22)		$H_{eff} = 6.02\times3.350\times10^4$	DPAC	GSW65			
						+0.704(38)	$\omega\tau = 0.593(24)$	$H_{eff} = 6.07\times2.019\times10^4$	IPAC	GSW65			
						0.76(5)			Mö	ORS65a			
									R	Mü67			
									E, R	Pa58			
										B164			
						0.74(8)	$\mu H = 2.4(1)\times10^{-17}$	$H_{hf} = 6.5\times10^6$	Mö	Co65			
						+0.53(4)			IPAC	Gü62			
									R	MSS68			
										Sh67			
		161			5/2	-0.472(13)			R	Mü67	2.36(4)	A	EEF67
									E, R	Pa58, B164	+1.35(30)	E	Pa58
						-0.47(9)*			A	EEF67		E, R	B164

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
66	Dy	161	25.6	$2.9(2)\times10^{-8}$ s	5/2	+0.571(18)			Mö	NW65	2.31(8)	Mö	NW65
									R	Mü67		A	EEF67
									E, R	Pa68, B164	2.24(20)	Mö	ORS65
						+0.562(28)			Mö	ORS65		A	EEF67
									R	Mü67			
									E, R	Pa58, B164			
			74.6	$3.0(2)\times10^{-9}$ s	3/2	-0.402(12)			Mö	HHW68	+1.42(13)	Mö	HHW68
									R	Mü67		A	EEF67
									E, R	Pa58, B164		R	Sh67
									R	Sh67	1.30(11)	Mö	CQ68
						0.398(16)			Mö	CQ68		A	EEF67
									R	Mü67			
									E, R	Pa58, B164			
		162	80.7	$2.25(7)\times10^{-9}$ s	2	0.74(8)	$\mu H = 1.73(7)\times10^{-17}$		Mö	HHW68			
									E	Pa58			
									E, R	B164			
		163			5/2	+0.635(14)			E	Pa58	2.46(4)	A	EEF67
									E, R	B164	+1.62(40)	E	Pa58
						0.66(13)*			A	EEF67		E, R	B164
		164	73.4	$2.42(24)\times10^{-9}$ s	2	+0.672(28)			Mö	Mü67	-1.96(18)	Mö	MHQ66
									E, R	Pa58, B164		A	EEF67
67	Ho	165			7/2	4.113(22)*			A	Pe67	+2.82(5)	A	GKS62
												A, R	B164
						+4.01(8)			A	GKS62	2.4	A	GS64
									A, R	B164			
						+4.03(15)			E	BB58			
										HW58			
									E, R	B164			
		166	9	$1.20(15)\times10^{3}$ y	7	3.3(5)			Nos	PMS59			
68	Er	164	91.5	$1.73(3)\times10^{-9}$ s	2	0.688(18)			Mö	MQH67			
									Mö	DPH64			
									Ad	SU65			
									R	Sh67			
		165		10.3 h	5/2	0.65(3)			A	AMM65a	2.2(1)	A	AMM65a
						$Q/\mu > 0$					$Q/\mu > 0$		
		166	80.6	$1.82(2)\times10^{-9}$ s	2	0.624(12)			Mö	DPH64	-1.30(30)	Mö	HKW65
									Ad	SU65	≈ -1.6	Mö	CW64
									R	Sh67			
						0.61(3)		$H_{hf} = 8.4\times10^{6}$	Mö	CW64			
						+0.520(68)	$\omega\tau = +0.368(18)$	$H_{eff} = 8.36\times1.355\times10^{4}$	IPAC	BKG61			
			265	$1.20(8)\times10^{-10}$ s	4	+1.09(10)	$\omega\tau = 0.083(6)$	$H_{eff} = 7.08\times5.300\times10^{4}$	IPAC	GKM63			
									R	MSS68			
										Sh67			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
68	Er	166	265	$1.20(8)\times10^{-10}$ s	4	1.28(16)	$\omega\tau = 0.60(5)$	$H_{hf} = -2.2(3)\times10^{6}$	Ce	DHH68			
		167			7/2	-0.5647(24)*			Ad	SU65	2.827(12)	A	SU65
		168	79.8	$1.91(3)\times10^{-9}$ s	2	0.650(13)			Mö	MQH66			
									Mö	DPH64			
									Ad	SU65			
									R	Sh67			
						0.66(4)	$\mu H = 2.5(1)\times10^{-17}$	$H_{hf} = 7.46\times10^{6}$	Mö	SER67			
						+0.53(6)	$\omega\tau = 0.485(51)$	$H_{eff} = 7.26\times2.030\times10^{4}$	IPAC	Bo62b			
									R	MSS68			
										Sh67			
			264	$1.21(8)\times10^{-10}$ s	4	1.28(16)	$\omega\tau = 0.60(5)$	$H_{hf} = -2.2(3)\times10^{6}$	Ce	DHH68			
						0.88(16)	$\omega\tau = +0.31(4)$	$H_{hf} = -1.64(19)\times10^{6}$	Ce	BH67			
		169		9.4 d	1/2	+0.513(25)			Ad	DM63a			
		170	261	1.35×10^{-10} s (estimated)	4	1.16(16)	$\omega\tau = 0.62(6)$	$H_{hf} = -2.2(3)\times10^{6}$	Ce	DHH68			
						1.52(24)	$\omega\tau = 0.58(5)$	$H_{hf} = -1.64(19)\times10^{6}$	Ce	BH67			
		171		7.52 h	5/2	0.697(48)			A	Ma63	2.37(20)	A	Ma63
						0.70(5)			A	BMM64	2.4(2)	A	BMM64
69	Tm	166		7.7 h	2	0.0465(15)			A	Wa62	4.36(17)	A	Wa62
									A, R	B164		A, R	B164
		169			1/2	-0.2308(15)			Ad	GP67			
						-0.231(1)			Ad	Pe63			
						-0.229(3)			Ad	Ri62			
						-0.234(3)*			End	BH65			
			8.42	$3.9(2)\times10^{-9}$ s	3/2	+0.538(11)			Mö	KKE63	-1.3	Mö	Co64a
									Ad, R	GP67	-1.1(1)	Mö	HKK63
						+0.501(25)			Mö	Co64a			
									Ad	GP67			
									R	Sh67			
			118	$6.2(3)\times10^{-11}$ s	5/2	0.61(12)	$\omega\tau = 0.0060(2)$	$H_{eff} = 5.31\times1.08(4)\times10^{4}$	IPAC	BDB65			
						0.68(12)			IPAC	KKW66			
									IPAC	BDB65			
						0.54(16)	$\omega\tau = 0.0056(17)$	$H_{eff} = 5.6\times1.300\times10^{4}$	IPAC	MR60a			
			139	$3.21(14)\times10^{-10}$ s	7/2	1.22(14)	$\omega\tau = 0.0439(40)$	$H_{eff} = 5.31\times1.08(4)\times10^{4}$	IPAC	BDB65			
									R	MSS68			
										Sh67			
		170		130 d	1	0.2467(36)			A	CL60	0.574(9)	A	CL60
									Ad, R	GP67		A, R	B164
		171		1.92 y	1/2	0.229(5)			A	BMM64			
									Ad	GP67			
									R	Sh67			
			129	$3.62(15)\times10^{-10}$ s	7/2	0.94(18)	R = 0.0097(10)	$H_{eff} = 5.08\times2.147\times10^{4}$	IPAC	ABB65a			
70	Yb	170	84.3	$1.57(5)\times10^{-9}$ s	2	0.670(10)			Mö	HWK65			
									Op	OO67			
									R	Sh67			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
70	Yb	170	84.3	$1.57(5)\times10^{-9}$ s	2	0.66(4)			CeTD	TS65			
		171			1/2	0.49183(2)			Op	OO67			
						+0.4925(4)			N	GJW64			
			66.7	$8.7(10)\times10^{-10}$	3/2	0.3476(24)			Mö	HKS66			
									Op	OO67			
						0.351(3)			Mö	GK66			
									Op	OO67			
			75.9	$1.7(3)\times10^{-9}$ s	5/2	1.011(5)			Mö	HKK67			
									Op	OO67			
									R	Sh67			
		172	78.7	$1.57(4)\times10^{-9}$ s	2	0.666(16)			Mö	MQP66			
									Mö	HWK65			
									Op	OO67			
									R	Sh67			
						0.558(28)		$H_{ext} = 3.400\times10^4$	CeTD	TS66			
						+0.608(68)		$H_{eff} = 2.58\times3.590\times10^4$	DPAC	GEB64			
			1174	$8.3(3)\times10^{-9}$ s	3	+0.642(42)		$H_{eff} = 2.58\times2.800\times10^4$	DPAC	GBE65			
		173			5/2	0.67748(3)			Op	OO67	+3.1(2)	O	RM64
						-0.6795(10)			N	GJW64			
									O	RM64			
									R	Sh67			
		174	76.5	$1.79(5)\times10^{-9}$ s	2	0.674(14)			Mö	MHP66			
									Mö	HWK65			
									Op	OO67			
									R	Sh67			
						0.494(26)		$H_{ext} = 3.400\times10^4$	CeTD	TS66			
		175		101 h	7/2	0.15(4)			Nos	GJS57			
		176	82.1	$2.0(2)\times10^{-9}$ s	2	0.598(30)		$H_{ext} = 3.400\times10^4$	CeTD	TS66			
						0.74(4)			Mö	ELW67a			
71	Lu	175			7/2	+2.230(11)			N	RR62	+5.68(6)	A	Ri62a
											+4.0(5) or +5.6(6)	O	BBG61
			114	$1.00(5)\times10^{-10}$ s	9/2	+1.81(20)	$\omega\tau = 0.0145(14)$	$H_{ext} = 5.225(50)\times10^4$	IPAC	KMS65			
						+1.50(50)	$\omega\tau = -0.003(1)$	$H_{ext} = 1.300\times10^4$	IPAC	MR60			
									R	MSS68			
										Sh67			
			251	4.2×10^{-11} s	11/2	+1.94(63)		$H_{hf} = -3.38(42)\times10^5$	IPAC	DHN66			
									R	MSS68			
										Sh67			
		176		3×10^{10} y	7	+3.14(3)			O	BBG61	8.1(2)	A	SS62
						3.18(3)			A	SS62	+5.6(7) or +7.9(9)	O	BBG61
			290	3.68(1) h	1	0.318(3)			A	WAP65	-2.39(4)	A	WAP65

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
71	Lu	177		6.7 d	7/2	+2.236(10)			A	PS62a	+5.51(6)	A	PS62a
			970	155 d	23/2						+12.8(14)	Nos	BS66
												A	PS62a
72	Hf	177			7/2	+0.61(3)			O	Li65	~+3(1)	O	SJ56
			113	$5.2(2)\times10^{-10}$ s	9/2	+1.04(6)	$\omega\tau = 0.0249(10)$	$H_{ext} = 2.920\times10^4$	IPAC	MKL62			
							$\omega\tau = 0.0416(20)$	$H_{ext} = 5.310\times10^4$					
						+1.10(15)**				BHK62			
						+0.8(2)	$\omega\tau = -0.0091(14)$	$H_{ext} = 1.300\times10^4$	IPAC	MR60			
									R	MSS68			
										Sh67			
			250	1.00×10^{-10} s	11/2	+1.52(44)		$H_{hf} = -1.23\times10^5$	IPAC	Ca67			
									R	MSS68			
										Sh67			
		178	93.2	$1.47(3)\times10^{-9}$ s	2	+0.59(4)	$\omega\tau = 0.085(11)$	$H_{ext} = 2.520(30)\times10^4$	IPAC	KMO62			
							$\omega\tau = 0.1326(97)$	$H_{ext} = 4.570(50)\times10^4$	R	MSS68			
										Sh67			
						+0.600(70)	$\omega\tau = 0.0461(28)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
						+0.722(70)	$\omega\tau = 0.182(17)$	$H_{ext} = 4.955\times10^4$	IPAC	Bo62			
									R	MSS68			
										Sh67			
		179			9/2	-0.47(3)			O	Li65	~+3(1)	O	SJ56
		180	93.3	$1.50(2)\times10^{-9}$ s	2	+0.757(64)	$\omega\tau = 0.0290(23)$	$H_{ext} = 4.250\times10^4$	IPAC	Bo61a			
									R	MSS68			
										Sh67			
						+0.634(70)	$\omega\tau = 0.0492(25)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
									R	MSS68			
										Sh67			
			309	$7.1(9)\times10^{-11}$ s	4	+2.3(4)	$\omega\tau = 0.0159(29)$	$H_{ext} = 5.320\times10^4$	IPAC	Bo61a			
									R	MSS68			
										Sh67			
73	Ta	181			7/2	+2.35(1)			N	BB60	+3.9(4)	O	Li65
			482	$1.08(2)\times10^{-8}$ s	5/2	+3.34(4)		$H_{ext} = 2.115(20)\times10^4$	DPAC	BHS62	2.53(10)	DPAC	SCC65
						+3.23(5)		$H_{ext} = 3.000\times10^4$	DPAC	MBM63			
						3.23(5)			CDPAC	ABB64			
						3.23(8)		$H_{ext} = 2.910(30)\times10^4$	DPAC	BKM64			
						3.45(8)		$H_{ext} = 2.075(30)\times10^4$	DPAC	Hr62			
74	W	182	100	$1.37(1)\times10^{-9}$ s	2	0.532(18)	$\mu H = 1.659(14)\times10^{-18}$	$H_{hf} = 6.3(13)\times10^5$	Mö	PBA68			
						+0.403(36)		$H_{ext} = 2.02(2)\times10^4$	Ce	GV62			
									R	MSS68			
										Sh67			
						+0.478(40)		$H_{ext} = 3.430(30)\times10^4$	CeTD	SKS64			
						0.498(48)		$H_{ext} = 4.16\times10^4$	Ce	EKS65			
						0.466(54)			Mö	CGB65			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
74	W	182	100	$1.37(1)\times10^{-9}$ s	2	+0.672(88)		$H_{ext} = 2.930(30)\times10^{4}$	DPAC	KRB63			
			329	6.4×10^{-11} s	4	+0.84(28)	$\omega\tau = 0.035(9)$	$H_{hf} = 4.60(45)\times10^{5}$	IPAC	GGH67			
									R	BGG67a			
										MSS68			
										Sh67			
						0.66(28)	$\omega\tau = +0.032(13)$	$H_{hf} = -4.3(10)\times10^{5}$	Ce	BH67			
									R	MSS68			
										Sh67			
		183			1/2	+0.117206(2)			N	KH61			
			46.5	$1.84(5)\times10^{-10}$ s	3/2	-0.03(3)			Mö	AKP67			
									Mö	PBA68			
			99.1	$7.1(4)\times10^{-10}$ s	5/2	0.930(43)			Mö	AKP67			
									Mö	PBA68			
						0.55(30)	$\omega\tau = 0.0174(9)$	$H_{ext} = 1.660\times10^{4}$	IPAC	GGH67			
		184	111	$1.26(2)\times10^{-9}$ s	2	0.592(18)	$\mu H = 1.892(31)\times10^{-18}$	$H_{hf} = 6.3(13)\times10^{5}$	Mö	PBA68			
						+0.407(32)			Ce	GV62			
									R	MSS68			
										Sh67			
						+0.566(34)			DPAC	KGH63			
						0.560(36)		$H_{ext} = 4.16\times10^{4}$	Ce	EKS65			
									R	MSS68			
										Sh67			
						0.550(50)			CeTD	SKS65			
									Mö	CGB64			
						0.564(80)			Mö	PBA68			
			364	5.4×10^{-11} s	4	+1.12(34)	$\omega\tau = 0.04(1)$	$H_{hf} = 4.60(45)\times10^{5}$	IPAC	GGH67			
									R	BGG67a			
										MSS68			
										Sh67			
		186	123	$1.01(4)\times10^{-9}$ s	2	0.632(18)	$\mu H = 1.955(36)\times10^{-18}$	$H_{hf} = 6.3(13)\times10^{5}$	Mö	PBA68			
										PBA67			
						+0.584(54)		$H_{ext} = 2.03(2)\times10^{4}$	Ce	GV62			
						0.77(7)			Mö	CGB65			
									R	MSS68			
										Sh67			
						+0.700(70)	$\omega\tau = 0.0389(23)$	$H_{ext} = 1.660\times10^{4}$	IPAC	GGH67a			
						+0.736(84)**			Ce	SK63			
						0.56(12)**			R	EKS65			
			399	4.9×10^{-11} s	4	+0.46(10)	$\omega\tau = 0.0125(8)$	$H_{hf} = 4.60(45)\times10^{5}$	IPAC	GGH67			
									R	BGG67a			
										MSS68			
										Sh67			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
75	Re	183	496	$7.89(16)\times10^{-9}$ s	9/2	5.31(32)		$H_{ext} = 2.960(30)\times10^4$	DPAC	GSA68			
		185			5/2	+3.1713(3)			N	Li65	2.30(90)	O	KSW66
											+2.8	O	Li65
		186		90 h	1	+1.731(3)			Ad	AM65a	≈ 0.4	O	KSW66
									A	SWM65			
		187		4×10^{10} y	5/2	+3.2038(3)			N	Li65	2.20(90)	O	KSW66
											+2.6	O	Li65
			206	$5.63(8)\times10^{-7}$ s	9/2	+5.02(6)		$H_{ext} = 3150(30)$	DPAC	WWK63			
						+4.71(14)		$H_{ext} = 1720(18)$	DPAC	KKW63			
								$H_{ext} = 5020(51)$					
		188		16.7 h	1	+1.780(5)			Ad	AM65a	≈ 0.4	O	KSW66
									A	SWM65			
76	Os	186	137	$8.45(20)\times10^{-10}$ s	2	0.64(3)			Mö	CGB65			
						+0.544(38)	$\omega\tau = 0.0250(14)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
									R	MSS68			
										Sh67			
						+0.632(56)	$\omega\tau = 0.098(8)$	$H_{ext} = 5.350(15)\times10^4$	IPAC	Bo61			
		187			1/2	+0.06431(3)			N	KS67			
						+0.0656(6)			O	Mu62			
		188	155	$7.1(2)\times10^{-10}$ s	2	+0.41(2)	$\omega\tau = 0.020(1)$	$H_{ext} = 1.98(2)\times10^4$	Ce	GKV63			
									R	MSS68			
										Sh67			
						+0.560(42)	$\omega\tau = 0.0219(12)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
						0.620(54)			Mö	CGB65			
			633	$5.6(6)\times10^{-12}$ s	2	+0.85(16)	R = 0.0336(35)	$H_{hf} = 1.145(25)\times10^6$	IPAC	MMC67			
									R	MSS68			
										Sh67			
						+1.15(28)	R = 0.0470(100)	$H_{hf} = 1.4\times10^6$	IPAC	KDD67			
									R	MSS68			
										Sh67			
		189			3/2	+0.65585(8)			N	Li65	+0.8(2)	O	MK57
		190	187	$2.4(3)\times10^{-10}$ s	2	+1.10(17)	$\omega\tau = 0.0148(13)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
									R	MSS68			
										Sh67			
		192	206	2.1×10^{-10} s	2	+1.06(14)	$\omega\tau = 0.0124(11)$	$H_{ext} = 1.660\times10^4$	IPAC	GGH67a			
									R	MSS68			
										Sh67			
						0.21	$\omega\tau = 0.235(34)$	$H_{hf} = 1.430\times10^6$	IPAC	KBD65			
									R	MSS68			
										Sh67			
77	Ir	191			3/2	+0.14589(3)*			N	NB67	+1.5(1)	Mö	WKK67
						+0.16(3)			O	Li65		O	Li65

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
77	Ir	191	82.3	$3.8(4)\times10^{-9}$ s	1/2	+0.542(5)			Mö	WKK68			
									N	NB67			
			171	4.9(1) s	11/2	6.3(15)	$\mu H = 4.3(3)\times10^{-17}$	$H_{hf} = 1.35(30)\times10^{6}$	Nos	CCC64			
		192		74.2 d	4	1.35(8)	$\mu H = 1.05(5)\times10^{-17}$	$H_{eff} = 1.500(30)\times10^{6}$	Nos	RSS67			
						$1.8\binom{6}{5}$	$\mu H = 1.20\binom{20}{12}\times10^{-17}$	$H_{hf} = 1.35(30)\times10^{6}$	Nos, R	KKN63			
		193			3/2	+0.15887(9)*			N	NB67	+1.5(1)	O	Li65
						+0.17(3)			O	Li65			
			73.0	$6.2(2)\times10^{-9}$ s	1/2	+0.4700(10)			Mö	WKK68			
									N	NB67			
		194		17.4 h	1	0.40(4)	$\mu H = 0.31(3)\times10^{-17}$	$H_{eff} = 1.500(30)\times10^{6}$	Nos	RSS67			
78	Pt	192	316	$3.5(3)\times10^{-11}$ s	2	0.515(47)	$\omega\tau = 0.079(5)$	$H_{hf} = -1.235(25)\times10^{6}$	IPAC, R	BBD68			
									R	MSS68			
										Sh67			
		194	328	$3.5(5)\times10^{-11}$ s	2	0.638(70)	$\omega\tau = 0.0960(32)$	$H_{hf} = -1.235(25)\times10^{6}$	IPAC, R	BBD68			
						$0.79\binom{36}{24}$	$\omega\tau = 0.00392$	$H_{ext} = 4.160\times10^{4}$	Ce	SKR65			
									R	MSS68			
										Sh67			
			622	$6.2(14)\times10^{-11}$ s	2	0.262(60)	$\omega\tau = 0.078(13)$	$H_{hf} = 1.42(11)\times10^{6}$	IPAC	KBD65			
						+0.30(6)			IPAC	BG65			
						+0.30(10)	$\omega\tau = 0.083(20)$	$H_{hf} = 1.320(80)\times10^{6}$	IPAC	ABB66			
		195			1/2	+0.60591(6)			N	Li65			
			98.8	$1.7(2)\times10^{-10}$ s	3/2	-0.62(6)			Mö	AKP67a			
						-0.60(15)			Mö	BGB67			
						-0.65(15)			Mö	ADF66			
		196	356	3.6×10^{-11} s	2	+0.535(66)	$\omega\tau = 0.0850(52)$	$H_{hf} = -1.235(25)\times10^{6}$	IPAC	BBD68			
									R	MSS68			
										Sh67			
						+0.540(71)		$H_{hf} = 1.250(30)\times10^{6}$	IPAC	Ca67			
									R	MSS68			
										Sh67			
						+0.42(10)		$H_{hf} = 7.0(10)\times10^{5}$	IPAC	BG65			
79	Au	190		39 m	1	0.066			A	CEN66			
						0.063			A	LLS63			
		191		3.2 h	3/2	0.137(7)			A	ES64			
		192		4.1 h	1	0.008			A	ES63a			
		193		16 h	3/2	0.139(7)			A	ES64			
		194		39.5 h	1	0.074(4)			A	CEN65			
						0.076			A	HCH57			
		195		183 d	3/2	0.147(7)			A	CEN65			
						0.13(4)			Nos	CST65			
		196		6.18 d	2	+0.59(3) or -0.63(3)			A	CEN65			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
79	Au	197			3/2	+0.145879(8)*			N	NB67	0.594(10)	A	BLL67
						+0.14482(1)			Ad	Pe63			CG66a
						0.144835(70)			Ad	DP67	+0.56(10)	O	Li65
						+0.1453(4)			End	WL60			
			77.3	$1.892(14)\times10^{-9}$ s	1/2	0.420(4)***	$\mu H = 3.333(10)\times10^{-18}$	$H_{hf} = 1.568(15)\times10^{6}$	Mö	THP68			
						+0.37(4)			Mö	GKK64			
		198		2.698 d	2	+0.5897(4)			A	VEN67			
		199		3.15 d	3/2	+0.2698(7)			A	VEN67			
80	Hg	193		≈ 6 h	3/2	-0.607(20)*			O	KDA64	-2.0(10)	O	DAK66
									Op	Ca61			
			141	11(1) h	13/2	-1.0628(54)			Ol	Sm64	1.37(27)	O	TS64
									O	TS64		A	ML60
		195		9.5 h	1/2	+0.537957(33)			Ol	Sm64			
									O	TS64			
						0.537958(33)			Op	WS64			
									Op	Ca61			
			176	40.0(5) h	13/2	-1.04894(13)			Ol	Sm64	1.41(55)	O	TS64
									O	TS64		A	M160
											1.5(1)	O	KD63
		197		65 h	1/2	+0.523947(8)			Op	Wa62a			
			299	24(1) h	13/2	-1.0314(8)			Mc	Hi61	+1.61(13)	Mc	Hi61
		198	412	$2.2(1)\times10^{-11}$ s	2	+1.10(22)		$H_{ext} = 5.715\times10^{4}$	IPAC	KAB64			
						+0.76(22)	$\omega\tau = 0.081(16)$	$H_{hf} = -1.42\times10^{6}$	IPAC	KBD64			
							$\omega\tau = 0.020(5)$		Ce	KGM68			
		199			1/2	+0.502597(6)			Op	Ca61			
			158	$2.37(7)\times10^{-9}$ s	5/2	+1.01(8)		$H_{ext} = 2.600(8)\times10^{4}$	IPAC	GBW61			
									R	MSS68			
										Sh67			
		200	368	$4.7(14)\times10^{-11}$ s	2	+1.46(54)	$\omega\tau = 0.056(5)$		Ce	KGM68			
									IPAC	KAB64			
		201			3/2	-0.556584(9)			Op	Ca61	+0.50(4)	A	ML60
											+0.50(5)	O	BC57
											0.45	O	Mu65
		202	439	$2.4(5)\times10^{-11}$ s	2	+1.54(46)	$\omega\tau = 0.031(3)$		Ce	KGM68			
									IPAC	KAB64			
		203		46.9 d	5/2	0.840(20)			O	RS64a	0.5(8)	O	RS64a
									Op	Ca61		A	ML60
		204	430	$9.2(5)\times10^{-11}$ s	2	+0.58(30)	$\omega\tau = 0.044(5)$		Ce	KGM68			
									IPAC	KAB64			
81	Tl	197		2.8 h	1/2	1.55(2)*			O	DKG66			
		198		5.3 h	2	0.002			A	LJA58			
		199		7.4 h	1/2	1.58(2)			O	HS61			
		200		26.1 h	2	≤ 0.15			O	HS61			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$ (radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
81	Tl	201		73 h	1/2	1.59(2)			O	HS61			
		202		12.0 d	2	$\leq$ 0.15			O	HS61			
		203			1/2	+1.61131(8)			N	Li65			
			279	$2.81(4)\times10^{-10}$ s	3/2	+0.16(5)	$\omega\tau$ = +0.0107(27)	$H_{ext} = 5.060\times10^4$	IPAC	KMG65			
						+0.35(26)		$H_{ext} = 1.350\times10^4$	NRF	De62			
								$H_{ext} = 1.500\times10^4$					
		204		3.8 y	2	0.0893*			A	WMH58			
		205			1/2	+1.62716(8)			N	Li65			
						1.6265(9)*			Mb	BGL64			
82	Pb	204	1274	$2.80(12)\times10^{-7}$ s	4	+0.226(8)		$H_{ext} = 3.181\times10^4$	DPAC	SBL63			
						+0.220(12)		$H_{ext} = 3.520\times10^4$	DPAC	LDF68			
		207			1/2	+0.58940(8)			N	Li65			
			570	$1.29(3)\times10^{-10}$ s	5/2	+0.65(5)			DPAC	JKS66a			
						+0.65(10)	$\omega\tau$ = 0.0129(9)	$H_{ext} = 5.520\times10^4$	IPAC	KAB66			
						+0.72(12)	$\omega\tau$ = +0.0130(13)	$H_{ext} = 5.060\times10^4$	IPAC	GJK64			
									R	MSS68			
										Sh67			
		208	3198	$2.97(17)\times10^{-10}$ s	5	-0.07(14) if $g_{2615}=0$	$\omega\tau$ = -0.0014(27)	$H_{ext} = 5.150\times10^4$	IPAC	JGS65			
83	Bi	203		11.8 h	9/2	+4.59(5)			A	LJ59	-0.64(5)	A	LJ59
		204		11.2 h	6	+4.25(5)			A	LJ59	-0.41(5)	A	LJ59
		205		15.3 d	9/2	(+5.5)			A	LJ59			
		206		6.24 d	6	+4.56(5)			A	LJ59	-0.19(5)	A	LJ59
		209		$> 2\times10^{18}$ y	9/2	+4.0794(2)			N	Li65	-0.34	A	TS60
									N	FS59	-0.4	O	Li65
		210		5.01 d	1	0.0442(1)			A	ALW62	0.13(1)	A	ALW62
		211	405	$3.18(14)\times10^{-10}$ s	7/2	4.41(65)	R = -1.39(19)	$H_{ext} = 1.830\times10^4$	IPAC	ABB65b			
									R	MSS68			
										Sh67			
84	Po	205		1.8 h	5/2						0.17	A	OAL61
		207		5.7 h	5/2						0.28	A	OAL61
89	Ac	227		21.6 y	3/2	+1.1(1)			O	Li65	+1.7(2)	O	Li65
													FTM58
90	Th	229		7340 y	5/2	+0.34(7)			O	FTE62	-3.0	A	MNW61
						0.41(10)			O	Eg64	~ 4.6	O	Eg64
91	Pa	231		3.25×10^4 y	3/2	1.98(2)			End	ASJ61	2.7	E	Li65
		233		27.0 d	3/2	+3.4(8)			A	MNW61	3.8	E	Li65
											-3.0	A	MNW61
92	U	233		1.62×10^5 y	5/2	0.54			E	DHW57	3.4	E	DHW57
		235		7.1×10^8 y	7/2	0.35			E	DHW57	4.0	E	DHW57
93	Np	237		2.14×10^6 y	5/2	6.0(25)			E	Li65			

Z	El	A	Level energy (keV)	Level halflife	Spin	Dipole moment (nuclear magnetons)	$\omega\tau$ (radians), μH(ergs), $a\tau$(radians), R, P	Field (gauss) H_{ext}, H_{eff}, or H_{hf}	Method	Reference	Quadrupole moment (barns)	Method	Reference
93	Np	237	59.5	$6.3(5)\times10^{-8}$ s	5/2	1.90(15)		$H_{eff} = 1.68\times1.25\times10^4$	DPAC	GP67a			
						+2.0(5)**				Li65			
						3.2(13)			Mö	DKR68			
									E	Li65			
						3.2(13)			Mö	SP66			
									E	Li65			
		239	74.7	$1.40(6)\times10^{-9}$ s	5/2	1.98(24)	$\omega\tau = -0.238(17)$	$H_{eff} = 1.68\times1.85\times10^4$	IPAC	GP67a			
94	Pu	239		2.44×10^4 y	1/2	+0.200(4)*			Ad	FMN65	+4.9	O	Li65
						0.207(33)*			O, R	Be63			
						+0.19(5)*			O	Ko65a			
		241		13.2 y	5/2	-0.69(2)			O	CFG63	2.76	A	MW61
									Ad	FMN65	+5.6(20)	O	Ch64
									R	Sh67			
						0.73(12)*			O, R	Be63			
95	Am	241		458 y	5/2	+1.58(3)*			Ad	AM66	+4.9	O	MFT56
						+1.4*			O	MFT56			
		242		16.0 h	1	+0.3808(15)*			Ad	AM66	2.76	A	MW61
						0.373(7)			A	MW61		O	MFT56
									Ad	AM66			
									R	Sh67			
		243		7.95×10^3 y	5/2	+1.58(4)*			O	MFT56	+4.9	O	MFT56
									Ad	AM66			
						+1.4*			O	MFT56			
99	Es	253		20.47 d	7/2	4.9			Nos	NRS62			

* This value is reported as published by the original authors. It has not been corrected in the manner described in the introduction either because of insufficient data, because the authors made their own correction analysis, or because large uncertain corrections (such as Knight shift) are applicable.

** This value has not been corrected for a possible half-life discrepancy, because the value originally used for the half-life was not available for comparison.

*** This value is subject to a hyperfine-anomaly correction.

Part 3. Table of Nuclear Moment Ratios

Z	El	M(A, I, E)/M(A', I', E') M = μ, Q, or g E = level energy in keV	Ratio Value	Method	Reference
1	H	μ(2, 1)/μ(1, 1/2)	0.3070115(24)	Mb	BBH52
3	Li	g(7, 3/2)/g(6, 1)	2.6409107(50)	N	AWB51
			2.640910(10)	N	WP51
			2.64094(5)	Mb	KM49
		Q(7, 3/2)/Q(6, 1)	+56.8(32)	Mb	WGK64
			53(3)	N	Cr53
			43(4)	N	SP51
5	B	g(11, 3/2)/g(10, 3)	2.986291(20)	N	BP58
		Q(11, 3/2)/Q(10, 3)	0.4798(5)	Q	De52
7	N	g(15, 1/2)/g(14, 1)	1.40275480(20)	N	Ba62
			1.4027566(10)	N	BHS61
			1.4027576(15)	N	APB59
17	Cl	g(36, 2)/g(35, 3/2)	1.20(7)	M	AF55
		μ(37, 3/2)/μ(35, 3/2)	0.832445(4)	N	TW53
			0.83236(7)	N	PY51
			0.83243(7)	N	WP51
19	K	g(40, 4)/g(39, 3/2)	1.24346(24)	A	EBF52
		μ(41, 3/2)/μ(39, 3/2)	0.54891(6)	A	OLK50
			0.54886(8)	N	BOS54
		Q(41, 3/2)/Q(39, 3/2)	+1.2173(2)	Mb	BH67a
			1.220(2)	Mb	LFC53
			1.22	N	KH57a
22	Tl	Q(49, 7/2)/Q(47, 5/2)	0.819(1)	A	CP65
23	V	μ(51, 7/2)/μ(49, 7/2)	1.153(13)	E	WWG57
		μ(51, 7/2)/μ(50, 6)	1.5389045(6)	N	HR64
			1.538(3)	E	KSC53
25	Mn	μ(55, 5/2)/μ(52, 6)	1.16(6)	E	Je61
		μ(55, 5/2)/μ(53, 7/2)	0.6873(9)	E	DJJ56a
		μ(55, 5/2)/μ(54, 3)	-1.050(20)	E	Je61
		g(56, 3)/g(52, 6)	2.13(21)	Nos	BD60
26	Fe	μ(57, 3/2, 14.4)/μ(57, 1/2, 0)	1.7135(15)	Mö	PJM65
			-1.715(2)	Mö	Ko65b
			-1.715(4)	Mö	PHH62
27	Co	μ(59, 7/2)/μ(56, 4)	1.205(2)	E	JDJ56
			1.208(5)	E	BBL56
		μ(59, 7/2)/μ(57, 7/2)	1.00(1)	E	BBL56
		μ(59, 7/2)/μ(58, 2)	1.1450(31)	E	DJ57
		μ(60, 5)/μ(58, 2)	0.9394(18)	E	DJ57
		μ(60, 5)/μ(59, 7/2)	0.8191(16)	E	DJJ56
28	Nl	μ(61, 5/2, 67.4)/μ(61, 3/2, 0)	-0.559(12)	Mö	LCS68
			-0.577(25)	Mö	EQ68
29	Cu	μ(65, 3/2)/μ(63, 3/2)	1.0711(2)	N	Po48
			1.071	N	YWC67
		Q(65, 3/2)/Q(63, 3/2)	0.925(3)	N	Be51
30	Zn	Q(67, 5/2)/Q(65, 5/2)	-6.554(13)	Od	BMN64
31	Ga	μ(71, 3/2)/μ(69, 3/2)	1.2706241(21)	N	RP55
					Po48a
			1.2700(8)	O	Ja56
33	As	μ(76, 2)/μ(75, 3/2)	-0.6293(4)	E	PC58
35	Br	Q(81, 3/2)/Q(79, 3/2)	0.8352(4)	Mb	FCL53
			0.57	N	Po47
36	Kr	Q(83, 7/2, 9.3)/Q(83, 9/2, 0)	1.70(2)	Mö	RS66
		μ(85, 9/2)/μ(83, 9/2)	1.035(2)	O	RM55
		Q(85, 9/2)/Q(83, 9/2)	+1.66(10)	O	RM55
37	Rb	g(87, 3/2)/g(85, 5/2)	3.388966(47)	N	AWB51a
		Q(87, 3/2)/Q(85, 5/2)	+0.483807(14)	Mb	BH67a

Z	El	M(A, I, E)/M(A', I', E') M = μ, Q, or g E = level energy in keV	Ratio Value	Method	Reference
37	Rb	Q(87, 3/2)/Q(85, 5/2)	0.48382(12)	Mb	TB54
42	Mo	μ(97, 5/2)/μ(95, 5/2)	1.02100(10)	N	PY51
			1.03	E	Ky62
		Q(97, 5/2)/Q(95, 5/2)	9.2	N	Ka64
44	Ru	g(99, 3/2, 90)/g(99, 5/2, 0)	0.759(16)	Mö	Ki66
		|Q(99, 3/2, 90)/Q(99, 5/2, 0)|	≥3	Mö	Ki66
		μ(101, 5/2)/μ(99, 5/2)	1.09(3)	E	GO52
47	Ag	μ(109, 1/2)/μ(107, 1/2)	1.14962(1)	N	SJ54
48	Cd	μ(109, 5/2)/μ(107, 5/2)	1.345900(15)	Ol	TM63
		Q(109, 5/2)/Q(107, 5/2)	1.01142(4)	Ol	TM63
			1.007(20)	Od	BMN63
		μ(113, 1/2)/μ(111, 1/2)	1.0460840(2)	Op	LL66
			1.046083(3)	N	KW59
		Q(113, 11/2)/Q(109, 5/2)	-1.02371(4)	Od	BMN64a
		Q(115, 11/2)/Q(109, 5/2)	-0.79(3)	Od	MNP64
49	In	μ(115, 9/2)/μ(113, 9/2)	1.0021437(12)	N	RP57
50	Sn	g(119, 3/2, 23.8)/g(119, 1/2, 0)	0.217	Mö	KIZ66
			0.25(2)	Mö	HMP60
51	Sb	g(121, 7/2, 37.2)/g(121, 5/2, 0)	0.498(5)	Mö	RK67
		Q(121, 7/2, 37.2)/Q(121, 5/2, 0)	1.38(2)	Mö	RKS66
		μ(122, 2)/μ(121, 5/2)	-0.5678(4)	E	Pi58
		μ(123, 7/2)/μ(121, 5/2)	0.541533(3)	N	EF58
52	Te	μ(125, 1/2)/μ(123, 1/2)	1.208(60)	O	MA49
53	I	Q(127, 7/2, 57.6)/Q(127, 5/2, 0)	0.896(2)	Mö	PR64
		μ(129, 5/2, 27.8)/μ(129, 7/2, 0)	+1.07(7)	Mö	HD64
		Q(129, 7/2)/Q(127, 5/2)	0.701213(15)	Q	LZ53
		Q(129, 5/2, 27.8)/Q(129, 7/2, 0)	+1.232(4)	Mö	PSH65
			+1.237(2)	Mö	PSH65
54	Xe	g(129, 3/2, 39.6)/g(129, 1/2, 0)	0.83(7) or -0.29(13)	Mö	CPS68
		Q(129, 3/2, 39.6)/Q(131, 3/2, 0)	3.45(9)	Mö	Pe64
55	Cs	g(133, 5/2, 81.0)/g(133, 7/2, 0)	1.871(16)	Mö	CPS68
		g(134, 4)/g(133, 7/2)	1.01447(29)	A	SJE57
		μ(135, 7/2)/μ(133, 7/2)	1.05820(8)	A	SJE57
		μ(137, 7/2)/μ(133, 7/2)	1.1004(2)	A	SJE57
56	Ba	μ(137, 3/2)/μ(135, 3/2)	1.1187(3)	A	KSG59
			1.1174(10)	A	Ha41
			+1.10(3)	O	JT63
		Q(137, 3/2)/Q(135, 3/2)	1.543(3)	Q	WM62a
			+1.6(1)	O	JT63
57	La	g(139, 7/2)/g(138, 5)	1.07058(3)	N	SJ55 SW51
		Q(139, 7/2)/Q(138, 5)	~0.29(4)	N	SJ55 SW51
60	Nd	μ(145, 7/2)/μ(143, 7/2)	+0.621570(16)	End	Ha62
			0.62154(4)	E	Er66
			0.62156(12)		
			+0.62166(14)	A	Sp63
		Q(145, 7/2)/Q(143, 7/2)	+0.528(4)	A	Sp63
			+0.510(5)	End	Ha62
		μ(147, 5/2)/μ(143, 7/2)	0.5423(5)	E	Ha62 KAJ57
62	Sm	μ(149, 7/2)/μ(147, 7/2)	0.8244	A	Wo66
			0.818(5)	E	BS52
		Q(149, 7/2)/Q(147, 7/2)	-0.2890(8)	A	Wo66
		μ(149, 5/2, 22.5)/μ(149, 7/2, 0)	0.93(1)	Mö	ON67
			+0.89(5)	Mö	GB64

Z	El	M(A, I, E)/M(A', I', E') M = μ, Q, or g E = level energy in keV	Ratio Value	Method	Reference
63	Eu	g(151, 7/2, 21.6)/g(151, 5/2, 0)	+0.532(4)	Mö	Ki64
			+0.528(5)	Mö	BS63a
		Q(151, 7/2, 21.6)/Q(151, 5/2, 0)	+1.3(5)	Mö	NO63
		μ(152, 3)/μ(151, 5/2)	0.5574(60)	E	AKJ57
			0.565(6)	E	MPT57
		Q(152, 3)/Q(151, 5/2)	2.75(24)	A	Al63
		μ(153, 5/2)/μ(151, 5/2)	0.441491(82)	Ad	ESW65
			0.44185(51)	End	BW62
			0.4454(10)	O	KW57
			0.4417(12)	E	AKJ57
		Q(153, 5/2)/Q(152, 3)	0.926(77)	A	Al63
		g(153, 3/2, 103)/g(153, 5/2, 0)	2.22(8)	Mö	AMO64
		μ(154, 3)/μ(153, 5/2)	1.308(4)	E	AKJ57
64	Gd	g(155, 5/2, 86.5)/g(155, 3/2, 0)	1.36(4)	Mö	TB68
			-2.1(3)	Mö	DES66
		Q(155, 5/2, 86.5)/Q(155, 3/2, 0)	0.346(1)	Mö	TB68
			0.18(10)	Mö	BBB68
		Q(155, 3/2, 105)/Q(155, 3/2, 0)	1.0(2)	Mö	BBB68
		Q(156, 2, 89.0)/Q(155, 3/2, 0)	1.19(5)	Mö	TB68
			1.07(4)	Mö	SER67
		μ(157, 3/2)/μ(155, 3/2)	1.3342(80)	E	LS59
			1.328(9)	N	BG64a
			1.311(10)	E	HB60
			1.359(22)	E	MP57
			1.27(3)	O	KCP59
		Q(157, 3/2)/Q(155, 3/2)	1.28(10)	O	KCP59
		Q(158, 2, 79.5)/Q(155, 3/2, 0)	1.15(3)	Mö	SER67
		Q(160, 2, 75.3)/Q(155, 3/2, 0)	1.19(7)	Mö	SER67
65	Tb	g(159, 5/2, 58.0)/g(159, 3/2, 0)	0.48(3) or 0.69(3)	Mö	ABO66
66	Dy	g(160, 2, 86.8)/g(161, 5/2)	2.02(12)	Mö	ORS65a
		μ(161, 5/2, 25.6)/μ(161, 5/2, 0)	-1.21(2)	Mö	NW65
			1.22(3)	Mö	CQ68
			-1.30(3)	Mö	BBE61a
			-1.19(5)	Mö	ORS65
		Q(161, 5/2, 25.6)/Q(161, 5/2, 0)	0.98(3)	Mö	NW65
			1.00(3)	Mö	CQ68
			0.83(4)	Mö	BGF64
			0.95(10)	Mö	ORS65
		g(161, 3/2, 74.6)/g(161, 5/2, 0)	+1.42(2)	Mö	HHW68
			1.40(4)	Mö	CQ68
		Q(161, 3/2, 74.6)/Q(161, 5/2, 0)	0.55(4)	Mö	CQ68
			0.60(5)	Mö	HHW68
		μ(163, 5/2)/μ(161, 5/2)	-1.39(2)	E	Pa58
			1.40(2)	N	KSI66
		Q(163, 5/2)/Q(161, 5/2)	1.06(1)	N	KSI66
			+1.18(15)	E	Pa58
		g(164, 2, 73.4)/g(161, 5/2, 0)	-1.78(6)	Mö	Mü67
		Q(164, 2, 73.4)/Q(161, 5/2, 0)	-0.83(7)	Mö	Mü67
68	Er	g(166, 2, 80.6)/g(164, 2, 91.5)	0.907(12)	Mö	MQH67
		g(166, 2, 80.6)/g(167, 7/2, 0)	1.935(46)	Mö	DPH64
		g(168, 2, 79.8)/g(166, 2, 80.6)	1.042(8)	Mö	MQH66
		g(168, 4, 264)/g(166, 4, 265)	1.00	Ce	DHH68
		g(170, 4, 261)/g(166, 4, 265)	0.92	Ce	DHH68
69	Tm	μ(169, 3/2, 8.4)/μ(169, 1/2, 0)	-2.33(4)	Mö	KKE63
			-2.17(10)	Mö	Co64a
		g(169, 7/2, 139)/g(169, 5/2, 118)	1.28(12)	IPAC	KKW66

Z	El	M(A, I, E)/M(A', I', E') M = μ, Q, or g E = level energy in keV	Ratio Value	Method	Reference
70	Yb	g(171, 3/2, 66.7)/g(171, 1/2, 0)	0.2355(15)	Mö	HKS66
		g(171, 5/2, 75.9)/g(171, 1/2, 0)	0.411(2)	Mö	HKK67
		g(172, 2, 78.7)/g(170, 2, 84.3)	0.991(17)	Mö	MQP66
		Q(172, 2, 78.7)/Q(170, 2, 84.3)	1.01(2)	Mö	ELW67
		μ(173, 5/2)/μ(171, 1/2)	-1.3797(15)	O	RM64
			-1.381(2)	O	KN55
			1.378(3)	E	AWC65
			1.3749(50)	E	Lo60
			1.362	E	LR62
		g(174, 2, 76.5)/g(170, 2, 84.3)	1.006(15)	Mö	MHP66
		Q(174, 2, 76.5)/Q(170, 2, 84.3)	1.04(2)	Mö	ELW67
		Q(176, 2, 82.1)/Q(170, 2, 84.3)	1.045(20)	Mö	ELW67
71	Lu	μ(176, 7)/μ(175, 7/2)	1.3937(97)	O	St58
			1.406(10)	O	BBG61
		Q(176, 7)/Q(175, 7/2)	1.41(2)	O	BBG61
			1.45(8)	O	St58
		Q(177, 23/2, 970)/Q(177, 7/2, 0)	2.33(25)	Nos	BS66
72	He	μ(179, 9/2)/μ(177, 7/2)	-0.7837(49)	O	SJ56
		Q(179, 9/2)/Q(177, 7/2)	1.01(2)	O	SJ56
		Q(180, 2, 93.3)/Q(176, 2, 88.4)	0.91(2)	Mö	GSS68
					GKL66
		Q(180, 2, 93.3)/Q(178, 2, 93.2)	0.97(2)	Mö	GSS68
					GKL66
74	W	g(183, 3/2, 46.5)/g(182, 2, 100)	-0.07(7)	Mö	AKP67
		Q(183, 3/2, 46.5)/Q(182, 2, 100)	+0.86(14)	Mö	STS66
		g(183, 5/2, 99.1)/g(182, 2, 100)	1.40(4)	Mö	AKP67
		Q(183, 5/2, 99.1)/Q(182, 2, 100)	+0.94(4)	Mö	AKP67
		μ(184, 2, 111)/μ(182, 2, 100)	1.11(2)	Mö	PBA68
			1.06(15)	Mö	CGB64
		Q(184, 2, 111)/Q(182, 2, 100)	0.936(15)	Mö	PBA68
			1.00(12)	Mö	CG65
		μ(186, 2, 123)/μ(182, 2, 100)	1.19(2)	Mö	PBA68
					PBA67
		Q(186, 2, 123)/Q(182, 2, 100)	0.882(12)	Mö	PBA68
					PBA67
75	Re	μ(187, 5/2)/μ(185, 5/2)	1.0108(4)	O	SK37
76	Os	Q(190, 2, 187)/Q(188, 2, 155)	0.90(23/15)	Ce	Sp64
		Q(192, 2, 206)/Q(190, 2, 187)	0.97(28)	Ce	Sp64
77	Ir	g(191, 1/2, 82.3)/g(191, 3/2, 0)	+11.14(9)	Mö	WKK68
		g(193, 1/2, 73.0)/g(193, 3/2, 0)	+8.875(18)	Mö	WKK68
		Q(193, 3/2)/Q(191, 3/2)	0.97(3)	Mö	WKK67
80	Hg	μ(199, 1/2)/μ(195, 1/2)	0.934269(58)	Op	WS64
		μ(199, 1/2)/μ(197, 1/2)	0.959252(14)	N	Wa62a
		g(200, 2, 368)/g(198, 2, 412)	1.32(42)	Ce	KGM68
		μ(201, 3/2)/μ(199, 1/2)	-1.1074164(5)	Od	LB63
			1.1090(7)	O	RSE60
		g(202, 2, 439)/g(198, 2, 412)	1.40(32)	Ce	KGM68
		g(204, 2, 430)/g(198, 2, 412)	0.53(27)	Ce	KGM68
81	Tl	μ(205, 1/2)/μ(203, 1/2)	1.00983613(6)	N	BB63
			1.009838(1)	N	GM53
			1.00966(46)	O	SK37
92	U	μ(235, 7/2)/μ(233, 5/2)	0.651(2)	E	DHW57
			-0.63(4)	O	KC56
			-0.67	O	BGL57
		Q(235, 7/2)/Q(233, 5/2)	1.17(20)	E	DHW57
			+1.25(50)	O	KC56
			+1.4	O	BGL57

Z	El	M(A, I, E)/M(A', I', E') M = μ, Q, or g E = level energy in keV	Ratio Value	Method	Reference
93	Np	μ(237, 5/2, 59.5)/μ(237, 5/2, 0)	+0.537(5)	Mö	SP66
			+0.533(5)	Mö	DKR68
		Q(237, 5/2, 59.5)/Q(237, 5/2, 0)	+1.0(1)	Mö	SP66
		μ(239, 5/2, 74.7)/μ(237, 5/2, 59.5)	1.04(9)	IPAC	GP67a
94	Pu	μ(241, 5/2)/μ(239, 1/2)	3.53(2)	E	BLP54
			-3.43(5)	O	CFG63
95	Am	μ(243, 5/2)/μ(241, 5/2)	0.992	O	FT57
			+1.00(1)	O	MFT56
		Q(243, 5/2)/Q(241, 5/2)	+1.00(1)	O	MFT56

Part 4. Magnetic Shielding Constants

The shielding constants σ used in the calculation of the magnetic moments are listed below. The effective magnetic field at the nucleus is $(1 - \sigma)H$, where H is the applied field. The value of σ for Z = 1 was taken from Ra56, and those for Z = 2 through Z = 100 were taken from BS64, SB64, and BS63. These authors used Hartree-Fock electron density functions for their calculations for Z = 2 through Z = 36, and Thomas-Fermi-Dirac functions for Z = 37 through Z = 100. Calculations for the Z = 37 through Z = 100 region were made only for every fifth Z value (37, 40, 45, ···), and the constants for the other Z values were obtained by graphical interpolation. All these shielding constants apply to neutral atoms except for σ of Z = 1, which applies to mineral oil. For compounds, small variations due to chemical shifts would be expected, but normally the neutral atom values are adequate.

Z	σ	Z	σ	Z	σ
1	0.0000278	35	0.00316	68	0.00765
2	0.0000599	36	0.00329	69	0.00779
3	0.000101	37	0.00349	70	0.00793
4	0.000149	38	0.00362	71	0.00808
5	0.000202	39	0.00375	72	0.00823
6	0.000261	40	0.00386	73	0.00838
7	0.000326	41	0.00400	74	0.00854
8	0.000395	42	0.00412	75	0.00868
9	0.000471	43	0.00424	76	0.00885
10	0.000551	44	0.00437	77	0.00900
11	0.000631	45	0.00449	78	0.00915
12	0.000712	46	0.00463	79	0.00929
13	0.000794	47	0.00476	80	0.00944
14	0.000879	48	0.00488	81	0.00958
15	0.000967	49	0.00502	82	0.00975
16	0.00106	50	0.00514	83	0.00990
17	0.00115	51	0.00527	84	0.0101
18	0.00125	52	0.00540	85	0.0102
19	0.00135	53	0.00554	86	0.0104
20	0.00144	54	0.00568	87	0.0105
21	0.00152	55	0.00581	88	0.0107
22	0.00164	56	0.00595	89	0.0108
23	0.00174	57	0.00609	90	0.0110
24	0.00185	58	0.00623	91	0.0112
25	0.00196	59	0.00636	92	0.0113
26	0.00207	60	0.00650	93	0.0115
27	0.00219	61	0.00664	94	0.0117
28	0.00230	62	0.00678	95	0.0118
29	0.00242	63	0.00693	96	0.0120
30	0.00254	64	0.00707	97	0.0122
31	0.00266	65	0.00721	98	0.0124
32	0.00278	66	0.00736	99	0.0125
33	0.00291	67	0.00750	100	0.0127
34	0.00303				

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