Compilation of Direct Measurements of Spins of ground states and Long-lived isomers

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Motivation

- Previous published compilation: *Nuclear Spins and Moments* by G.H. Fuller J. Phys. Chem. Ref. Data 5, 835 (1976) 1976Fu06 (literature quoted up to 1974)

  Earlier compilation 1969Fu11: G.H. Fuller and V.W. Cohen: NDT 5, 433

- Direct measurement of spin is a strong argument for JPI assignments in ENSDF evaluations
- "2. Spin determinations by such techniques as atomic-beam resonance, paramagnetic resonance, electron-spin resonance, and optical spectroscopy give correct values."

- With radioactive ion-beam facilities, direct measurement of nuclear spin may, once again, become an active area of research.

Methods of Direct Measurement

- Hyperfine structure: optical spectroscopy or collinear laser spectroscopy.
- Nuclear magnetic resonance
- Atomic and molecular beams
- Electron scattering
- β−asymmetry from oriented/polarized nuclei
- Microwave spectroscopy
- Optical pumping
- Electron paramagnetic resonance
- Spin exchange

Literature and Procedure

Compilation done using the following sources and sequence for each nuclide:

- *Nuclear Spins and Moments*, H.G. Fuller:
  J. Phys. Chem. Ref. Data **5**, 835 (1976); NDT **5**, 433 (1969)
- *The Table of Isotopes, Seventh Edition,* C.M. Lederer et al. (1978)
- *ENSDF database.*
- *NSR database*
- *Current publications*

Nuclide	Level Energy (keV)	Spin	π	Method of Spin Measurement	NSR Keynumber	Citation
45Sc	0	7/2	-	Optical Spectroscopy	1934Ko01	Z Physik 92, 82
				Optical Spectroscopy	1934Sc01	Naturwiss. 22, 758
73Cu	0	3/2	-	Collinear/Insource Laser Spectroscopy	2009Fl03	Phys Rev Lett 103, 142501
73Se	0	9/2	+	Nuclear Magnetic Resonance/Nuclear Orientation	1988Be39	Phys Rev C38, 2329
161Yb	0	3/2	-	LASER Spectroscopy	1983Ne13	Hyper Int 15/16, 181
161Lu	0	1/2	+	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
207Rn	0	5/2	-	Hyperfine Structure	1987Bo29	Hyper Int 34, 25
221Ra	0	5/2	+	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
				Laser Spectroscopy	1988Ah02	Nucl Phys A483, 244

Compilation of Direct Nuclear Spin Measurements of Ground States and Long-Lived Isomers

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Preliminary Draft

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Abstract

We present a compilation of nuclear ground and isomeric state spins measured by direct methods. To our knowledge, this is the first such compilation since 1976, when the compilation *Nuclear Spins and Moments* (J. Chem. Phys. Ref. Data 5, 835) by G. H. Fuller was published. We anticipate that the area of direct spin measurement will continue to expand and we will update this table as it does so.

Introduction

The direct measurement of nuclear spins is cited as the primary argument for spin assignment to ground states and isomers by the National Nuclear Data Center: "Spin determinations by such techniques as atomic-beam resonance, paramagnetic resonance, electron-spin resonance, and optical spectroscopy give correct values." (Nuclear Data Sheets Vol. 110, No. 1, p. iv).

Our motivation in compiling this data was driven by the observation that there have been several direct measurements effected since the publication of *Nuclear Spins and Moments*, which tabulates nuclear spins measured up to 1974. Thus, to our knowledge, there has been no new compilation of measured nuclear spins for nearly 35 years.

Additionally, it is our strong belief that interest in the area of nuclear spins and their measurement will increase in the foreseeable future due to present technologies which allow the production of previously unattainable radioactive ion beams. For example, the paper entitled *Nuclear spins and magnetic moments of* ^{71,73,75}*Cu: Inversion of \pi* $p_{3/2}$ *and* $f_{5/2}$ *levels in* ^{75}*Cu* by K.T. Flanagan et al. was accepted for publication in Physical Review Letters on September 2, 2009. Furthermore, it is our intent to continuously update this table with new spin measurements as they are published.

In the table below, we present nuclides for which spins were directly measured. The level energies of long-lived isomers for which spins were measured are also given. Measured spin values are given, where parentheses and/or question marks are reproduced from the source from which the reference was taken, and indicate an uncertain value. The method of spin measurement is given, along with the citation and NSR keynumber of the reference from which the measurement was taken. References prior to 1976 are taken primarily from Fuller et al. The Table of Isotopes, Seventh Edition by Edgardo Browne et al, published in 1978 was also of great help. Finally more recent references were found using the Nuclear Science References (NSR) and the Evaluated Nuclear Structure Data File (ENSDF) databases maintained by the National Nuclear Data Center, Brookhaven National Laboratory. Parities are taken from the ENSDF database.

Table1: Directly measured nuclear spins compilation. The symbol ~ indicates that no hyperfine structure was observed by the reference.

Nuclide	Level (keV)	Spin	π	Method of Spin Measurement	NSR Keynumber	Citation
n	0	1/2	+	Slow-neutron scattering from ortho- and para- H2	1937Sc09	Phys Rev 52, 1250
				Reflection from magnetized iron	1950Ha67	Phys Rev 79, 888
				Neutron beam resonance	1954St90	Phys Rev 96, 983
1H	0	1/2	+	Specific heat	1927De01	Proc Roy Soc (London) 115A, 483
				Band Spectra	1929Mu01	Trans Faraday Soc 25, 634
				Band Spectra	1930He02	Z Physik 64, 151
2H	0	1	+	Optical Spectroscopy	1933Le02	Phys Rev 43, 837
				Optical Spectroscopy	1934Mu03	Phys Rev 46, 95
				Nuclear Magnetic Resonance	1950Le06	Phys Rev 78, 204
3H	0	1/2	+	Nuclear Magnetic Resonance	1947Bl31	Phys Rev 71, 373
				Nuclear Magnetic Resonance	1947Bl32	Phys Rev 71, 551
				Optical Spectroscopy	1949Di31	Phys Rev 76, 283
3He	0	1/2	+	Nuclear Magnetic Resonance	1949An11	Phys Rev 76, 1460
				Optical Spectroscopy	1949Do24	Phys Rev 76, 1529
				Atomic and Molecular Beams	1953We01	Phys Rev 90, 377A
4He	0	0	+	Optical Spectroscopy	1929Mu01	Trans Faraday Soc 25, 634
6He	0		+	Atomic and Molecular Beams	1958Co68	Phys Rev Lett 1, 208
6Li	0	1	+	Atomic and Molecular Beams	1937Ma06	Phys Rev 51, 19
				Nuclear Magnetic Resonance	1951Sc07	Phys Rev 81, 157
7Li	0	3/2	-	Optical Spectroscopy	1930Ha01	Phys Rev 35, 789
				Optical Spectroscopy	1932Gr03	Phys Rev 42, 44
				Atomic and Molecular Beams	1935Fo03	Phys Rev 48, 746
				Inelastic Electron-Scattering	1966Ra29	Phys Rev 144, 859
				Inelastic Electron-Scattering	1969Vi02	Nucl Phys A132, 410
8Li	0	(2)	+	β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1959Co68	Phys Rev Lett 3, 429
		(2)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1962Co08	Phys Rev 126, 1506
		(2)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1967Gu14	Yadern Fiz 6, 657
		(2)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1971Ha67	Phys Rev 79, 888
		2		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1971Co68	
		2		Radiative Detection of Optical Pumping	1973	Z Physik 261, 237

9Be	0	3/2	-	Nuclear Magnetic Resonance	1951Ha50	Phys Rev 83, 672
				Nuclear Magnetic Resonance	1951Sc17	Phys Rev 81, 886
				Nuclear Magnetic Resonance	1953Kn50	Phys Rev 92, 539A
				Nuclear Magnetic Resonance	1956Br48	J Chem Phys 24, 751
		(3/2)		Inelastic Electron-Scattering	1965Gr18	Phys Rev 139, B880
		(3/2)		Inelastic Electron-Scattering	1966Ra29	Phys Rev 144, 859
		(3/2)		Inelastic Electron-Scattering	1969Vi02	Nucl Phys A132, 410
		(3/2)		Inelastic Electron-Scattering	1969Be50	Phys Lett 30B, 412
10B	0	3	+	Microwave Spectroscopy	1950Go10	Phys Rev 78, 512
				Microwave Spectroscopy	1950We03	Phys Rev 78, 202
		(3)		Inelastic Electron-Scattering	1966Ra29	Phys Rev 144, 859
		(3)		Inelastic Electron-Scattering	1969Vi02	Nucl Phys A132, 410
11B	0	3/2	-	Microwave Spectroscopy	1950Go10	Phys Rev 78, 512
		(3/2)		Inelastic Electron-Scattering	1965Gr18	Phys Rev 139, B880
		(3/2)		Inelastic Electron-Scattering	1966Ra29	Phys Rev 144, 859
		(3/2)		Inelastic Electron-Scattering	1969Vi02	Nucl Phys A132, 410
11C	0	3/2	-	Atomic and Molecular Beams	1961Sn01	Bull Am Phys Soc 6, No 3, 224 A1
12B	0	(1)	+	β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1967Su03	Phys Lett 25B, 130
		(1)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1968Su05	J Phys Soc Japan 25, 1258
		(1)		Time Differential Perturbed Angular Distribution	1968Pf03	
		1		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1970Su04	Phys Lett 31B, 520
		(1)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1970Wi17	Phys Rev C2, 1219
		1		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1971Mi06	J Phys Soc Japan 30, 311
		(1)		β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1971Wi28	
12C	0	0	+	Optical Spectroscopy	1929Mu01	Trans Faraday Soc 25, 634
12N	0	1	+	β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1967Su09	Contrib.Intern.Conf.Nucl.Struct., Tokyo, 196
				β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1968Su05	J Phys Soc Japan 25, 1258
				β-asymmetry from polarized nuclei/Nuclear Magnetic Resonance	1971Mi06	J Phys Soc Japan 30, 311
13C	0	1/2	-	Optical Spectroscopy	1948Je21	Phys Rev 74, 355
				Nuclear Magnetic Resonance		Phys Rev 96, 543 (1954)

13N	0	1/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1961Sn01 1964Be24	Bull Am Phys Soc 6, No 3, 224 A1 Phys Rev 136, B27
14C	0	0	+	Optical Spectroscopy	1948Je21	Phys Rev 74, 355
14N	0	1	+	Optical Spectroscopy Microwave Spectroscopy Microwave Spectroscopy	1928Or01 1946Co10 1948To10, 1947To16	Z Physik 49, 315 Phys Rev 70, 979 Phys Rev 74, 1113, ibid 71, 644
15N	0	1/2	-	Optical Spectroscopy Optical Spectroscopy	1939Kr11 1940Wo10	Z Physik 111, 467 J Chem Phys 8, 351
15O	0	1/2	-	Atomic and Molecular Beams	1963Co17	Phys Rev 131, 700
16O	0	0	+	Optical Spectroscopy	1929Mu01	Trans Faraday Soc 25, 634
17O	0	5/2	+	Nuclear Magnetic Resonance Microwave Spectroscopy Microwave Spectroscopy	1951Ad08 1952Ge26 1952Mi26	Phys Rev 81, 1067 Phys Rev 85, 474 Phys Rev 86, 607A
18O	0	0	+	Microwave Spectroscopy Microwave Spectroscopy	1948To10 1951Mi20	Phys Rev 74, 1113 Phys Rev 82, 454
19F	0	1/2	+	Optical Spectroscopy Optical Spectroscopy Microwave Spectroscopy	1929Ga01 1933Ca04 1949Gi28	Astrophys J 69, 77 Z Physik 84, 393 Phys Rev 75, 1014
19Ne	0	1/2	+	Atomic and Molecular Beams	1963Co22	Phys Rev Lett 10, 347
20Ne	0	0	+	Optical Spectroscopy Atomic and Molecular Beams	1927Ha01~ 1960Lu06~	Naturwissenschaften 15, 163 Phys Rev 120, 153
20Na	0	2	+	β-asymmetry from polarized nuclei/Spin Exchange β-asymmetry from polarized nuclei/Spin Exchange Radiative Detection of Optical Pumping	1970Bo47 1971Ot04	Nucl Phys A246, 187 (1975)
21Ne	0	3/2	+	Optical Spectroscopy Atomic and Molecular Beams	1949Ko21 1956Hu70	Phys Rev 76, 1417 Phys Rev 104, 715
21Mg	0	5/2		Laser Spectroscopy/Nuclear Magnetic Resonance	2009Kr	Phys Lett B 678, 465
21Na	0	3/2	+	Atomic and Molecular Beams Spin Exchange Spin Exchange	1965Am01 1969Ko10 1971Ot04	Phys Rev 137, B1157 Z Physik 226, 297
22Ne	0	0	+	Optical Spectroscopy	1927Ha01~	Naturwissenschaften 15, 163
22Na	0	3	+	Atomic and Molecular Beams Atomic and Molecular Beams	1949Da01 1949Da14	Phys Rev 76, 1068 Phys Rev 76, 1076
23Na	0	3/2	+	Optical Spectroscopy Optical Spectroscopy Optical Spectroscopy Atomic and Molecular Beams	1933Gr03 1933Jo04 1934El02 1934Ra01	Phys Rev 44, 935 Phys Rev 43, 761 Phys Rev 46, 583 Phys Rev 46, 707
24Na	0	4	+	Atomic and Molecular Beams Atomic Beam Laser Spectroscopy	1953Be19 1978Hu12	Phil Mag 44, 33 Phys Rev C18, 2342
24Mg	0	0	+	Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
25Mg	0	5/2	+	Optical Spectroscopy	1949Cr18	Phys Rev 76, 1527

25Mg				Paramagnetic Resonance	1957We13	Phys Rev 107, 1535
26Na	0	3	+	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
26Mg	0	0	+	Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
27Na	0	5/2	+	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
27Al	0	5/2	+	Optical Spectroscopy	1938He06	Z Physik 108, 739
				Atomic and Molecular Beams	1939Mi08	Phys Rev 56, 303
				Atomic and Molecular Beams	1949Le15	Phys Rev 76, 1086
				Nuclear Magnetic Resonance	1950Po66	Phys Rev 79, 685
				Nuclear Magnetic Resonance	1956Br48	J Chem Phys 24, 751
				Electron Scattering	1971De55	
				Electron Scattering	1975St01	Nucl Phys A237, 365
28Na	0	1	+	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
28Si	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
				Nuclear Magnetic Resonance	1954Wi08~	Phys Rev 93, 1428
29Na	0	3/2	+	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
29Si	0	1/2	+	Microwave Spectroscopy	1953Wh39~	Phys Rev 92, 1256
				Nuclear Magnetic Resonance	1953We51	Phys Rev 89, 923
				Nuclear Magnetic Resonance (Double Resonance)	1954Wi08	Phys Rev 93, 1428
				Nuclear Magnetic Resonance (Double Resonance)	1954Og01	J Chem Phys 22, 147
30Na	0	2	+	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
30Si	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
30P	0	1	+	Atomic and Molecular Beams	1968Ph02	Priv Comm
				Atomic and Molecular Beams		ND A5, 433 (1969)
31Na	0	3/2	(+)	Atomic and Molecular Beams	1978Hu12	Phys Rev C18, 2342
				β-Nuclear Magnetic Resonance	2000Ke09	Eur Phys J A 8, 31
31Mg	0	1/2	(+)	β-Nuclear Magnetic Resonance with g-factor measurement	2005Ne01	Phys Rev Lett 94, 022501
31P	0	1/2	+	Optical Spectroscopy	1933As01	Phys Rev 44, 919
				Optical Spectroscopy	1949Cr31	Can J Research 27A, 156
				Microwave Spectroscopy	1949Gi28~	Phys Rev 75, 1014
				Electron Paramagnetic Resonance	1954Fl41	Phys Rev 94, 1392
31Ar	0	5/2	(+)	β-Recoil Energy Shift	1998Ax01	Nucl Phys A628, 345
				β-Recoil Energy Shift	1999Th09	Phys Lett 467B, 194
				β-Recoil Energy Shift	2002Fy01	Nucl Phys A701, 394c
32P	0	1	+	Electron Paramagnetic Resonance	1957Fe32	Phys Rev 107, 1462
32S	0	0	+	Optical Spectroscopy	1931Na01	Phys Rev 37, 490
				Optical Spectroscopy	1936Ol01	Z Physik 100, 656
33S	0	3/2	+	Microwave Spectroscopy	1948To13	Phys Rev 74, 626
				Microwave Spectroscopy	1952Es07	Phys Rev 85, 532
				Microwave Spectroscopy	1952Ki31	Phys Rev 88, 142
				Nuclear Magnetic Resonance	1953We51	Phys Rev 89, 923
34S	0	0	+	Microwave Spectroscopy	1948To10~	Phys Rev 74, 1113
35S	0	3/2	+	Microwave Spectroscopy	1949Co12	Phys Rev 76, 703
				Microwave Spectroscopy	1951We11	Phys Rev 81, 948
35Cl	0	3/2	+	Microwave Spectroscopy	1948To10, 1947To16	Phys Rev 74, 1113, ibid 71, 644
				Microwave Spectroscopy	1949To17	J Chem Phys 17, 782
				Atomic and Molecular Beams	1949Da14	Phys Rev 76, 1076
36S	0	0	+	Microwave Spectroscopy	1949Lo21~	Phys Rev 75, 529

36Cl	0	2	+	Microwave Spectroscopy	1949To10	Phys Rev 76, 691
				Microwave Spectroscopy	1951Jo21	Phys Rev 83, 1249
				Microwave Spectroscopy	1952Gi04	Phys Rev 85, 716A
				Microwave Spectroscopy	1955Aa23	Phys Rev 98, 1317
36Ar	0	0	+	Optical Spectroscopy	1937Ko03	Z Physik 105, 389
				Optical Spectroscopy	1953Me73	Helv Phys Acta 26, 811
36K	0	2	+	β-asymmetry from polarized nuclei/Spin Exchange	1972Sc35	
				Spin Exchange	1973Sc36	
37Cl	0	3/2	+	Microwave Spectroscopy	1948To10, 1947To16	Phys Rev 74, 1113, ibid 71, 644
				Atomic and Molecular Beams	1949Da14	Phys Rev 76, 1076
				Microwave Spectroscopy	1949To17	J Chem Phys 17, 782
37Ar	0	3/2	+	Optical Spectroscopy	1965Ro13	Phys Rev 140, B820
37K	0	3/2	+	Radiative Detection of Optical Pumping	1968Be19	Phys Lett 26B, 721
				Spin Exchange	1971Vo03	Z Physik 244, 44
38Ar	0	0	+	Optical Spectroscopy	1953Me73~	Helv Phys Acta 26, 811
38K	0	3	+	Atomic Beam Magnetic Resonance	1965Ph02	Phys Rev 138, B773
39Ar	0	7/2	-	Optical Spectroscopy	1967Tr12	J Opt Soc Am 57, 1452
39K	0	3/2	+	Atomic and Molecular Beams	1935Mi08	Phys Rev 47, 739
				Atomic and Molecular Beams	1935Fo03	Phys Rev 48, 746
				Optical Spectroscopy	1937Ja02	Nature 140, 276
40Ar	0	0	+	Optical Spectroscopy	1937Ko03~	Z Physik 105, 389
				Optical Spectroscopy	1953Me73~	Helv Phys Acta 26, 811
40K	0	4	-	Atomic and Molecular Beams	1949Da01	Phys Rev 76, 1068
40Ca	0	0	+	Optical Spectroscopy	1931Fr01~	Z Physik 71, 89
41K	0	3/2	+	Atomic and Molecular Beams	1936Ma03	Phys Rev 49, 921
41Ca	0	7/2	-	Nuclear Magnetic Resonance	1962Br30	Phys Rev Lett 9, 166
42K	0	2	-	Atomic and Molecular Beams	1953Be19	Phil Mag 44, 33
				Atomic and Molecular Beams	1969Ch20	Phys Rev 184, 1102
				Atomic and Molecular Beams	1973CoZG	Bull Am Phys Soc 18, No 4, 727, KO9
43K	0	3/2	+	Atomic and Molecular Beams	1959Pe26	Phys Rev 116, 734
43Ca	0	7/2	-	Nuclear Magnetic Resonance	1953Je06	Phys Rev 90, 1130
				Optical Spectroscopy	1954Ke14	Proc Phys Soc (London) 67A, 450
43Sc	0	7/2	-	Atomic and Molecular Beams	1966Co13	Phys Rev 141, 1106
44K	0	2	-	Laser Spectroscopy	1982Du06	J Phys (Paris) 43, 509
				Laser Spectroscopy	1982To02	Phys Lett 108B, 169
44Sc	0	2	+	Atomic and Molecular Beams	1966Co13	Phys Rev 141, 1106
44Sc	270	6	+	Atomic and Molecular Beams	1966Co13	Phys Rev 141, 1106
45K	0	3/2	+	Atomic and Molecular Beams	1967Ga08	Phys Rev 161, 1152
				Atomic and Molecular Beams	1968Ga28	Priv Comm
45Ca	0	7/2	-	Atomic Beam with Laser Double Resonance Detection	1979Be47	Z Phys A292, 401
45Sc	0	7/2	-	Optical Spectroscopy	1934Ko01	Z Physik 92, 82
				Optical Spectroscopy	1934Sc01	Naturwissenschaften 22, 758
45Ti	0	7/2	-	Atomic and Molecular Beams	1966Co19	Phys Rev 148, 1157

46Sc	0	4	+	Atomic and Molecular Beams	1962Pe21	Phys Rev 128, 1740
47K	0	1/2	+	Atomic Beam Laser Spectroscopy	1982To02	Phys Lett 108B, 169
47Ca	0	7/2	-	Atomic Beam with Laser Fluorescence Spectroscopy	1982An15	Phys Rev C 26, 2194
47Sc	0	7/2	-	Atomic and Molecular Beams	1966Co13	Phys Rev 141, 1106
47Ti	0	5/2	-	Nuclear Magnetic Resonance	1953Je16	Phys Rev 92, 1262
				Electron Paramagnetic Resonance	1961Ga16	Zh Eksp Teor Fiz 41, 337
				Electron Paramagnetic Resonance	1962Wa03	Phys Rev 125, 233
47V	0	3/2	-	Atomic and Molecular Beams	1967Re06	Bull Am Phys Soc 12, No.4, 474
				Atomic and Molecular Beams	1978Re03	Phys Rev C17, 2229
48Sc	0	6	+	Atomic and Molecular Beams	1967Re06	Bull Am Phys Soc 12, No.4, 474
48V	0	4	+	Atomic and Molecular Beams	1966Re06	Bull Am Phys Soc 11, No.1, 82
				γ-Anisotropy from Polarized Nuclei	1966Ca04	Proc Phys Soc (London) 87, 927
49Ti	0	7/2	-	Nuclear Magnetic Resonance	1953Je16	Phys Rev 92, 1262
				Electron Paramagnetic Resonance	1961Ga16	Zh Eksp Teor Fiz 41, 337
				Electron Paramagnetic Resonance	1962Mc05	Bull Am Phys Soc 7, No 1, 30, GA9
				Electron Paramagnetic Resonance	1962Wa03	Phys Rev 125, 233
49V	0	7/2	-	Electron Paramagnetic Resonance	1957We17	Bull Am Phys Soc 2, No 1, 31, JA9
49Cr	0	5/2	-	Atomic and Molecular Beams	1965Sa22	Arkiv Fysik 30, 540
				Atomic and Molecular Beams	1970Jo27	Phys Scr 2, 16
50V	0	6	+	Electron Paramagnetic Resonance	1952Ba63	Proc Phys Soc (London) 65A, 952
				Electron Paramagnetic Resonance	1952Ki31	Phys Rev 88, 142
				Electron Paramagnetic Resonance	1953Ki41	Phys Rev 92, 109
51V	0	7/2	-	Optical Spectroscopy	1936Ko04	Z Physik 98, 624
				Electron Paramagnetic Resonance	1951Bl43	Proc Phys Soc (London) 64A, 601
				Electron Paramagnetic Resonance	1952Ba63	Proc Phys Soc (London) 65A, 860
51Cr	0	7/2	-	Atomic and Molecular Beams	1959Ch24	Bull Am Phys Soc 4, No 3, 151 H6
				Atomic and Molecular Beams	1965Sa22	Arkiv Fysik 30, 540
51Mn	0	5/2	-	Atomic and Molecular Beams	1965Sa22	Arkiv Fysik 30, 540
				Atomic and Molecular Beams	1968Jo19	Arkiv Fysik 37, 317
				Atomic and Molecular Beams		Nucl Phys A166, 306 (1971)
52Mn	0	6	+	γ-Anisotropy from Polarized Nuclei	1957Hu80	Physica 23, 605
				Dynamic Nuclear Orientation		Physica 24, 157 (1958)
		6?		γ-Anisotropy from Oriented Nuclei	1961Je04	Prog Cryog 3, K Mendelssohn, Ed, 129
				Electron Paramagnetic Resonance	1961Je04	Prog Cryog 3, K Mendelssohn, Ed, 129
				Atomic and Molecular Beams	1966Ad03	Arkiv Fysik 31, 549

52Mn				γ-Anisotropy from Oriented Nuclei/Nuclear Magnetic Resonance	1970Ni11	Physica 50, 259
52Mn	383	2	+	Atomic and Molecular Beams	1965Sa22	Arkiv Fysik 37, 317
				Atomic and Molecular Beams	1965Ph04	Phys Rev 140, B555
53Cr	0	3/2	-	Electron Paramagnetic Resonance	1951Bl74	Proc Phys Soc (London) 64A, 1135
				Electron Paramagnetic Resonance	1952Bo66	Proc Phys Soc (London) 65A, 860
				Nuclear Magnetic Resonance	1954Ha39	Helv Phys Acta 27, 259
				Coulomb Excitation Reorientation	1971Th19	
53Mn	0	7/2	-	Electron Paramagnetic Resonance	1956Do45	Phys Rev 104, 1378
54Mn	0	3	+	γ-Anisotropy from Oriented Nuclei	1960Ba42	Phys Rev 120, 946
				Electron Paramagnetic Resonance	1961Je04	Prog Cryog 3, K Mendelssohn, Ed, 129
				γ-Anisotropy from Oriented Nuclei/Dynamic Nuclear Orientation	1961Je04	Prog Cryog 3, K Mendelssohn, Ed, 129
				γ-Anisotropy from Polarized Nuclei/Nuclear Magnetic Resonance	1967Te01	Phys Rev Lett 18, 240
				γ-Anisotropy from Oriented Nuclei/Nuclear Magnetic Resonance	1970Ni11	Physica 50, 259
55Mn	0	5/3	-	Optical Spectroscopy	1930Wh01	Phys Rev 35, 208
				Optical Spectroscopy		Phys Rev 35, 1146 (1930)
				Electron Paramagnetic Resonance	1951Bl30	Proc Roy Soc (London) 205A, 336 (1951)
				Microwave Spectroscopy	1954Ja16	Phys Rev 96, 649
				Atomic and Molecular Beams	1957Wo46	Proc Phys Soc (London) 70A, 485
				Atomic and Molecular Beams	1979De19	Z Physik A291, 207
55Co	0	7/2	-	Radioactive Detection of Nuclear		Nucl Phys A201, 561
56Mn	0	3	+	γ-Anisotropy from Polarized Nuclei	1960Ba06	Phys Rev 117, 519
				Atomic and Molecular Beams	1961Ch05	Phys Rev 122, 891
56Co	0	4	+	Electron Paramagnetic Resonance	1956Ba69	Proc Phys Soc (London) 69A, 353
				Electron Paramagnetic Resonance	1956Jo06	Phys Rev 102, 738
57Fe	0	1/2	-	Electron Paramagnetic Resonance	1957Ga16	Doklady Akad.Nauk SSSR 113, 1243
				Electron Paramagnetic Resonance	1958Lu64	Phys Rev Lett 1, 295
57Co	0	7/2	-	Electron Paramagnetic Resonance	1956Ba69	Proc Phys Soc (London) 69A, 353
				γ-Anisotropy from Oriented Nuclei/Nuclear Magnetic Resonance	1972Ni01	Physica 57, 1
58Co	0	1,2	+	Electron Paramagnetic Resonance	1957Do38	Phys Rev 108, 60
59Fe	0	3/2	-	Atomic and Molecular Beams	1965Do11	Bull Am Phys Soc 10, No 4, 445, BC11
				γ-Anisotropy from Oriented Nuclei	1970Ts04	Phys Rev C2, 2168

59Co	0	7/2	-	Optical Spectroscopy	1935K05	Z Physik 94, 58
				Optical Spectroscopy	1935Mo07	Phys Rev 47, 256A
				Electron Paramagnetic Resonance	1951Bl38	Proc Roy Soc (London) 208A, 143
60Co	0	5	+	γ-Anisotropy from Oriented Nuclei	1954Bl07	Proc Roy Soc (London) 221A, 170
				γ-Anisotropy from Oriented Nuclei	1955Po17	Physica 21, 233
				γ-Anisotropy from Polarized Nuclei	1955Wh42	Physica 21, 841
				Electron Paramagnetic Resonance	1956Do08	Phys Rev 101, 1001
				γ-Anisotropy from Polarized Nuclei/Nuclear Magnetic Resonance	1972Ni01	Physica 57, 1
60Co	58	2	+	Atomic and Molecular Beams	1968Ro08	Priv Comm
				Atomic and Molecular Beams	1969Hu12	
				Atomic and Molecular Beams		ND A5, 517 (1969)
60Cu	0	2	+	Atomic and Molecular Beams	1958Re10	Phys Rev 109, 465
61Ni	0	3/2	-	Electron Paramagnetic Resonance	1958Wo52	Phys Rev Lett 1, 16
61Cu	0	3/2	-	Atomic and Molecular Beams	1957Ni09	Bull Am Phys Soc 2, No 4, 200 KA11
				Atomic and Molecular Beams	1958Re10	Phys Rev 109, 465
62Cu	0	1	+	Atomic and Molecular Beams	1966Do01	Phys Rev 142, 638
				Atomic and Molecular Beams	1968Ph01	Phys Rev 169, 917
63Cu	0	3/2	-	Optical Spectroscopy	1932Ri02	Z Physik 79, 1
				Optical Spectroscopy	1936Sc07	Z Physik 100, 113
63Zn	0	3/2	-	Optical Double Resonance	1967Mc17	Bull Am Phys Soc 12, No 1, 132 HG10
				Optical Double Resonance	1969La05	Phys Rev 177, 1606
64Cu	0	1	+	Atomic and Molecular Beams	1954Le40	Phys Rev 95, 1356
64Zn	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
				Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
65Cu	0	3/2	-	Optical Spectroscopy	1932Ri02	Z Physik 79, 1
65Zn	0	5/2	-	Optical Double Resonance	1964By01	Phys Rev 134, A47
66Cu	0	1	+	Atomic and Molecular Beams	1964Ro04	Phys Rev Lett 8, 266
				Atomic and Molecular Beams	1969Cu09	J Phys A (London) 2, 658
66Zn	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
				Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
66Ga	0	0	+	Atomic and Molecular Beams	1957Wo35~	Bull Am Phys Soc 2, No 8, 838 K2
67Zn	0	5/2	-	Optical Spectroscopy	1937Ly07	Z Physik 104, 434
				Optical Spectroscopy	1948Ar06	Phys Rev 74, 1263A
				Nuclear Magnetic Resonance	1953We51	Phys Rev 89, 923
67Ga	0	3/2	-	Atomic and Molecular Beams	1957Hu86	Phys Rev 105, 1928
68Zn	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
				Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
68Ga	0	1	+	Atomic and Molecular Beams	1958Hu14	Phys Rev 110, 534
69Ga	0	3/2	-	Optical Spectroscopy	1932Ja04	Z Physik 75, 229
				Optical Spectroscopy	1933Ca02	Nature 131, 204
69Ge	0	5/2	-	Atomic and Molecular Beams	1970Ol02	Phys Rev C2, 228
69As	0	5/2	-	Atomic Beam Magnetic Resonance	1976He21	Phys Scr 14, 138
70Ga	0	1	+	Atomic and Molecular Beams	1962Eh01	Phys Rev 125, 2008

70Ge	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
70As	0	4	+	Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams	1969Ph04 1976He24	 Hyperfine Interactions 2, 399 ND A5, 433 (1969) PC68 Philips2 Bull Am Phys Soc 14, 944 (1969)
71Cu	0	3/2	-	Collinear/Insource Laser Spectroscopy	2009FlAA	Phys Rev Lett 103, 142501
71Ga	0	3/2	-	Optical Spectroscopy Optical Spectroscopy	1932Ja04 1933Ca02	Z Physik 75, 229 Nature 131, 204
71Ge	0	1/2	-	Atomic and Molecular Beams	1963Ch12	Phys Rev 131, 245
71As	0	5/2		Nuclear Magnetic Resonance/Static Nuclear Orientation		Nucl Phys A259, 378 (1976)
72Ga	0	3	-	Atomic and Molecular Beams	1960Ch13	Phys Rev 120, 2138
72Ge	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
72As	0	2	-	Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams	1969Ph04	 ND A5, 433 (1969) Bull Am Phys 14, 944 (1969)
73Cu	0	3/2	-	Collinear/Insource Laser Spectroscopy	2009FlAA	Phys Rev Lett 103, 142501
73Ge	0	9/2	+	Microwave Spectroscopy	1949To09	Phys Rev 76, 700
73Se	0	9/2	+	Nuclear Magnetic Resonance/Nuclear Orientation	1988Be39	Phys Rev C38, 2329
75Cu	0	5/2		Collinear/Insource Laser Spectroscopy	2009FlAA	Phys Rev Lett 103, 142501
74Ge	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
74Se	0	0	+	Microwave Spectroscopy Microwave Spectroscopy	1949St07~ 1950Ge05~	Phys Rev 75, 827 Phys Rev 78, 174
74Br	13.58	4	(+)	Atomic and Molecular Beams	1980Ek02	Phys Scr 22, 344
75Ge	0	1/2	-	Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams	1968Ol02 1969OlZY 1970Ol02	Bull Am Phys Soc 13, No4, 493 GL11 Thesis, Univ.Calif(Berkeley); Diss Abst Int 31B, 2181 Phys Rev C2, 228
75As	0	3/2	-	Optical Spectroscopy Microwave Spectroscopy Nuclear Magnetic Resonance Electron Paramagnetic Resonance	1932To01 1948Da08 1952Je05 1954Fl41	Proc Roy Soc (London) 137A, 541 Phys Rev 74, 1245A Phys Rev 85, 478 Phys Rev 94, 1392
75Se	0	5/2	+	Microwave Spectroscopy	1955Aa06	Phys Rev 98, 1224
75Br	0	3/2	-	Atomic and Molecular Beams	1980Ek02	Phys Scr 22, 344
75Kr	0	5/2	+	Hyperfine Structure	1995Ke04	Nucl Phys A586, 219
76Ge	0	0	+	Microwave Spectroscopy	1949To09~	Phys Rev 76, 700
76As	0	2(1?) 2	-	Electron Paramagnetic Resonance Atomic and Molecular Beams	1958Pi43 1961Ch10	Phys Rev 109, 1423 Phys Rev 122, 1302
76Se	0	0	+	Optical Spectroscopy	1933Ra02	Acta Phys Polon 2, 119

76Se				Microwave Spectroscopy	1949St07	Phys Rev 75, 827
				Microwave Spectroscopy	1950Ge05	Phys Rev 78, 174
76Br	0	1	-	Atomic and Molecular Beams	1960Li11	Phys Rev 119, 1053
76Rb	0	1	(-)	β(θ) Measurement from Oriented Nuclei	1978Fi01	Z Physik A284, 3
				β(θ) Measurement from Oriented Nuclei	1978Bo38	Hyperfine Interactions 4, 174
				Hyperfine Structure	1981Th04	Phys Rev C23, 2720
77Se	0	1/2	-	Microwave Spectroscopy	1949St07	Phys Rev 75, 827
				Microwave Spectroscopy	1950Ge05	Phys Rev 78, 174
				Nuclear Magnetic Resonance	1953We51	Phys Rev 89, 923
				Optical Spectroscopy	1954Da05	Phys Rev 93, 159
77Br	0	3/2	-	Atomic and Molecular Beams	1959Gr92	Bull Am Phys Soc 4, No 4, 250 K6(1959)
				Atomic and Molecular Beams	1980EkZY	Priv Comm
77Br	105.86	9/2	+	Atomic and Molecular Beams	1980Ek02	Phys Scr 22, 344
				Atomic and Molecular Beams	1980EkZY	Priv Comm
77Kr	0	5/2	+	Hyperfine Structure ???	1995Ke04	Nucl Phys A586, 219
77Rb	0	3/2	-	Atomic and Molecular Beams	1976EkZX	Proc Int Conf Nuclei Far From Stability, 3rd, Cargese, France, R Klapisch
				Atomic and Molecular Beams	1978Ek04	Nucl Phys A311, 269
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
77Sr	0	5/2	+	Hyperfine Splitting	1992Li11	Phys Rev C46, 797
78Se	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
				Microwave Spectroscopy	1949St07~	Phys Rev 75, 827
				Microwave Spectroscopy	1950Ge05~	Phys Rev 78, 174
				Optical Spectroscopy	1954Da05	Phys Rev 93, 159
78Br	0	1	+	Atomic and Molecular Beams	1980Ek02	Phys Scr 22, 344
				Atomic and Molecular Beams	1980EkZY	Priv Comm
78Rb	0	0	(+)	Atomic and Molecular Beams	1976EkZX	Proc Int Conf Nuclei Far From Stability, 3rd, Cargese, France, R Klapisch
				Atomic and Molecular Beams	1978Ek04	Nucl Phys A311, 269
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
				Atomic and Molecular Beams	1980EkZY	Priv Comm
78Rb	103.3+X	4	(-)	Atomic and Molecular Beams	1976EkZX	Proc Int Conf Nuclei Far From Stability, 3rd, Cargese, France, R Klapisch
				Atomic and Molecular Beams	1978Ek04	Nucl Phys A311, 269
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
79Se	0	7/2	+	Microwave Spectroscopy	1953Ha50	Phys Rev 92, 1532
79Br	0	3/2	-	Optical Spectroscopy	1930Br01	Nature 125, 414
				Optical Spectroscopy	1932To02	Proc Roy Soc (London) 136A, 585

79Br				Microwave Spectroscopy	1948To10, 1947To16	Phys Rev 74, 1113, ibid 71, 644
				Atomic and Molecular Beams	1954Ki11	Phys Rev 94, 1610
79Rb	0	5/2	+	Atomic and Molecular Beams	1976EkZX	Proc Int Conf Nuclei Far From Stability, 3rd, Cargese, France, R Klapisch
				Atomic and Molecular Beams	1978Ek04	Nucl Phys A311, 269
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
				Atomic and Molecular Beams	1978Th04	Z Physik A287, 323
				Atomic and Molecular Beams	1980EkZY	Priv Comm
79Sr	0	3/2	(-)	Hyperfine Structure	1987Bu11	Z Physik A327, 361
				Hyperfine Structure	1990Bu12	Phys Rev C41, 2883
80Se	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
				Optical Spectroscopy	1934Ol01	Z Physik 90, 138
				Microwave Spectroscopy	1949St07~	Phys Rev 75, 827
				Microwave Spectroscopy	1950Ge05~	Phys Rev 78, 174
				Optical Spectroscopy	1954Da05	Phys Rev 93, 159
80Br	0	1	+	Atomic and Molecular Beams	1959Li41	Bull Am Phys Soc 4, No1, 11 CA4
80Br	85	5	-	Atomic and Molecular Beams	1959Li41	Bull Am Phys Soc 4, No1, 11 CA4
80Rb	0	1	+	In-beam Optical Pumping	1974NeZI	Contrib Intern Conf Hyperfine Interactions Studied in Nuclear
				In-beam Optical Pumping	1977CoZP	KFK-2504, 56
81Br	0	3/2	-	Optical Spectroscopy	1930Br01	Nature 125, 414
				Optical Spectroscopy	1932To02	Proc Roy Soc (London) 136A, 585
				Microwave Spectroscopy	1948To10, 1947To16	Phys Rev 74, 1113, ibid 71, 644
				Atomic and Molecular Beams	1954Ki11	Phys Rev 94, 1610
81Rb	0	3/2	-	Atomic and Molecular Beams	1956Ho52	Phys Rev 104, 101
81Rb	85	9/2	+	Atomic and Molecular Beams	1956Hu69	Phys Rev 104, 757
81Sr	0	1/2	-	Hyperfine Structure	1987Bu11	Z Physik A327, 361
82Se	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
				Microwave Spectroscopy	1950Ge05~	Phys Rev 78, 174
				Microwave Spectroscopy	1949St07	Phys Rev 75, 827 (1949)
82Br	0	5	-	Atomic and Molecular Beams	1959Ga12	Phys Rev 116, 393
				β-asymmetry from polarized nuclei	1971Hi12	
82Kr	0	0	+	Optical Spectroscopy	1933Ko02~	Z Physik 85, 353
82Rb	0	1	+	Atomic and Molecular Beams	1981Th04	Phys Rev C23, 2720
82Rb	30	5	-	Atomic and Molecular Beams	1956Ho52	Phys Rev 104, 101
82Rb	69	5		Atomic and Molecular Beams	1981Th04	Phys Rev C23, 2720
83Kr	0	9/2	+	Optical Spectroscopy	1938Ko02	Z Physik 109, 349
				Optical Spectroscopy	1938Sc10	Z Physik 111, 165
		9/2?		Atomic and Molecular Beams	1946Ke05	Revs Modern Phys 18, 323

83Kr				Optical Spectroscopy	1955Ra46	Kgl.Danske Videnskab.Selskab, Mat.-fys.Medd. 30, No.13
				Atomic and Molecular Beams	1961Ku07	Z Physik 165, 402
83Rb	0	5/2	-	Atomic and Molecular Beams	1956Ho52	Phys Rev 104, 101
83Sr	0	7/2	+	Collinear Fast-Beam Spectroscopy ???	1987Bu11	Z Physik A327, 361
				Collinear Fast-Beam Spectroscopy	1990Li28	Hyperfine Interactions 59, 161
83Sr	259	1/2	-	Collinear Fast-Beam Spectroscopy	1987Bu11	Z Physik A327, 361
				Collinear Fast-Beam Spectroscopy	1990Li28	Hyperfine Interactions 59, 161
84Kr	0	0	+	Microwave Spectroscopy	1933Ko02	Z Physik 85, 353
84Rb	0	2	-	Atomic and Molecular Beams	1956Ho52	Phys Rev 104, 101
84Rb	464	6	-	Atomic and Molecular Beams	1976EkZX	Prof Int Conf Nuclei Far From Stability, 3rd, Cargese, France, R. Klapisch
				Atomic and Molecular Beams	1978Ek04	Nucl Phys A311, 269
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
85Kr	0	9/2	+	Optical Spectroscopy	1955Ra13	Z Physik 141, 160
85Rb	0	5/2	-	Optical Spectroscopy	1933Ko01	Z Physik 83, 417
				Optical Spectroscopy	1936Ko05	Z Physik 103, 485
				Atomic and Molecular Beams	1936Mi01	Phys Rev 50, 220
86Kr	0	0	+	Optical Spectroscopy	1933Ko02~	Z Physik 85, 353
86Rb	0	2	-	Atomic and Molecular Beams	1953Be19	Phil Mag 44, 33
86Rb	556	6	-	Atomic and Molecular Beams	1981Th04	Phys Rev C23, 2720
86Sr	0	0	+	Optical Spectroscopy	1931Fr01~	Z Physik 71, 89
87Kr	0	5/2	+	Laser Spectroscopy	1995Ke04	Nucl Phys A586, 219
87Rb	0	3/2	-	Optical Spectroscopy	1933Ko01	Z Physik 83, 417
				Optical Spectroscopy	1936Ko05	Z Physik 103, 485
				Atomic and Molecular Beams	1936Mi01	Phys Rev 50, 220
				Atomic and Molecular Beams	1962Pe14	Phys Rev 127, 524
				Hyperfine Structure	1981Th04	Phys Rev C23, 2720
87Sr	0	9/2	+	Optical Spectroscopy	1938He05	Z Physik 108, 232
				Electron Paramagnetic Resonance	1965Cu05	Phys Rev 140, A1181
				Electron Paramagnetic Resonance		Phys Rev 151, 734 (1966)
				Laser Spectroscopy	1987An02	Z Physik A326, 493
				Laser Spectroscopy	1987Bu11	Z Physik A327, 361
				Laser Spectroscopy	1990Li28	Hyperfine Interactions 59, 161
87Sr	389	1/2	-	Laser Spectroscopy	1987An02	Z Physik A326, 493
				Laser Spectroscopy	1987Bu11	Z Physik A327, 361
				Laser Spectroscopy	1990Li28	Hyperfine Interactions 59, 161
87Y	0	1/2	-		1974EkZW	Priv Comm
				Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
87Y	381	9/2	+		1974EkZW	Priv Comm
				Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283

88Rb	0	2	-	Atomic and Molecular Beams	1968Va03	Phys Rev 166, 1131
88Sr	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Fr01 1938He05	Z Physik 71, 89 Z Physik 108, 232
89Kr	0	3/2	(+)	Collinear Fast Laser Spectroscopy	1995Ke04	Nucl Phys A586, 219
89Rb	0	3/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek05 1979Ek02	Hyperfine Interactions 4, 165 Phys Scr 19, 516
89Sr	0	5/2	+	Hyperfine Structure	1987Bu11	Z Physik A327, 361
89Y	0	1/2	-	Optical Spectroscopy Optical Spectroscopy Optical Spectroscopy	1940Wi08 1949Cr17 1950Ku69	Z Physik 116, 547 Phys Rev 76, 1528 Proc Phys Soc (London) 63A, 830
90Rb	0	0	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek05 1979Ek02	Hyperfine Interactions 4, 165 Phys Scr 19, 516
90Rb	107	3	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek05 1979Ek02	Hyperfine Interactions 4, 165 Phys Scr 19, 516
90Y	0	2	-	Atomic and Molecular Beams	1962Pe01	Phys Rev 125, 284
90Nb	0	8		 Atomic and Molecular Beams	1974EkZW 1975Ru06	Priv Comm Phys Lett 58B, 283
90Mo	0				1974EkZW	Priv Comm
91Kr	0	5/2	(+)	Hyperfine Structure	1995Ke04	Nucl Phys A586, 219
91Rb	0	3/2	(-)	Nuclear Radiation Detected Optical	1978Bo38	Hyperfine Interactions 4,
91Sr	0	5/2	+	Laser Spectroscopy	1987Bu11	Z Physik A327, 361
91Y	0	1/2	-	Atomic and Molecular Beams	1962Pe21	Phys Rev 128, 1740
91Zr	0	5/2	+	Optical Spectroscopy Nuclear Magnetic Resonance	1949Ar06 1957Br89 1957Br26	Phys Rev 76, 873 Helv Phys Acta 30, 267 Phys Rev 105, 1929
92Rb	0	0	-	Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
92Mo	0	0	+	Optical Spectroscopy	1951Ar29~	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
93Rb	0	5/2	-	Hyperfine Structure	1981Th04	Phys Rev C23, 2720
93Nb	0	9/2	+	Optical Spectroscopy Optical Spectroscopy	1934Ba01 1947Me27	Phys Rev 46, 806 Phys Rev 72, 451
94Rb	0	3	(-)	Optical Pumping detected by β-Asymmetry	1978Bo38	Hyperfine Interactions 4, 174
94Mo	0	0	+	Optical Spectroscopy	1951Ar29~	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
94Tc	0				1974EkZW	Priv Comm
95Rb	0	5/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1979Ke02 1979Ek02	Z Physik A289, 407 Phys Scr 19, 516
95Sr	0	1/2	+	Collinear Fast Beam Laser Spectroscopy	1987Bu11	Z Physik A327, 361

95Mo	0	5/2	+	Optical Spectroscopy	1951Ar29	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
				Optical Spectroscopy	1954Wo07	Phys Rev 93, 954A
				Electron Paramagnetic Resonance	1956Ow04	Phys Rev 102, 591
95Tc	0	9/2	+		1974EkZW	Priv Comm
				Atomic and Molecular Beams	1975Ru06~	Phys Lett 58B, 283
96Y	1140	308	+	Atomic and Molecular Beams	2007Ch07	Phys Lett B 645, 133
96Mo	0	0	+	Optical Spectroscopy	1951Ar29	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
96Tc	0	6		Nuclear Magnetic Resonance	1971Fo24	
					1974EkZW	Priv Comm
		7	+	Nuclear Magnetic Resonance	1975Sa18	Hyperfine Interactions 1, 183
97Rb	0	3/2	+	Atomic and Molecular Beams	1981Th04	Phys Rev C23, 2720
97Sr	0	1/2	+	Collinear Fast Beam Laser Spectroscopy	1987Bu11	Z Physik A327, 361
				Collinear Fast Beam Laser Spectroscopy	1990Li28	Hyperfine Interactions 59, 161
				Collinear Fast Beam Laser Spectroscopy	1990Bu12	Phys Rev C41, 2883
97Mo	0	5/2	+	Optical Spectroscopy	1951Ar29	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
				Optical Spectroscopy	1954Wo07	Phys Rev 93, 954A
				Electron Paramagnetic Resonance	1956Ow04	Phys Rev 102, 591
98Mo	0	0	+	Optical Spectroscopy	1951Ar29~	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
98Rb	0	0		Atomic and Molecular Beams	1981Th04	Phys Rev C23, 2720
99Sr	0	3/2	+	Hyperfine Structure	1991Li05	Phys Lett 256B, 141
99Mo	0	1/2	+	Atomic and Molecular Beams	1974Ru05	Nucl.Instrum.Methods 119, 269
					1974EkZW	Priv Comm
99Tc	0	9/2	+	Electron Paramagnetic Resonance	1953Ke49	Phys Rev 92, 303
				Optical Spectroscopy	1958Lo26	Phys Rev 110, 842
99Tc	142	1/2	-		1974EkZW	Priv Comm
				Atomic and Molecular Beams	1974Ru05	Nucl.Instrum.Methods 119, 269
99Ru	0	5/2	+	Electron Paramagnetic Resonance	1952Gr19	Proc Phys Soc (London) 65A, 951
				Optical Spectroscopy	1955Mu78	J Phys Soc Japan 10, 919
				Time Differential Perturbed Angular Correlation	1965Ma27	Phys Rev 139, B532

99Ru	90	3/2	+	Time Differential Perturbed Angular Correlation	1964Bo28	Phys Lett 13, 330
				Time Differential Perturbed Angular Correlation	1965Ma27	Phys Rev 139, B532
				Mossbauer Spectroscopy	1966Ki02	Phys Rev 144, 1022
99Ru	1261	7/2	+	Nuclear Magnetic Resonance Anisotropy	1985Ed06	Phys Rev C32, 1707
99Rh	64	9/2	+		1974EkZW	Priv Comm
				Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
100Mo	0	0	+	Optical Spectroscopy	1951Ar29	Studier over Spectralliniers Struktur, Nordisk Bogtrykkeri, Copenhagen
100Rh	0	1	-	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
				Atomic and Molecular Beams	1978Ru04	Phys Scr 18, 209
101Ag	0	9/2	+	Atomic and Molecular Beams	1970Wa35	Phys Scr 1, 238
101Ru	0	5/2	+	Paramagnetic Resonance	1952Gr19	Procs Phys Soc 65A, 951
				Optical Spectroscopy	1955Mu78	J Phys Soc Japan 10, 919
101Rh	157.32	9/2	+	Atomic and Molecular Beams	1978Ru04	Phys Scr 18, 209
102Ag	0	5	+	Atomic and Molecular Beams	1970Wa35	Phys Scr 1, 238
102Ag	9.3	2	+	Atomic and Molecular Beams	1968Gr01	Nucl Phys A106, 193
103Ag	0	7/2	+	Atomic and Molecular Beams	1958Ew85	Bull Am Phys Soc 3, No. 7, 370, M2
103Rh	0	1/2	-	Optical Spectroscopy	1951Ku41	Proc Phys Soc (London) 64A, 1090
104Ag	0	5	+	Atomic and Molecular Beams	1959Ew89	Phys Rev 115, 614
				Atomic and Molecular Beams	1961Am02	Phys Rev 123, 1793
104Ag	6.90	2	+	Atomic and Molecular Beams	1958Re10	Phys Rev 109, 465
				Atomic and Molecular Beams	1959Ew89	Phys Rev 115, 614
				Atomic and Molecular Beams	1961Am02	Phys Rev 123, 1793
105Ag	0	1/2	-	Atomic and Molecular Beams	1958Ew84	Phys Rev 110, 595
105Pd	0	5/2	+	Optical Spectroscopy	1952St56	Z Physik 132, 429
				Optical Spectroscopy	1953Bl28	J Phys Radium 14, 135
105Cd	0	5/2	+	Optical Double Resonance	1969La06	Phys Rev 177, 1615
105In	0	9/2	+	Isotope shift and hfs measurements	1987Eb02	Nucl Phys A464, 9 (1987)
106Ag	0	1	+	Atomic and Molecular Beams	1958Re10	Phys Rev 109, 465
				Atomic and Molecular Beams	1959Ew89	Phys Rev 115, 614
106Ag	89.66	6	+	Atomic and Molecular Beams	1959Ew89	Phys Rev 115, 614
106In	0	7	+	Nuclear Magnetic Resonance	1987Va27	Hyperfine Interactions 34, 439
107Ag	0	1/2	-	Optical Spectroscopy	1937Ja01	Proc Roy Soc (London) 158A, 372
				Optical Spectroscopy	1950Cr26	Can J Research 28A, 558
107Cd	0	5/2	+	Optical Double Resonance	1963By02	Phys Rev 132, 1181
				Optical Double Resonance	1969La06	Phys Rev 177, 1615
107In	0	9/2	+	Isotope shift and hfs measurements	1987Eb02	Nucl Phys A464, 9
108Ag	0	1	+	Atomic and Molecular Beams	1964Ro04	Phys Letters 8, 266

108Ag	109.47	6	+	Hyperfine Structure	1975Fi07	Z Physik A274, 79
108In	0	7	+	Nuclear Magnetic Resonance	1986Va27	Phys Rev Lett 57, 2641
108In	29.75	2	+	Collinear Fast Beam Laser Spectroscopy	1986Eb01	Z Physik A323, 119
109Ag	0	1/2	-	Optical Spectroscopy	1937Ja01	Proc Roy Soc (London) 158A, 372
				Optical Spectroscopy	1950Cr26	Can J Research 28A, 558
109Ag	88.03	7/2	+	Atomic and Molecular Beams	1965St18	Phys Can 21, No 2, 42, Abstr. 12.7
109Cd	0	5/2	+	Optical Double Resonance	1963Mc11	Phys Rev 131, 707
109In	0	9/2	+	Atomic and Molecular Beams	1959Ma19	Thesis, Univ California ; UCRL-8721
109Sn	0	7/2	+	Atomic and Molecular Beams	1974Ho17	Phys Scr 9, 317
		5/2	+	Hyperfine Structure	1987Eb01	Z Physik A326, 121
110Ag	0	1	+	Atomic and Molecular Beams	1969Cu09	J Phys A (London) 2, 658
110Ag	117.59	6	+	Atomic and Molecular Beams	1958Ew84	Phys Rev 110, 595
110Cd	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
110In	0	7	+	Atomic and Molecular Beams	1958Ma43	Phys Rev 111, 286
				Atomic and Molecular Beams	1959Ma19	Thesis, Univ California ; UCRL-8721
110In	62.1	2	+	Atomic and Molecular Beams	1967Pr13	Thesis, Univ California ; UCRL-17472
				Atomic and Molecular Beams	1968Ca10	Priv Comm
				Atomic and Molecular Beams	1968CaZX	Thesis, Princeton Univ ; PUC-937-321
110Sn	0	0	+	Atomic and Molecular Beams	1974Ho17	
111Ag	0	1/2	-	Atomic and Molecular Beams	1954Le40	Phys Rev 95, 1356
				Atomic and Molecular Beams	1956Wo27	Proc Phys Soc (London) 69A, 581
111Cd	0	1/2	+	Optical Spectroscopy	1931Sc01	Z Physik 67, 433
				Optical Spectroscopy	1933Jo02	Proc Phys Soc (London) 45, 625
				Nuclear Magnetic Resonance	1950Pr51	Phys Rev 79, 35
111Cd	396.214	11/2	-	Optical Double Resonance	1969La06	Phys Rev 177, 1615
111In	0	9/2	+	Atomic and Molecular Beams	1959Ma19	Thesis, Univ.California (1959); UCRL-8721
111Sn	0	7/2	+	Atomic and Molecular Beams	1974Ho17	Phys Scr 9, 317
112Ag	0	2	(-)	Atomic and Molecular Beams	1964Ch06	Phys Rev 133, B1138
112In	0	1	+	Atomic and Molecular Beams	1968Ca10	Priv Comm
				Atomic and Molecular Beams	1968CaZX	Thesis, Princeton Univ; PUC-937-321
				Atomic and Molecular Beams	1971CaYV	Priv Comm
112In	156.59	4	+	Atomic and Molecular Beams	1968Ca14	Priv Comm
				Atomic and Molecular Beams	1971CaYV	Priv Comm
112Cd	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
113Ag	0	1/2	-	Atomic and Molecular Beams	1964Ch06	Phys Rev 133, B1138
113Cd	0	1/2	+	Optical Spectroscopy	1931Sc01	Z Physik 67, 433
				Optical Spectroscopy	1933Jo02	Proc Phys Soc (London) 45, 625
113Cd	263.54	11/2	-	Optical Double Resonance	1964By03	Phys Rev 136, B1654
113In	0	9/2	+	Optical Spectroscopy	1937Ba08	Phys Rev 52, 836

113In				Atomic and Molecular Beams	1938Mi05	Phys Rev 53, 384
113In	391.7	1/2	-	Atomic and Molecular Beams	1960Ch08	Phys Rev 118, 1578
113Sn	0	1/2	+	Atomic and Molecular Beams	1969Pr07	Phys Rev 181, 1665
113Sn	77.39	7/2	+	Atomic and Molecular Beams	1974Ho17	Phys Scr 9, 317
114Cd	0	0	+	Optical Spectroscopy	1929Sc01	Z Physik 56, 291
114In	190	5	+	Atomic and Molecular Beams	1957Go23	Phys Rev 108, 1524
115Cd	0	1/2	+	Optical Double Resonance	1964Mc06	Phys Rev 134, B25
115Cd	180	11/2	-	Optical Double Resonance	1964Mc06	Phys Rev 134, B26
				Optical Double Resonance	1969La06	Phys Rev 177, 1615
115In	0	9/2	+	Optical Spectroscopy	1933Ja03	Z Physik 80, 59
				Optical Spectroscopy	1934Pa01	Naturwissenschaften 22, 136
				Atomic and Molecular Beams	1938Mi05	Phys Rev 53, 384
				Atomic and Molecular Beams	1939Ha12	Phys Rev 56, 30
				Atomic and Molecular Beams	1942Ha07	Phys Rev 61, 459
115In	336.24	1/2	-	Atomic and Molecular Beams	1961Ki02	Can J Phys 39, 230
115Sn	0	1/2	+	Optical Spectroscopy	1949Gu02	Phys Rev 75, 767
				Nuclear Magnetic Resonance	1950Pr51	Phys Rev 79, 35
115Sb	0	5/2	+	Atomic and Molecular Beams	1968Ja05	Phys Rev 175, 65
116Cd	0	0	+	Optical Spectroscopy	1929Sc01~	Z Physik 56, 291
116In	127.3	5	+	Atomic and Molecular Beams	1956Nu12	Phil Mag 1, 587
				Atomic and Molecular Beams	1957Go23	Phys Rev 108, 1524
116Sn	0	0	+	Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
116Sb	0	3	+	Atomic and Molecular Beams	1968Ga08	Priv Comm
				Atomic and Molecular Beams	1974Ek01	Nucl Phys A226, 219
116Sb	383	8	-	Atomic and Molecular Beams	1974Ek01	Nucl Phys A226, 219
116Te	0	0	+	Atomic and Molecular Beams	1961Ax04~	Arkiv Fysik 20, 473
117In	0	9/2	+	Atomic and Molecular Beams	1963Ca05	Can J Phys 41, 823
117In	315.3	1/2	-	Atomic and Molecular Beams	1968Mu04	Can J Phys 46, 177
117Sn	0	1/2	+	Optical Spectroscopy	1933Sc03	Naturwissenschaften 21, 660
				Optical Spectroscopy	1934To01	Proc Roy Soc (London) 144A, 574
				Nuclear Magnetic Resonance	1950Pr51	Phys Rev 79, 35
117Sb	0	5/2	+	Atomic and Molecular Beams	1968Ja05	Phys Rev 175, 65
117Te	0	1/2	+	Atomic and Molecular Beams	1961Ax04	Arkiv Fysik 20, 473
118In	60	5	+	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
118In	200	8	-	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
118Sn	0	0	+	Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
118Sb	0	1	+	Atomic and Molecular Beams	1968Ja05	Phys Rev 175, 65
118Sb	250	8	-	Atomic and Molecular Beams	1974Ek01	Nucl Phys A226, 219
				Nuclear Magnetic Resonance	1974Ca06	Nucl Phys A221, 1
118Cs	0	2		Hyperfine Structure Shape	1981Th06	Nucl Phys A367, 1
119In	0	9/2	+	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
119In	311.4	1/2	-	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
119Sn	0	1/2	+	Optical Spectroscopy	1933Sc03	Naturwissenschaften 21, 660
				Optical Spectroscopy	1934To01	Proc Roy Soc (London) 144A, 574
				Nuclear Magnetic Resonance	1950Pr51	Phys Rev 79, 35
119Sb	0	5/2	+	Atomic and Molecular Beams	1968Ja05	Phys Rev 175, 65

119Te	0	1/2	+	Atomic and Molecular Beams	1961Ax04	Arkiv Fysik 20, 473
119Te	261.0	11/2	-	Atomic and Molecular Beams	1961Ax04	Arkiv Fysik 20, 473
119Cs	0	9/2	+	Optical Pumping	1978Fi01	Z Physik A284, 3
119Cs	0+X	3/2	(+)	Optical Pumping	1978Ek03	Phys Lett 76B, 565
120Sn	0	0	+	Optical Spectroscopy	1931Mu02~	Z Physik 72, 793
120Sb	0	1	+	Atomic and Molecular Beams	1968Ja05	Phys Rev 175, 65
120Sb	0+X	8	-	Atomic and Molecular Beams Nuclear Magnetic Resonance	1974Ek01 1974Ca06	Nucl Phys A226, 219 Nucl Phys A221, 1
120Cs	0	2	(+)	Atomic and Molecular Beams Atomic and Molecular Beams Optical Pumping	1976EkZX 1977Ek02 1978Ek03	Proc Int Conf Nuclei Far from Stability, 3rd, Cargese, France, R.Klapisch, Ed., CERN-76-13, p.193 (1976) Nucl Phys A292, 144 Phys Lett 76B, 565
121In	0	9/2	+	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
121In	313.0	1/2	-	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
121Sn	0	3/2	+	Atomic and Molecular Beams	1969Pr07	Phys Rev 181, 1665
121Sn	6.30	11/2	-	LASER Spectroscopy	1986An24	Phys Rev C34, 1052
121Sb	0	5/2	+	Optical Spectroscopy Optical Spectroscopy Microwave Spectroscopy	1932Ba01 1934Cr03 1951Lo24	Z Physik 79, 206 Can J Research 10, 693 Phys Rev 81, 798
121I	0	5/2	+	Atomic and Molecular Beams	1974EkZX	Priv Comm
121Cs	0	3/2	(+)	Atomic and Molecular Beams LASER Spectroscopy	1977Ek02 1981Th06	Nucl Phys A292, 144 Nucl Phys A367, 1
121Cs	68.5	9/2	(+)	Atomic and Molecular Beams LASER Spectroscopy	1977Ek02 1981Th07	Nucl Phys A292, 144 Phys Lett 106B, 163
122In	40	5	+	LASER Spectroscopy	1987Eb02	Nucl Phys A464, 9
122In	290	(8)	(-)	LASER Spectroscopy	1987Eb02	Nucl Phys A464, 9
122Sb	0	2	-	Paramagnetic Resonance Atomic and Molecular Beams γ-Anisotropy from Polarized Nuclei	1958Pi45 1960Fe08 1971Kr15	Phys Rev 112, 935 Phil Mag 5, 1309 Phys Rev C4, 1329
122Cs	0	1	+	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
122Cs	140	8	(-)	Atomic and Molecular Beams Atomic and Molecular Beams	1977Ek02 1977Ek03	Nucl Phys A292, 144 Bull Acad Sci USSR, Phys Ser 41, No 8, 166
123Sn	0	11/2	-	LASER Spectroscopy	1986An24	Phys Rev C34, 1052
123Sn	24.6	3/2	+	Atomic and Molecular Beams	1968Ch38	Bull Am Phys Soc 13, No 12, 1650, BE3
123Sb	0	7/2	+	Optical Spectroscopy Optical Spectroscopy Microwave Spectroscopy	1932Ba01 1934Cr03 1951Lo24	Z Physik 79, 206 Can J Research 10, 693 Phys Rev 81, 798
123Te	0	1/2	+	Optical Spectroscopy Optical Spectroscopy	1932Ba01 1950Fo08	Z Physik 79, 206 Phys Rev 78, 744
123I	0	5/2	+	Atomic and Molecular Beams	1958Ga18	Phys Rev 111, 534
123Cs	0	1/2	+	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
123Ba	0	5/2	(+)	*LASER spectroscopy on atomic beam	1983Mu12	Nucl Phys A403, 234
124Sb	0	3	-	Atomic and Molecular Beams γ-Anisotropy from Polarized Nuclei γ-Anisotropy from Polarized Nuclei	1960Fe08 1968Kn02 1970Si17	Phil Mag 5, 1309 Phys Rev 170, 1051 Nucl Phys A156, 19

124I	0	2	-	Atomic and Molecular Beams	1958Ga18	Phys Rev 111, 534
124Cs	0	1	+	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
125In	0	9/2	+	LASER Spectroscopy	1987Eb02	Nucl Phys A464, 9
125In	360.1	1/2	(-)	LASER Spectroscopy	1987Eb02	Nucl Phys A464, 9
125Sb	0	7/2	+	γ-Anisotropy from Polarized Nuclei	1964He08	Bull Am Phys 9, No 5, 562, S8
				Nuclear Magnetic Resonance	1968Ba70	
				γ-Anisotropy from Polarized Nuclei	1968An05	Phys Rev 169, 978
				γ-Anisotropy from Polarized Nuclei	1968St16	Phys Rev 172, 1243
125Te	0	1/2	+	Optical Spectroscopy	1949Ma47	Phys Rev 76, 1002
				Optical Spectroscopy	1950Fo08	Phys Rev 78, 744
125Te	35.49	3/2	+	Mossbauer Spectroscopy	1962Fr10	Bull Am Phys Soc 7, No 9, 600, C6
125I	0	5/2	+	Microwave Spectroscopy	1958Fl39	Phys Rev 110, 536
125Cs	0	1/2	(+)	Atomic and Molecular Beams	1966Da11	Thesis, Univ California; UCRL-16998
				Atomic and Molecular Beams	1971Da01	Phys Rev C3, 1326
125Ba	0	1/2	(+)	LASER Spectroscopy	1983Mu12	Nucl Phys A403, 234
126In	0	3	(+)	LASER Spectroscopy	1987Eb02	Nucl Phys A464, 9
126Te	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
126I	0	2	-	Atomic and Molecular Beams	1960Ga12	Nucl Phys 19, 140
126Cs	0	1	+	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
127I	0	5/2	+	Optical Spectroscopy	1938Mu06	Z Physik 109, 162
				Microwave Spectroscopy	1948Go25	Revs Modern Phys 20, 668
				Atomic and Molecular Beams	1953Ki14	Phys Rev 91, 476A
127Cs	0	1/2	+	Atomic and Molecular Beams	1956Ni16	Phys Rev 104, 1380
128Sb	0	8	-	Atomic and Molecular Beams	1974Ek01	Nucl Phys A226, 219
128Te	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
128I	0	1	+	Atomic and Molecular Beams	1959Sh63	Phys Rev 114, 858
128Cs	0	1	+	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
129I	0	7/2	+	Microwave Spectroscopy	1949Li09	Phys Rev 76, 149
129Xe	0	1/2	+	Optical Spectroscopy	1934Jo01	Proc Roy Soc (London) 144A, 587
				Optical Spectroscopy	1934Ko02	Z Physik 87, 460
				Optical Spectroscopy	1950Ko09	Phys Rev 77, 722
129Cs	0	1/2	+	Atomic and Molecular Beams	1956Ni16	Phys Rev 104, 1380
130Te	0	0	+	Optical Spectroscopy	1933Ra02~	Acta Phys Polon 2, 119
130I	0	5	+	Atomic and Molecular Beams	1958Ga20	Phys Rev Letters 1, 292
				Atomic and Molecular Beams	1959Sh63	Phys Rev 114, 858
130Cs	0	1	+	Atomic and Molecular Beams	1956Ni16	Phys Rev 104, 1380
				Atomic and Molecular Beams	1958Ni27	Phys Rev 112, 186
130Cs	163.3	5	-	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
				LASER Spectroscopy	1981Th06	Nucl Phys A367, 1
130Ce	0	0	+	Atomic and Molecular Beams	1973In04~	Phys Scr 7, 24
131I	0	7/2	+	Microwave Spectroscopy	1953Li24	Phys Rev 92, 1271
131I				Microwave Spectroscopy	1958Fl39	Phys Rev 110, 536

				Atomic and Molecular Beams	1958Ga18	Phys Rev 111, 534
131Xe	0	3/2	+	Optical Spectroscopy	1934Ko02	Z Physik 87, 460
				Optical Spectroscopy	1950Ko09	Phys Rev 77, 722
131Cs	0	5/2	+	Atomic and Molecular Beams	1953Be19	Phil Mag 44, 33
				Atomic and Molecular Beams	1956Ni14	Bull Am Phys Soc 1, No 7, 343, R3
131La	0	3/2	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
132I	0	4	+	Atomic and Molecular Beams	1959Sh64	Bull Am Phys Soc 4, No 6, 386, B10
				Atomic and Molecular Beams	1960Ga12	Nucl Phys 19, 140
132Xe	0	0	+	Optical Spectroscopy	1934Jo01~	Proc Roy Soc (London) 144A, 587
132Cs	0	2	+	Atomic and Molecular Beams	1958Ni27	Phys Rev 112, 186
132La	0	2	-	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
132La	188.2	6	-	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
132Ce	0	0	+	Atomic and Molecular Beams	1973In04~	Phys Scr 7, 24
133I	0	7/2	+	Atomic and Molecular Beams	1960Ga12	Nucl Phys 19, 140
133Xe	0	3/2	+	Optical Spectroscopy	1978Hu04	Z Physik A285, 229
133Cs	0	7/2	+	Optical Spectroscopy	1931Ko01	Z Physik 73, 437
				Atomic and Molecular Beams	1934Co04	Phys Rev 46, 713
				Optical Spectroscopy	1934Ja02	Proc Roy Soc (London) 143A, 455
133Ba	0	1/2	+	Optical Spectroscopy	1976Ho13	Phys Lett 62B, 390
				LASER Spectroscopy	1978No09	Phys Rev C18, 2369
133Ba	288.2	11/2	-	LASER Spectroscopy	1978No09	Phys Rev C18, 2369
133La	0	5/2	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
133Ce	0	1/2	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
133Ce	37.1	9/2	-	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
134Xe	0	0	+	Optical Spectroscopy	1934Jo01~	Proc Roy Soc (London) 144A, 587
134Cs	0	4	+	Atomic and Molecular Beams	1952Ja18	Phys Rev 87, 676
				Atomic and Molecular Beams	1953Be19	Phil Mag 44, 33
134Cs	138.7	8	-	Atomic and Molecular Beams	1955Gi04	Phys Rev 98, 1194A
				Atomic and Molecular Beams	1955Go31	Phys Rev 99, 192
134Ba	0	0	+	Optical Spectroscopy	1950Ar51~	Phys Rev 79, 836
134Ce	0	0	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
134Pr	0+X	2	-	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
134Nd	0	0	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
135I	0	7/2	+	Atomic and Molecular Beams	1960Ga12	Nucl Phys 19, 140
135Cs	0	7/2	+	Atomic and Molecular Beams	1949Da01	Phys Rev 76, 1068
				LASER Spectroscopy	1981Th06	Nucl Phys A367, 1
135Cs	1633	19/2	-	Atomic and Molecular Beams	1977Ek02	Nucl Phys A292, 144
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
				LASER Spectroscopy	1981Th06	Nucl Phys A367, 1
135Ba	0	3/2	+	Optical Spectroscopy	1932Mu06	Sci Papers, Inst Phys Chem Res (Tokyo) 18, 304
				Optical Spectroscopy	1937Be09	Phys Rev 52, 1127
				Atomic and Molecular Beams	1941Ha14	Phys Rev 60, 75
				Optical Spectroscopy	1950Ar51	Phys Rev 79, 836

135La	0	5/2	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
135Ce	0	1/2	(+)	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
135Pr	0	3/2	(+)	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
135Nd	0	9/2	(-)	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
136Xe	0	0	+	Optical Spectroscopy	1934Jo01	Proc Roy Soc (London) 144A, 587
136Cs	0	5	+	Atomic and Molecular Beams Atomic and Molecular Beams	1971Da01 1981Th06	Phys Rev C3, 1326 Nucl Phys A367, 1
136Cs	0+X	8	-	Atomic and Molecular Beams	1981Th06	Nucl Phys A367, 1
136Ba	0	0	+	Optical Spectroscopy	1950Ar51~	Phys Rev 79, 836
136La	0	1	+	Atomic and Molecular Beams	1973In04	Phys Scr 7, 24
136Pr	0	2	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
136Nd	0	0	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
137Cs	0	7/2	+	Atomic and Molecular Beams LASER Spectroscopy	1949Da01 1978Sc27	Phys Rev 76, 1068 Phys Lett 79B, 209
137Ba	0	3/2	+	Optical Spectroscopy Optical Spectroscopy Atomic and Molecular Beams Optical Spectroscopy	1932Mu06 1937Be09 1941Ha14 1950Ar51	Sci Papers, Inst Phys Chem Res (Tokyo) 18, 304 Phys Rev 52, 1127 Phys Rev 60, 75 Phys Rev 79, 836
137La	0	7/2	+	Optical Spectroscopy	1972Fi19	Z Physik 254, 127
137Ce	0	3/2	+	γ-Anisotropy from Oriented Nuclei Atomic and Molecular Beams	1963Ha07 1973In04	Phys Rev 129, 1601 Phys Scr 7, 24
137Ce	254.3	11/2	-	γ-Anisotropy from Oriented Nuclei Atomic and Molecular Beams	1966Bl17 1973In04	Phys Rev 143, 78 Phys Scr 7, 24
137Pr	0	5/2	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
137Nd	0	1/2	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
138Cs	0	3	-	Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams	1967St22 1978Sc27 1979Bo01	Can J Phys 45, 3393 Phys Lett 79B, 209 Z Physik A289, 227
138Cs	79.9	6	-	Atomic and Molecular Beams	1981Th06	Nucl Phys A367, 1
138Ba	0	0	+	Optical Spectroscopy	1950Ar51~	Phys Rev 79, 836
138La	0	5	+	Nuclear Magnetic Resonance	1955So31	Phys Rev 99, 613A
138Pr	364	7	-	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
138Nd	0	0	+	Atomic and Molecular Beams	1972Ek04~	Nucl Phys A196, 178
139Xe	0	3/2	-	Atomic and Molecular Beams	1989Bo03	Phys Lett 216B, 7
139Cs	0	7/2	+	Atomic and Molecular Beams Atomic and Molecular Beams	1979Bo01 1979Ek02	Z Physik A289, 227 Phys Scr 19, 516
139La	0	7/2	+	Optical Spectroscopy Atomic and Molecular Beams	1934An02 1971Ch02	Phys Rev 45, 685 Phys Rev A3, 25
139Ce	0	3/2	+	γ-Anisotropy from Oriented Nuclei γ-Anisotropy from Oriented Nuclei γ-Anisotropy from Oriented Nuclei Atomic and Molecular Beams	1961Kn02 1962Gr17 1963Ha07 1973In04	Ann Phys (New York) 6, 211 Phil Mag 7, 1087 Phys Rev 129, 1601 Phys Scr 7, 24
139Pr	0	5/2	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
139Nd	0	3/2	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
139Nd	231.2	11/2	-	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
139Sm	0	1/2	+	LASER Spectroscopy	1992Le09	J Phys (London) G18, 1177

140Cs	0	1	-	Hyperfine Structure Shape	1979Bo01	Z Physik A289, 227
				Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
140La	0	3	-	Atomic and Molecular Beams	1960Pe09	Bull Am Phys Soc 5, No 5, 343, D7
				Gamma-anisotropy	1966Bl05	Phys Rev 143, 911
140Pr	0	1	+	Atomic and Molecular Beams	1972Ek04	Nucl Phys A196, 178
140Nd	0	0	+	Atomic and Molecular Beams	1972Ek04~	Nucl Phys A196, 178
140Sm	0	0	+	Atomic and Molecular Beams	1972Ek05~	Phys Scr 6, 181
141Xe	0	5/2	(-)	Hyperfine Structure Shape	1989Bo03	Phys Lett 216B, 7
141Cs	0	7/2	+	Hyperfine Structure Shape	1979Bo01	Z Physik A289, 227
				Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
141Ba	0	3/2	-	Hyperfine Structure Shape	1981Ne06	Hyperfine Interactions 9, 151
				Hyperfine Structure Shape	1983Mu12	Nucl Phys A403, 234
				Hyperfine Structure Shape	1988We07	Z Physik A329, 407
141Ce	0	7/2	-	Paramagnetic Resonance	1957Ke13	Phys Rev 108, 54
				γ-Anisotropy from Oriented Nuclei	1962Gr17	Phil Mag 7, 1087
				γ-Anisotropy from Oriented Nuclei	1963Ha07	Phys Rev 129, 1601
141Pr	0	5/2	+	Optical Spectroscopy	1929Wh01	Phys Rev 34, 1397
				Paramagnetic Resonance	1951Da28	Atti accad Nazl Lincei, Rend, Classe sci fis mat e nat 11, 77
				Paramagnetic Resonance	1958Ba35	Proc Roy Soc (London) 245A, 156
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
141Nd	0	3/2	+	Atomic and Molecular Beams	1962Al04	Bull Am Phys Soc 7, No 3, 239, YB9
141Pm	0	5/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
141Sm	0	1/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
141Sm	176.0	11/2	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
141Eu	0	5/2	+	Hyperfine Structure Shape	1985Ah02	Z Physik A321, 35
142Cs	0	0	-	Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
				LASER Spectroscopy	1979Bo01	Z Physik A289, 227
				LASER Spectroscopy	1981Th06	Nucl Phys A367, 1
142Pr	0	2	-	γ-Anisotropy from Oriented Nuclei	1958Da12	Can J Phys 36, 997
				γ-Anisotropy from Oriented Nuclei	1958Gr92	Phil Mag 3, 456
				Atomic and Molecular Beams	1962Ca10	Phys Rev 126, 1004
				γ-Anisotropy from Oriented Nuclei	1970Hi14	Bull Am Phys Soc 15, No 4, 628, JG12
142Pr	3.694	5	-	Atomic and Molecular Beams	1969Hu12	Contrib Intern Conf Properties Nucl States, Montreal, Canada, p.91
142Sm	0	0	+	Atomic and Molecular Beams	1972Ek05~	Phys Scr 6, 181
142Eu	0	1	+	Hyperfine Structure Shape	1985Ah02	Z Physik A321, 35
142Eu	0.0+X	8	-	Hyperfine Structure Shape	1985Ah02	Z Physik A321, 35
143Xe	0	5/2	-	Hyperfine Structure Shape	1989Bo03	Phys Lett 216B, 7
143Cs	0	3/2	+	Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
				LASER Spectroscopy	1981Th06	Nucl Phys A367, 1
143Ba	0	5/2	-	Hyperfine Structure Shape	1981Ne06	Hyperfine Interactions 9, 151
				Hyperfine Structure Shape	1983Mu12	Nucl Phys A403, 234

143Ba				Hyperfine Structure Shape	1988We07	Z Physik A329, 407
143Ce	0	3/2	-	Atomic and Molecular Beams	1965Ma19	Phys Rev 138, B766
143Pr	0	7/2	+	Atomic and Molecular Beams	1964Bu09	Phys Rev 135, B1281
143Nd	0	7/2	-	Optical Spectroscopy	1954Mu91	Phys Rev 96, 1543
				Paramagnetic Resonance	1955Bl51	Proc Phys Soc (London) 68A, 937
				Paramagnetic Resonance	1957Ke13	Phys Rev 108, 54
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
143Sm	0	3/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
143Eu	0	5/2	+	Atomic and Molecular Beams	1984Ek01	Z Physik A316, 239
144Cs	0	1		Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
145Cs	0	3/2	+	Atomic and Molecular Beams	1979Ek02	Phys Scr 19, 516
145Ba	0	5/2	-	Hyperfine Structure Shape	1983Mu12	Nucl Phys A403, 234
				Hyperfine Structure Shape	1988We07	Z Physik A329, 407
145Nd	0	7/2	-	Optical Spectroscopy	1954Mu91	Phys Rev 96, 1543
				Paramagnetic Resonance	1955Bl51	Proc Phys Soc (London) 68A, 937
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
145Eu	0	5/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
145Gd	0	1/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
146Cs	0	1	-	Hyperfine Structure Shape	1987Co19	Nucl Phys A468, 1
146Eu	0	4	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
147Nd	0	5/2	-	Paramagnetic Resonance	1957Ke13	Phys Rev 108, 54
				Atomic and Molecular Beams	1960Ca03	Nucl Phys 20, 509
147Pm	0	7/2	+	Optical Spectroscopy	1960Kl02	Physica 26, 103
				Atomic and Molecular Beams	1960Ca03	Nucl Phys 20, 509
				Paramagnetic Resonance	1961St18	Phys Rev 124, 1455
				Atomic and Molecular Beams	1963Bu14	Phys Rev 132, 723
				Optical Spectroscopy	1966Re04	Phys Rev 141, 1123
147Sm	0	7/2	-	Paramagnetic Resonance	1952Bo21	Proc Phys Soc (London) 65A, 368
				Optical Spectroscopy	1954Mu15	Phys Rev 93, 1232
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
147Eu	0	5/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
147Gd	0	7/2	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
148Pm	0	1	-	γ-Anisotropy from Oriented Nuclei	1963Gr10	Phys Rev 130, 1100
				Atomic and Molecular Beams	1965Al10	Phys Rev 138, B1356
148Eu	0	5	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
148Tb	0	2	-	Hyperfine Structure Shape	1990Al36	Z Physik A337, 367
149Nd	0	5/2	-	Atomic and Molecular Beams	1962Bu21	Thesis, Univ California; UCRL-10245
				Atomic and Molecular Beams	1964Bu09	Phys Rev 135, B1281
149Pm	0	7/2	+	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
				γ-Anisotropy from Oriented Nuclei	1963Gr10	Phys Rev 130, 1100

149Sm	0	7/2	-	Paramagnetic Resonance	1952Bo21	Proc Phys Soc (London) 65A, 368
				Optical Spectroscopy	1954Mu15	Phys Rev 93, 1232
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
149Sm	22.51	5/2	-	Mossbauer Spectroscopy	1965Of01	Phys Rev 137, A627
				Mossbauer Spectroscopy	1967Of01	Nucl Phys A93, 689
149Eu	0	5/2	+	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
149Gd	0	7/2	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
150Eu	42.1	0	-	Atomic and Molecular Beams	1972Ek05~	Phys Scr 6, 181
151Pm	0	5/2	+	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
				Atomic and Molecular Beams	1963Bu14	Phys Rev 132, 723
151Sm	0	5/2	-	Paramagnetic Resonance	1971Ro21	Can J Phys 49, 2227
151Sm	4.821	3/2	-	Paramagnetic Resonance	1971Ro21	Can J Phys 49, 2227
151Eu	0	5/2	+	Optical Spectroscopy	1935Sc01	Z Physik 94, 457
				Paramagnetic Resonance	1955Bl16	Proc Phys Soc (London) 68A, 55
				Paramagnetic Resonance	1957Ma19	Soviet Phys Doklady 2, 64
151Eu	21.54	7/2	+	Mossbauer Spectroscopy	1963Ba39	Phys Rev 131, 123
				Mossbauer Spectroscopy	1963No06	Phys Rev 132, 241
151Gd	0	7/2	-	Atomic and Molecular Beams	1972Ek05	Phys Scr 6, 181
151Tb	0	1/2	(+)	Atomic and Molecular Beams	1970Ad09	Phys Scr 2, 96
151Dy	0	7/2	(-)	Atomic and Molecular Beams	1970Ro21	Nucl Phys A154, 283
152Eu	0	3	-	Paramagnetic Resonance	1957Ab05	Phys Rev 108, 58
				Paramagnetic Resonance	1957Ma19	Soviet Phys Doklady 2, 64
152Eu	45.60	0	-	Atomic and Molecular Beams	1959Co52	Phys Rev Lett 2, 305
152Tb	0	2	-	Atomic and Molecular Beams	1970Ad09	Phys Scr 2, 96
152Dy	0	0	+	Atomic and Molecular Beams	1970Ro21~	Nucl Phys A154, 283
153Sm	0	3/2	+	Atomic and Molecular Beams	1960Ca05	Phys Rev 118, 233
153Eu	0	5/2	+	Optical Spectroscopy	1935Sc01	Z Physik 94, 457
				Paramagnetic Resonance	1955Bl16	Proc Phys Soc (London) 68A, 55
				LASER Spectroscopy	1985Ah02	Z Physik A321, 35
				LASER Spectroscopy	1992HuZW	Contrib 6th Intern Conf on Nuclei Far from Stability + 9th Intern Conf on Atomic Masses and Fundamental Constant, Bernkastel-Kues, Germany, PB5
153Gd	0	3/2	-	Atomic and Molecular Beams	1965Al16	Nucl Phys 71, 441
153Tb	0	5/2	+	Atomic and Molecular Beams	1970Ad09	Phys Scr 2, 96
				LASER Spectroscopy	1990Al36	Z Physik A337, 367
153Dy	0	7/2	(-)	Atomic and Molecular Beams	1970Ro21	Nucl Phys A154, 283

153Ho	0	11/2	-	LASER Spectroscopy LASER Spectroscopy	1988NeZZ 1989Al27	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126 Nucl Phys A504, 549
153Ho	68.7	1/2	+	LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
154Eu	0	3	-	Paramagnetic Resonance GAO	1957Ab05 1962Ju06	Phys Rev 108, 58 Phys Rev 128, 1733
154Tb	0	0		Atomic and Molecular Beams	1970Ad09~	Phys Scr 2, 96
154Tb	0+x	3	-	Atomic and Molecular Beams	1970Ad09	Phys Scr 2, 96
154Ho	0	2	-	Hyperfine Structure Shape Hyperfine Structure Shape	1988NeZZ 1989Al27	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126 Nucl Phys A504, 549
155Sm	0	3/2	-	Atomic and Molecular Beams	1968Ea02	Can J Phys 46, 230
155Gd	0	3/2	-	Paramagnetic Resonance Optical Spectroscopy Paramagnetic Resonance	1956Lo29 1956Sp21 1957Ma55	Phys Rev 103, 1309 Phys Rev 101, 1725 Zhur Eksptl i Teoret Fiz 33, 1116
155Gd	86.55	5/2	+	Mossbauer Spectroscopy Mossbauer Spectroscopy	1966De23 1968Bl07	Zh Eksperim i Teor Fiz 51, 95 Phys Rev 170, 1076
155Gd	105.3	3/2	+	Mossbauer Spectroscopy	1968Bl07	Phys Rev 170, 1076
155Tb	0	3/2	+	Atomic and Molecular Beams	1970Ad09	Phys Scr 2, 96
155Dy	0	3/2	-	Atomic and Molecular Beams	1970Ro21	Nucl Phys A154, 283
155Ho	0	5/2	+	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
156Eu	0	0	+	Atomic and Molecular Beams	1981Ek03	Z Phys A302, 181
156Tb	0	3	-	γ-Anisotropy from Oriented Nuclei Atomic and Molecular Beams	1962Lo01 1970Ad09	Nucl Phys 30, 452 Phys Scr 2, 96
156Ho	0	4	-	LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
157Eu	0	5/2	+	LASER Spectroscopy	1990Al34	Z Physik A337, 257
157Gd	0	3/2	-	Paramagnetic Resonance Optical Spectroscopy Paramagnetic Resonance Hyperfine Structure Shape	1956Lo29 1956Sp21 1957Ma55 1961Ka23	Phys Rev 103, 1309 Phys Rev 101, 1725 Zhur Eksptl i Teoret Fiz 33, 1116 Izvest Akad Nauk SSSR, Ser. p.12, 25, 111
157Dy	0	3/2	-	Atomic and Molecular Beams	1970Ro21	Nucl Phys A154, 283
157Ho	0	7/2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289

157Ho				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
157Er	0	3/2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
157Tm	0	1/2	+	Atomic and Molecular Beams	1978EkZW	Priv Comm
				Atomic and Molecular Beams	1984Ek01	Z Physik A316, 239
				LASER Spectroscopy	1986Al32	Izv Akad Nauk SSSR, Ser Fiz 50, 2366
				LASER Spectroscopy	1987Mi31	Zh Eksp Teor Fiz 93, 410
				LASER Spectroscopy	1988Al04	Nucl Phys A477, 37
157Yb	0	7/2	-	LASER Spectroscopy	1991Sc33	J Phys (London) B24, 4831
158Tb	0	3	-	Paramagnetic Resonance	1968Ea04	Phys Rev 170, 1083
158Ho	0	5	+	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
158Ho	67.20	2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
158Er	0	0	+	Atomic and Molecular Beams	1969Ek01~	Nucl Phys A135, 289
158Tm	0	2	-	Atomic and Molecular Beams	1978EkZW	Priv Comm
				Atomic and Molecular Beams	1984Ek01	Z Physik A316, 239
				LASER Spectroscopy	1986Al32	Izv Akad Nauk SSSR, Ser Fiz 50, 2366
159Eu	0	5/2	+	LASER Spectroscopy	1990Al34	Z Physik A337, 257
159Gd	0	3/2	-	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
				γ-Anisotropy from Polarized Nuclei	1971Kr19	Phys Rev C4, 1942
159Tb	0	3/2	+	Optical Spectroscopy	1934Sc02	Naturwissenschaften 22, 730
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Paramagnetic Resonance	1958Ba35	Proc Roy Soc (London) 245A, 156
				SpHt	1963Bl24	J Appl Phys 34, 1024
				SpHt	1963Bl25	Proc Intern Congr Quantum Electronics, 3rd, Paris, France
159Dy	0	3/2	-	Atomic and Molecular Beams	1965Al16	Nucl Phys 71, 441
159Ho	0	7/2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				LASER Spectroscopy	1970LiZY	Intern Conf Prop Nuclei, Leysin, Switzerland, Vol 1, p.387

159Ho				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
				LASER Spectroscopy	1989Al27	Nucl Phys A504, 549
159Er	0	3/2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
159Tm	0	5/2	+	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
159Yb	0	5/2	(-)	LASER Spectroscopy	1991Sc33	J Phys (London) B24, 4831
160Tb	0	3	-	γ-Anisotropy from Oriented Nuclei	1960Jo12	Phys Rev 120, 2108
				Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
160Ho	0	5	+	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				Atomic and Molecular Beams	1970LiZL	Proc Int Conf Prop Nuclei Far from Region of Beta-Stability, Leysin, Switzerland, Vol 1, p.387
				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
160Ho	59.98	2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
160Er	0	0	+	Atomic and Molecular Beams	1969Ek01~	Nucl Phys A135, 289
160Tm	0	1	-	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
161Tb	0	3/2	+	Atomic and Molecular Beams	1964Bu09	Phys Rev 135, B1281
161Dy	0	5/2	+	Paramagnetic Resonance	1956Co21	Proc Phys Soc (London) 69A, 282
				Paramagnetic Resonance	1958Pa11	Proc Roy Soc (London) 245A, 118
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
161Dy	25.65	5/2	-	Mossbauer Spectroscopy	1961Ba49	Phys Rev Letters 6, 467
				IPAC	1971Be23	Izv Akad Nauk SSSR, Ser Fiz 35, 135
161Dy	74.57	3/2	-	Mossbauer Spectroscopy	1968Cr10	Proc Intern Conf Hyperfine Struct Nucl Radiations, Asilomar, Pacific Grove, Calif
161Ho	0	7/2	-	Atomic and Molecular Beams	1964Bu09	Phys Rev 135, B1281
				Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
				LASER Spectroscopy	1987AlZO	Program and Theses, Proc 37th Ann Conf Nucl Spectrosc Struct At Nuclei, Yurmala, p.116

161Ho				LASER Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
161Er	0	3/2	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
161Tm	0	7/2	+	Atomic and Molecular Beams LASER Spectroscopy	1971Ek01 1988Al04	Nucl Phys A170, 649 Nucl Phys A477, 37
161Yb	0	3/2	-	LASER Spectroscopy	1983Ne13	Hyperfine Interactions 15/16, 181
161Lu	0	1/2	+	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
162Ho	0	1	+	Atomic and Molecular Beams Atomic and Molecular Beams	1969Ek01 1988NeZZ	Nucl Phys A135, 289 Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
162Ho	105.9	6	-	Atomic and Molecular Beams	1969Ek01	Nucl Phys A135, 289
162Tm	0	1	-	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
162Lu	0	1	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
163Dy	0	5/2	-	Paramagnetic Resonance Atomic and Molecular Beams	1958Pa11 1962Sp03	Proc Roy Soc (London) 245A, 118 Proc Phys Soc (London) 79, 787
163Ho	0	7/2	-	LASER Spectroscopy	1989Al27	Nucl Phys A504, 549
163Er	0	5/2	-	Atomic and Molecular Beams	1969St05	Phys Rev 179, 1170
163Tm	0	1/2	+	Atomic and Molecular Beams	1967Sc33	Bull Am Phys Soc 12, No 7, 1046, BF10
163Yb	0	3/2	-	LASER Spectroscopy	1983Ne13	Hyperfine Interactions 15/16, 181
163Lu	0	1/2	(+)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
164Ho	0	1	+	Atomic and Molecular Beams Atomic and Molecular Beams	1969Ek01 1970LiZY	Nucl Phys A135, 289 Intern Conf Prop Nuclei, Leysin, Switzerland, Vol 1, p.387
164Ho	139.8	6	-	Atomic and Molecular Beams Atomic and Molecular Beams	1969Ek01 1970LiZY	Nucl Phys A135, 289 Intern Conf Prop Nuclei, Leysin, Switzerland, Vol 1, p.387
164Tm	0	1	+	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
164Tm	0+x	6	-	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
164Lu	0	1	(-)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
165Dy	0	7/2	+	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
165Ho	0	7/2	-	Optical Spectroscopy Paramagnetic Resonance Optical Spectroscopy Paramagnetic Resonance	1935Sc02 1955Ba04 1957Be39 1958Hu17	Naturwissenschaften 23, 69 Proc Phys Soc (London) 68A, 1090 Optika i Spektroskopiya 3, 322 J Chem Phys 29, 754

165Ho				Paramagnetic Resonance	1958Ba35	Proc Roy Soc (London) 245A, 156
165Er	0	5/2	-	Atomic and Molecular Beams	1964Bu09	Phys Rev 135, B1281
165Tm	0	1/2	+	Atomic and Molecular Beams	1968Ek01	Phys Letters 26B, 146
				Atomic and Molecular Beams	1968Sc26	Bull Am Phys Soc 13, No 12, 1650, BE2
165Yb	0	5/2	-	Atomic and Molecular Beams	1983Ne13	Hyperfine Interactions 15/16, 181
165Lu	0	1/2	+	Atomic and Molecular Beams	1974Ek03	Phys Scr 10, 301
				LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
166Dy	0	0	+	Atomic and Molecular Beams	1961Ca07~	Phys Rev 122, 1796
166Ho	0	0	-	Atomic and Molecular Beams	1961Ca07~	Phys Rev 122, 1796
					1961Ch06~	Phys Rev 122, 591
166Tm	0	2	+	Atomic and Molecular Beams	1972Ad14	Nucl Phys A198, 380
166Lu	0	6	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
166Lu	34.37	3	(-)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
166Lu	43.0	0	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
167Er	0	7/2	+	Paramagnetic Resonance	1951Bl09	Proc Phys Soc (London) 64A, 204
				Paramagnetic Resonance	1958Hu17	J Chem Phys 29, 754
				Atomic and Molecular Beams	1962Sp03	Proc Phys Soc (London) 79, 787
167Tm	0	1/2	+	Atomic and Molecular Beams	1961Wa04	Phys Rev 121, 224
167Yb	0	5/2	-	LASER Spectroscopy	1982Bu21	Nucl Instrum Methods 202, 159
				LASER Spectroscopy	1983Ne13	Hyperfine Interactions 15/16, 181
167Lu	0	7/2	+	Atomic and Molecular Beams	1972Ek01	Phys Lett 39B, 199
				LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
167Lu	0+x	1/2	+	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
168Tm	0	3	+	Atomic and Molecular Beams	1971Ek01	Nucl Phys A170, 649
168Lu	0	6	(-)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
168Lu	220	3	+	Atomic and Molecular Beams	1974Ek03	Phys Scr 10, 301
				LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
169Er	0	1/2	-	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
169Tm	0	1/2	+	Optical Spectroscopy	1934Sc03	Naturwissenschaften 22, 838
				Optical Spectroscopy	1957Be39	Optika i Spektroskopiya 3, 322
				Paramagnetic Resonance	1961Ha37	J Chem Phys 35, 1521
				Paramagnetic Resonance	1963Lo07	W Low, Ed, Academic Press, New York, Vol 1, p.167
169Yb	0	7/2	+	Optical Spectroscopy	1974Ch38	J Phys (London) B7, L262
169Yb	24.20	1/2	-	LASER Spectroscopy	1983Ne13	Hyperfine Interactions 15/16, 181
169Lu	0	7/2	+	Atomic and Molecular Beams	1968Ek01	Phys Letters 26B, 146
				LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
169Lu	29.0	1/2	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
170Tm	0	1	-	Atomic and Molecular Beams	1960Ca15	Phys Rev 120, 920

170Lu	0	0	+	Atomic and Molecular Beams LASER Spectroscopy	1968Ek01~ 1998Ge13	Phys Letters 26B, 146 Eur Phys J A 3, 225
171Er	0	5/2	-	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
171Tm	0	1/2	+	Atomic and Molecular Beams	1961Ca07	Phys Rev 122, 1796
171Yb	0	1/2	-	Optical Spectroscopy Paramagnetic Resonance Paramagnetic Resonance	1938Sc10 1956Co21 1960Lo01	Z Physik 111, 165 Proc PhysSoc (London) 69A, 282 Phys Rev 118, 1608
171Lu	0	7/2	+	Atomic and Molecular Beams LASER Spectroscopy	1968Ek01 1998Ge13	Phys Letters 26B, 146 Eur Phys J A 3, 225
171Lu	71.13	1/2	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
172Lu	0	4	-	Atomic and Molecular Beams LASER Spectroscopy	1974Ek03 1998Ge13	Phys Scr 10, 301 Eur Phys J A 3, 225
172Lu	41.86	1	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
173Yb	0	5/2	-	Optical Spectroscopy Optical Spectroscopy Paramagnetic Resonance Paramagnetic Resonance	1938Sc10 1954Kr52 1956Co21 1960Lo01	Z Physik 111, 165 Ann Physik 15, 124 Proc Phys Soc (London) 69A, 282 Phys Rev 118, 1608
173Lu	0	7/2	+	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
174Lu	0	1	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
174Lu	170.8	6	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
175Lu	0	7/2	+	Optical Spectroscopy LASER Spectroscopy	1935Sc04 1998Ge13	Z Physik 98, 430 Eur Phys J A 3, 225
175Hf	0	5/2	(-)	LASER Spectroscopy	1997Ji02	Phys Rev C55, 1545
175Ta	0	7/2	+	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
176Lu	0	7	-	Optical Spectroscopy Optical Spectroscopy Atomic and Molecular Beams LASER Spectroscopy	1959Ka97 1961Bl07 1962Sp03 1998Ge13	Vestnik Leningrad Univ 14, No 16, Ser Fiz i Khim No 3, 51 J Phys Radium 22, 417 Proc Phys Soc (London) 79, 787 Eur Phys J A 3, 225
176Lu	122.8	1	-	Atomic and Molecular Beams LASER Spectroscopy	1965Wh03 1998Ge13	Phys Rev 137, B477 Eur Phys J A 3, 225
177Lu	0	7/2	+	Atomic and Molecular Beams LASER Spectroscopy	1962Pe07 1998Ge13	Phys Rev 126, 252 Eur Phys J A 3, 225
177Lu	970.2	23/2	-	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
177Hf	0	7/2	-	Optical Spectroscopy LASER Spectroscopy	1956Sp22 1995Ji15	Phys Rev 101, 1831 Phys Rev A52, 157
177Ta	0	7/2	+	Atomic and Molecular Beams	1978Ru04	Phys Scr 18, 209
178Lu	0	1	(+)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
178Lu	123.8	9	(-)	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
178Hf	0	0	+	Optical Spectroscopy	1935Ra01~	Naturwissenschaften 23, 69
179Lu	0	7/2	+	LASER Spectroscopy	1998Ge13	Eur Phys J A 3, 225
179Hf	0	9/2	+	Optical Spectroscopy	1956Sp22	Phys Rev 101, 1831
180Hf	0	0	+	Optical Spectroscopy	1935Ra01~	Naturwissenschaften 23, 69
181Ta	0	7/2	+	Optical Spectroscopy Optical Spectroscopy	1933Gi02 1933Mc01	Nature 132, 566 Phys Rev 44, 949

181Ta	6.237	9/2	-	Collinear Laser Spectroscopy	2006Bi14	Phys Rev C74, 047301
181Re	0	5/2	+	Atomic and Molecular Beams	1975Ru06	Phys Rev 58B, 283
181Hg	0	1/2	-	Optical Pumping	1976Bo09	Z Physik A276, 203
182W	0	0	+	Optical Spectroscopy	1934Gr04~	Phys Rev 45, 166
182Re	0	7	+	Nuclear Magnetic Resonance	1983Sp05	Hyperfine Interactions 15/16, 89
183Ta	0	7/2	+	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
183W	0	1/2	-	Optical Spectroscopy	1948Ko30	Z Physik 124, 685
				Optical Spectroscopy	1950Fo08	Phys Rev 78, 744
183Hg	0	1/2	-	Optical Pumping	1972Bo09	Phys Lett 38B, 308
184W	0	0	+	Optical Spectroscopy	1934Gr04~	Phys Rev 45, 166
184Au	0	5	+	LASER Spectroscopy	1997Le22	Phys Rev Lett 79, 2213
184Au	68.46	2	+	LASER Spectroscopy	1997Le22	Phys Rev Lett 79, 2213
185W	0	3/2	-	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
185Re	0	5/2	+	Optical Spectroscopy	1931Ze01	Nature 128, 637
				Optical Spectroscopy	1931Me01	Phys Rev 38, 1258
				Microwave Spectroscopy	1954Ja16	Phys Rev 96, 649
185Ir	0	5/2	-	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
185Au	0	5/2	-	Atomic and Molecular Beams	1978EkZW	Priv Comm
				Atomic and Molecular Beams	1980Ek04	Nucl Phys A348, 25
185Hg	0	1/2	-	Optical Pumping	1976Bo09	Z Phys A276, 203
185Hg	99.3	13/2	+	Quantum-Beat Spectroscopy	1979Kr11	Phys Rev Lett 43, 1376
186W	0	0	+	Optical Spectroscopy	1934Gr04~	Phys Rev 45, 166
186Re	0	1	-	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
186Ir	0	5	+	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
				Atomic and Molecular Beams	1978Ru04	Phys Scr 18, 209
186Au	0	3	-	Atomic and Molecular Beams	1976Ek01	Phys Lett 60B, 146
187W	0	3/2	-	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
187Re	0	5/2	+	Optical Spectroscopy	1931Ze01	Nature 128, 637
				Optical Spectroscopy	1931Me01	Phys Rev 38, 1258
				Microwave Spectroscopy	1954Ja16	Phys Rev 96, 649
187Os	0	1/2	-	Optical Spectroscopy	1955Mu45	Phys Rev 98, 1285
				Optical Spectroscopy	1961Gu08	Z Physik 165, 356
187Ir	0	3/2	+	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
187Pt	0	3/2	-	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
187Au	0	1/2	(+)	Atomic and Molecular Beams	1976Ek01	Phys Lett 60B, 146
187Hg	0	3/2	(-)	Optical Pumping	1971Bo31	Phys Lett 36B, 41
187Hg	0+X	13/2	(+)	Quantum-Beat Spectroscopy	1979Kr11	Phys Rev Lett 43, 1376
188Re	0	1	-	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
188Ir	0	1	-	Nuclear Magnetic Resonance	1985Ed02	Phys Rev C32, 582
188Au	0	1	(-)	Atomic and Molecular Beams	1976Ek01	Phys Lett 60B, 146
				Atomic and Molecular Beams	1978Ek05	Hyperfine Interactions 4, 165
				Atomic and Molecular Beams	1978EkZW	Priv Comm
				Atomic and Molecular Beams	1980Ek04	Nucl Phys A348, 25
189Os	0	3/2	-	Optical Spectroscopy	1952Mu40	Phys Rev 87, 1048
				Nuclear Magnetic Resonance	1954Lo36	Phys Rev 95, 291
				Optical Spectroscopy	1958Bl59	Ann Phys 3, 1019
189Ir	0	3/2	+	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
189Pt	0	3/2	-	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
189Au	0	1/2	+	Atomic and Molecular Beams	1976Ek01	Phys Lett 60B, 146

189Au	247.2	11/2	-	Atomic and Molecular Beams	1976Ek01	Phys Lett 60B, 146
189Hg	0	3/2	-	Optical Pumping	1976Bo09	Z Phys A276, 203
189Hg	0+X	13/2	+	LASER Spectroscopy	1979Da06	Phys Lett 82B, 199
190Au	0	1	-	Atomic and Molecular Beams	1964Li06	Arkiv Fysik 25, 107
				Atomic and Molecular Beams	1966Ch05	Phys Rev 144, 1020
190Tl	0+X	2	(-)	LASER Spectroscopy	1992Me07	Z Physik A341, 475
190Tl	0+Y	7	(+)	LASER Spectroscopy	1992Me07	Z Physik A341, 475
191Ir	0	3/2	+	Optical Spectroscopy	1950Br75	Naturwissenschaften 37, 397
				Optical Spectroscopy	1952Mu40	Phys Rev 87, 1048
				Optical Spectroscopy	1953Si61	Ann Physik 13, 136
191Pt	0	3/2	-	Atomic and Molecular Beams	1975Ru06	Phys Lett 58B, 283
191Au	0	3/2	+	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
191Hg	0	3/2	(-)	Optical Pumping	1976Bo09	Z Physik A276, 203
191Tl	0+X	9/2	(-)	Atomic and Molecular Beams	1984Be40	Phys Scr 30, 164
192Ir	0	4	+	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
192Au	0	1	-	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
193Ir	0	3/2	+	Optical Spectroscopy	1935Ve01	Proc Indian Acad Sci 2A, 203
				Optical Spectroscopy	1950Br75	Naturwissenschaften 37, 397
				Optical Spectroscopy	1952Mu40	Phys Rev 87, 1048
				Optical Spectroscopy	1953Si61	Ann Physik 13, 136
193Ir	73.05	1/2	+	Mossbauer Spectroscopy	1967At03	Phys Rev 163, 314
193Au	0	3/2	+	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
193Hg	0	3/2	(-)	Optical Spectroscopy	1964Kl01	Phys Letters 13, 212
				Optical Spectroscopy	1966Da07	Phys Rev 147, 861
193Hg	140.8	13/2	(+)	Optical Spectroscopy	1964To05	Nucl Phys 60, 614
				Optical Spectroscopy	1966Da07	Phys Rev 147, 861
193Tl	0	1/2	(+)	Atomic and Molecular Beams	1976Ek03	Hyperfine Interactions 1, 437
194Ir	0	1	-	Atomic and Molecular Beams	1963Do13	Nucl Phys 49, 449
194Pt	0	0	+	Optical Spectroscopy	1935Fu06~	Naturwissenschaften 23, 372
194Au	0	1	-	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
194Tl	0	2	-	Atomic and Molecular Beams	1976Ek03	Hyperfine Interactions 1, 437
195Pt	0	1/2	-	Optical Spectroscopy	1936Ja01	Z Physik 100, 513
				Optical Spectroscopy	1937To03	Proc Roy Soc (London) 158A, 110
				Nuclear Magnetic Resonance	1951Pr02	Phys Rev 81, 20
195Pt	259.3	13/2	+	Nuclear Magnetic Resonance	1972Ba22	Phys Rev Lett 28, 720
195Au	0	3/2	+	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
195Hg	0	1/2	-	Optical Spectroscopy	1964To05	Nucl Phys 60, 614
195Hg	176.1	13/2	+	Optical Spectroscopy	1964To05	Nucl Phys 60, 614
195Tl	0	1/2	+	Atomic and Molecular Beams	1962Ax02	Arkiv Fysik 22, 392
196Pt	0	0	+	Optical Spectroscopy	1935Fu06~	Naturwissenschaften 23, 372
196Au	0	2	-	Atomic and Molecular Beams	1960Ew06	Phys Rev 120, 1406
				Atomic and Molecular Beams	1970Sc07	Phys Rev C2, 225
196Au	595.7	12	-	Atomic and Molecular Beams	1962Ch13	Phys Rev 127, 572

196Tl	0	2	-	Atomic and Molecular Beams	1976Ek03	Hyperfine Interactions 1, 437
197Pt	0	1/2	-	Atomic and Molecular Beams	1968Ch18	Bull Am Phys Soc 13, No 6, 895, CE14
197Au	0	3/2	+	Optical Spectroscopy	1939El03	Phys Rev 55, 170
197Hg	0	1/2	-	Optical Spectroscopy Optical Double Resonance Optical Spectroscopy	1954Bi92 1959Me81 1973Re04	Phys Rev 96, 1531 Phys Rev 115, 126 Phys Rev C7, 2065
197Hg	298.9	13/2	+	Optical Spectroscopy Optical Spectroscopy	1959Me82 1973Re04	Phys Rev 115, 130 Phys Rev C7, 2065
197Tl	0	1/2	+	Atomic and Molecular Beams	1957Br32	Phys Rev 107, 189
198Au	0	2	-	Atomic and Molecular Beams	1956Ch08	Phys Rev 101, 1389
198Hg	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Sc03~ 1931To01~	Z Physik 72, 423 Proc Roy Soc (London) 130A, 558
198Tl	0	2	-	Atomic and Molecular Beams	1958Li45	Phys Rev Letters 1, 473
198Tl	543.5	7	+	Atomic and Molecular Beams	1957Br32	Phys Rev 107, 189
199Au	0	3/2	+	Atomic and Molecular Beams	1956Ch08	Phys Rev 101, 1389
199Hg	0	1/2	-	Optical Spectroscopy Nuclear Magnetic Resonance	1931Sc03 1951Pr02	Z Physik 72, 423 Phys Rev 81, 20
199Hg	532.5	13/2	+	Optical Pumping	1973Re04	Phys Rev C7, 2065
199Tl	0	1/2	+	Atomic and Molecular Beams	1957Br32	Phys Rev 107, 189
199Bi	0	9/2	-	Atomic and Molecular Beams	1959Ax98	Arkiv Fysik 15, 463
200mAu	962	12	-	Nuclear Magnetic Resonance/Static Nuclear Orientation	1973	Phys Rev C7, 1654
200Hg	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Sc03~ 1931To01~	Z Physik 72, 423 Proc Roy Soc (London) 130A,558
200Tl	0	2	-	Atomic and Molecular Beams	1958Ma21	Bull Am Phys Soc 3, No 3, 186 J6
200Bi	0	7	+	Atomic and Molecular Beams	1959Ax98	Arkiv Fysik 15, 463
201Hg	0	3/2	-	Optical Spectroscopy Optical Spectroscopy	1931Sc03 1935Sc04	Z Physik 72, 423 Z Physik 98, 430
201Tl	0	1/2	+	Atomic and Molecular Beams Atomic and Molecular Beams	1958Li45 1958Ma21	Phys Rev Lett 1, 473 Bull Am Phys Soc 3, No 3, 186 J6
201Pb	0	5/2	-	Atomic and Molecular Beams	1977Gu18	Phys Lett 72B, 166
201Bi	0	9/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1959Ax98 1960Li03	Arkiv Fysik 15, 463 Arkiv Fysik 16, 506A
201Po	0	3/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1961Ax02 1962Ax02	Arkiv Fysik 19, 461 Arkiv Fysik 22, 392
202Hg	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Sc03~ 1931To01~	Z Physik 72, 423 Proc Roy Soc (London) 130A,558
202Tl	0	2	-	Atomic and Molecular Beams	1958Ma35	Bull Am Phys Soc 3, No 5, 319 E10
202Bi	0	5	+	Atomic and Molecular Beams	1959Ax98	Arkiv Fysik 15, 463
202Po	0	0	+	Atomic and Molecular Beams	1961Ax02~	Arkiv Fysik 19, 461
203Hg	0	5/2	-	Optical Spectroscopy	1964Re03	Phys Lett 8, 257
203Tl	0	1/2	+	Optical Spectroscopy	1931Sc02	Z Physik 70, 1

203Tl				Optical Spectroscopy Nuclear Magnetic Resonance	1932Ja02 1950Pr51	Z Physik 75, 223 Phys Rev 79, 35
203Bi	0	9/2	-	Atomic and Molecular Beams	1959Li50	Arkiv Fysik 15, 445
203Po	0	5/2	-	Atomic and Molecular Beams	1961Ax02	Arkiv Fysik 19, 461
204Hg	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Sc03~ 1931To01~	Z Physik 72, 423 Proc Roy Soc (London) 130A,558
204Tl	0	2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1956Be24 1957Br32	Z Naturforsch 11a, 956 Phys Rev 107, 189
204Bi	0	6	+	Atomic and Molecular Beams	1959Li50	Arkiv Fysik 15, 445
204Po	0	0	+	Atomic and Molecular Beams	1961Ax02~	Arkiv Fysik 19, 461
205Hg	0	1/2	-	β-Asymmetry from Oriented Nuclei/Optical Pumping Optical Pumping	1972Ot03 1975Ro10	 Z Physik A272, 369
205Tl	0	1/2	+	Optical Spectroscopy Oprical Spectroscopy Nuclear Magnetic Resonance	1931Sc02 1932Ja02 1950Pr51	Z Physik 70, 1 Z Physik 75, 223 Phys Rev 79, 35
205Bi	0	9/2	-	Atomic and Molecular Beams	1959Li50	Arkiv Fysik 15, 445
205Po	0	5/2	-	Atomic and Molecular Beams	1961Ax02	Arkiv Fysik 19, 461
205Rn	0	5/2	-	Hyperfine Structure	1987Bo29	Hyperfine Interactions 34, 25
206Tl	0	0	-	Atomic and Molecular Beams Atomic and Molecular Beams	1968Ro12 1969Cu09~	Priv Comm J Phys A (London) 2, 658
206Pb	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Mu02~ 1932Ko01~	Z Physik 72, 793 Z Physik 75, 363
206Bi	0	6	+	Atomic and Molecular Beams Atomic and Molecular Beams	1957Ma24 1959Li50	Bull Am Phys Soc 2, No 8, 383K4 Arkiv Fysik 15, 445
206Po	0	0	+	Atomic and Molecular Beams	1961Ax02~	Arkiv Fysik 19, 461
207Pb	0	1/2	-	Optical Spectroscopy Optical Spectroscopy Nuclear Magnetic Resonance Atomic and Molecular Beams	1931Mu02 1932Ko01 1950Pr51 1970Lu05	Z Physik 72, 793 Z Physik 75, 363 Phys Rev 79, 35 Nucl Instrum Methods 79, 333
207Po	0	5/2	-	Atomic and Molecular Beams	1961Ax02	Arkiv Fysik 19, 461
207Rn	0	5/2	-	Hyperfine Structure	1987Bo29	Hyperfine Interactions 34, 25
207Fr	0	9/2	-	Hyperfine Structure/Atomic Beam	1986Ek02	Phys Scr 34, 624
208Pb	0	0	+	Optical Spectroscopy Optical Spectroscopy	1931Mu02~ 1932Ko01~	Z Physik 72, 793 Z Physik 75, 363
208Fr	0	7	+	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
209Bi	0	9/2	-	Optical Spectroscopy Optical Spectroscopy Optical Spectroscopy	1928Ba01 1935Sc04 1938Sc 10	Z Physik 47, 174 Z Physik 98, 430 Z Physik 111, 165
209Po	0	1/2	-	Optical Spectroscopy	1955Va16	J Opt Soc Am 45, 1087
209Fr	0	9/2	-	Atomic and Molecular Beams Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05 1986Ek02	Phys Scr 18, 51 Hyperfine Interactions 4, 165 Phys Scr 34, 624

209Ra	0	5/2	-	Collinear Laser Spectroscopy	1988Ah02	Nucl Phys A483, 244
210Bi	0	1	-	Atomic and Molecular Beams	1954Sm96	Priv Comm, quoted by 1954Pl30
210Po	0	0	+	Atomic and Molecular Beams	1961Al20~	Thesis, Univ California; UCRL-9850
210Fr	0	6	+	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
211Pb	0	9/2	+	Atomic and Molecular Beams	1986An06	Nucl Phys A451, 471
211At	0	9/2	+	Atomic and Molecular Beams	1958Ga16	Phys Rev Lett 1, 74
211Rn	0	1/2	-	Hyperfine Structure	1987Bo29	Hyperfine Interactions 34, 25
211Fr	0	9/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
211Ra	0	5/2	(-)	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
212Fr	0	5	+	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
213Fr	0	9/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
213Ra	0	1/2	-	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
219Rn	0	5/2	+	Collinear Fast-Beam Laser Spectroscopy Collinear Fast-Beam Laser Spectroscopy	1987Bo29 1988NeZZ	Hyperfine Interactions 34, 25 Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
220Fr	0	1	+	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
221Rn	0	7/2	+	Laser Spectroscopy	1987Bo29	Hyperfine Interactions 34, 25
221Fr	0	5/2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
221Ra	0	5/2	+	Collinear Fast-Beam Laser Spectroscopy Laser Spectroscopy	1983Ah03 1988Ah02	Phys Lett 133B, 47 Nucl Phys A483, 244
222Fr	0	2	-	Atomic and Molecular Beams Atomic and Molecular Beams	1978Ek02 1978Ek05	Phys Scr 18, 51 Hyperfine Interactions 4, 165
223Rn	0	7/2		Collinear Fast-Beam Laser Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126

223Fr	0	3/2	(-)	Atomic and Molecular Beams/Laser Optical Pumping	1985Co24	Phys Lett 163B, 66
223Ra	0	3/2	+	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
				Collinear Fast-Beam Laser Spectroscopy	1988Ah02	Nucl Phys A483, 244
224Fr	0	1	-	Nuclear Magnetic Resonance	1985Co24	Phys Lett 163B, 66
225Rn	0	7/2	-	Collinear Fast-Beam Laser Spectroscopy	1988NeZZ	Proc 5th Int Conf Nuclei Far from Stability, Rosseau Lake, Canada 1987, Ed., I.S.Towner, p.126
225Fr	0	3/2	-	Atomic and Molecular Beams	1985Co24	Phys Lett 163B, 66
225Ra	0	1/2	+	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
226Fr	0	1	-	Nuclear Magnetic Resonance	1985Co24	Phys Lett 163B, 66
227Fr	0	1/2	+	Atomic and Molecular Beams	1985Co24	Phys Lett 163B, 66
227Ra	0	3/2	+	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
				Collinear Fast-Beam Laser Spectroscopy	1988Ah02	Nucl Phys A483, 244
227Ac	0	3/2	-	Optical Spectroscopy	1951To19	Phys Rev 84, 168
228Fr	0	2	-	Nuclear Magnetic Resonance	1985Co24	Phys Lett 163B, 66
228Ac	0	3	+	βγ(θ)	1967Bh01	Nucl Phys A90, 696
229Ra	0	5/2	+	Collinear Fast-Beam Laser Spectroscopy	1983Ah03	Phys Lett 133B, 47
229Th	0	5/2	+	Optical Spectroscopy	1964Eg01	Opt Spektrosk 16, 549
				Optical Spectroscopy	1964To02	Priv Comm
231Pa	0	3/2	-	Optical Spectroscopy	1934Sc04	Naturwissenschaften 22, 511
				Electron Paramagnetic Resonance	1960Ky01	Thesis, Univ California; UCRL-9109
				Optical Spectroscopy	1961Ri06	Nature 192, 444
				Electron Paramagnetic Resonance	1961Ax01	Phys Rev 121, 1630
233Pa	0	3/2	-	Atomic and Molecular Beams	1961Ma42	Nucl Phys 23, 90
233U	0	5/2	+	Optical Spectroscopy	1954Va01	J Opt Soc Am 44, 87
				Optical Spectroscopy	1955Ko36	Zhur Eksptl I Teoret Fiz 28,471; Soviet Phys JETP 1, 310
				Optical Spectroscopy	1956Ka53	Opt Spektrosk 1, 809; AEC-tr-2890; Nucl Sci Abstr 11, 700, Abstr 6512
					1956Zi05	Doklady Akad Nauk SSSR 109, 283
				Electron Paramagnetic Resonance	1957Do40	Phys Rev 105, 1307
				α-Anisotropy from Oriented Nuclei	1958Da21	Physica 24, S69

233U				α-Anisotropy from Oriented Nuclei	1960Ro27	Proc Intern Conf Nucl Struct, Kingston, Canada, D.A.Bromley, E.W.Vogt, Eds., Univ Toronto Press, p.884
				α-Anisotropy from Oriented Nuclei	1968Ma42	Yadern Fiz 7, 473; Soviet J Nucl Phys 7, 297
235U	0	7/2	-	Optical Spectroscopy	1955Va07	J Opt Soc Am 45, 65
				Electron Paramagnetic Resonance	1956Hu26	Phys Rev 102, 292
				Optical Spectroscopy	1956Ka53	Opt Spektrosk 1, 809; AEC-tr-2890; Nucl Sci Abstr 11, 700, Abstr 6512
				Optical Spectroscopy	1957Bl66	J Phys Radium 18, 318
				α-Anisotropy from Oriented Nuclei	1958Da21	Physica 24, S69
237Np	0	5/2	+	Optical Spectroscopy	1948To08	Phys Rev 73, 1214
				Electron Paramagnetic Resonance	1954Bl73	Phil Mag 45, 992
				Electron Paramagnetic Resonance	1955Bo56	Repts Prog in Phys 18, 304
238Np	0	2	+	Atomic and Molecular Beams	1958Al92	Phys Rev 111, 1137
239Np	0	5/2	+	Atomic and Molecular Beams	1958Hu11	Phys Rev 110, 287
		>1/2		Electron Paramagnetic Resonance	1958Ab18	Phys Rev 112, 553
239Pu	0	1/2	+	Electron Paramagnetic Resonance	1954Bl72	Phil Mag 45, 991
				Optical Spectroscopy	1954Va06	Physica 20, 461
				Optical Spectroscopy	1955Ko36	Zhur Eksptl I Teoret Fiz 28,471; Soviet Phys JETP 1, 310
				Optical Spectroscopy	1955Ka40	Doklady Akad Nauk SSSR 103, 49
				Electron Paramagnetic Resonance	1955Bo56	Repts Prog in Phys 18, 304
				Electron Paramagnetic Resonance	1958Ab18	Phys Rev 112, 553
				Atomic and Molecular Beams	1958Hu70	Phys Rev 109, 390
241Pu	0	5/2	+	Electron Paramagnetic Resonance	1954Bl72	Phil Mag 45, 991
				Electron Paramagnetic Resonance	1955Bo56	Repts Prog in Phys 18, 304
241Am	0	5/2	-	Optical Spectroscopy	1953Fr01	Phys Rev 89, 318
				Optical Spectroscopy	1956Th18	Nature 178, 484
				Atomic and Molecular Beams	1960Ma30	Phys Rev 120, 1429
				Electron Paramagnetic Resonance	1967Ea04	
				Electron Paramagnetic Resonance	1968Ed01	J Chem Phys 48, 2110
242Am	0	1	-	Atomic and Molecular Bemas	1961Ma27	Phys Rev 124, 1904
242Cm	0	0	+	Atomic and Molecular Beams	1959Hu15~	Phys Rev 114, 586
243Am	0	5/2	-	Optical Spectroscopy	1954Co19	Phys Rev 94, 498
243Cm	0	5/2	+	Electron Paramagnetic Resonance	1973Ab03	Phys Lett 44A, 527
245Cm	0	7/2	+	Electron Paramagnetic Resonance	1970Ab03	Phys Rev B1, 3555
247Cm	0	9/2	-	Electron Paramagnetic Resonance	1973Ab03	Phys Lett 44A, 527
249Bk	0	7/2	+	Optical Spectroscopy	1967Wo01	J Opt Soc Am 57, 550
				Electron Paramagnetic Resonance	1972	Phys Lett 42A, 93
253Es	0	7/2	+	Optical Spectroscopy	1970Wo14	J Opt Soc Amer 60, 1297

253Es				Optical Spectroscopy	1970Co34	UCRL-19530, p.200
				Electron Paramagnetic Resonance	1970Ed02	J Chem Phys 52, 6425
				Electron Paramagnetic Resonance	1971Ed04	J Chem Phys 54, 2488
		≥7/2		Optical Spectroscopy	1968Wo07	J Opt Soc Am 58, 998
				Atomic and Molecular Beams	1975Go05	Phys Rev A11, 499
254Es	84.2	2	+	Atomic and Molecular Beams	1975Go05	Phys Rev A11, 499