^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 134, 149 (2016)	15-Apr-2015

$J^\pi(^{182}W)=0^+$.

Others: 1963Is01, 1965Er03, 1966Si04, 1967Si17, 1972Is05, 1973Ca09.

2011Bo09: E(pol d)=18 MeV, polarization≈60% from Lamb-shift ion source At Munich tandem accelerator; natural W target; Q3d magnetic spectrograph with position-sensitive detector (FWHM≈4 keV for $\theta\leq 20°$); measured $\sigma(\theta)$ and asymmetry (θ(lab)=11°−26° In 3° steps, 30°−50° In 5° steps); DWBA analysis.

1997Pr02: ED=26 MeV; carbon-backed, 94.5% enriched ^{182}W target; Q3d spectrograph with position sensitive cathode strip detector (FWHM unstated In 1997Pr02, but 3.3-3.9 keV listed In 1995Be02 for study using the same spectrograph); θ(lab)=60°; measured spectra (E(level)=0-2.2 MeV), 8 overlapping segments.

1973Ca09: E(pol d)=12.08, 15.0 MeV; isotopically enriched thick target; θ(lab)=30° *1255*° (7 angles); FWHM=25-35 keV; measured P spectra, analyzing power; DWBA calculations.

1972Ca01,1973Kl07: E(d)=12.08 MeV; FWHM=10-12 keV.

1966Si04,1967Si17: E(d)=7.5, 12 MeV.

DWBA analysis of data.

^{183}W Levels

E(level)[†]	J^π[‡]	L[@]	I(p) (rel.)[#]	Comments
0.0[e]	1/2−	1	0.0055[c]	
46.5[e] *3*	3/2−	1	0.089[c]	Ip(26 MeV)/Ip(12 MeV)=0.25; Ip(rel.,26 MeV)=70 *5* (1997Pr02).
99.1[e] *2*	5/2−	3	0.15	Ip(26 MeV)/Ip(12 MeV)=0.25; Ip(rel.,26 MeV)=49 *3* (1997Pr02).
208.8[df] *2*	3/2−&7/2−	1	0.058[cd]	Ip(26 MeV)/Ip(12 MeV)=0.2 *1* for doublet consisting of 3/2 *3*/2[512] and 7/2 *1*/2[510] levels and apparently dominated by the former; Ip(rel.,26 MeV)=42 *3* (1997Pr02).
291.9[f] *3*	5/2−	3	0.084[c]	Ip(26 MeV)/Ip(12 MeV)=0.24; Ip(rel.,26 MeV)=31.0 *23* (1997Pr02).
309.2[dg] *4*	9/2−&11/2+	5	[d]	Ip(26 MeV)/Ip(12 MeV)=0.91 for doublet including 9/2, 1/2[510] and 11/2, 11/2[615] levels (apparently dominated by the former since L=5 dominates); Ip(rel.,26 MeV)=11.8 *14* (1997Pr02). 3/2[510] band assignment In table 3 of 2011Bo09 is presumed to be a typographical error; In the literature, this doublet includes a member of the 1/2[510] band.
412.3[f] *2*	7/2−	3	0.044	J^π: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.35; Ip(rel.,26 MeV)=32 *7* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 67 (11°), 104 (20°), 184 (30°).
452.9[h] *2*	7/2−	3	0.115	J^π: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.30; Ip(rel.,26 MeV)=74 *8* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 209 (20°), 394 (30°).
486.1[g] *2*	13/2+	6	0.097	Ip(26 MeV)/Ip(12 MeV)=2.7; Ip(rel.,26 MeV)=46 *6* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09):≈16 (11°), 28 (20°).
552.8[f] *7*	9/2−	≥3		Ip(26 MeV)/Ip(12 MeV) >0.7 (12 MeV datum is an upper limit); Ip(rel.)=2.0 *14* (1997Pr02).
599.4[h] *9*	9/2−	≥3		Ip(26 MeV)/Ip(12 MeV)=1.4; Ip(rel.,26 MeV)=4.0 *17* (1997Pr02).
689.4[g] *10*	(15/2+)			Ip(rel.)=3.7 *12* (1997Pr02).
740.3[f] *6*	11/2−	5	0.035	Ip(26 MeV)/Ip(12 MeV)>1.3; Ip(rel.,26 MeV)=6.6 *26* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 13 (20°), 20 (30°).
913?[&] *5*				E(level): unconfirmed In subsequent studies so indicated As uncertain here.
935.0[k] *5*	1/2−	1	0.014	J^π: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.22; Ip(rel.,26 MeV)=8.3 *17* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 29 (11°), 44 (20°), 31 (30°).
964.2[i] *16*	(13/2+)	6		L and Nilsson orbital assignment taken from the literature. Ip(rel.,26 MeV)=3.5

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^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01 (continued)

^{183}W Levels (continued)

E(level)[†]	Jπ[‡]	L[@]	I(p) (rel.)[#]	Comments
				20 (1997Pr02).
999.2[j] *4*	7/2⁻	3	0.02	Ip(26 MeV)/Ip(12 MeV)=0.39; Ip(rel.,26 MeV)=15 *3* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 46 (11°), 62 (20°), 76 (30°).
1029 *6*		1		E(level),L: from 1972Ca01.
1069.3[l] *4*	7/2⁻	3		Ip(26 MeV)/Ip(12 MeV)=0.54; Ip(rel.,26 MeV)=9.2 *26* (1997Pr02).
1126.2[j] *8*	9/2⁻	≥5		Ip(26 MeV)/Ip(12 MeV)=3.2; Ip(rel.,26 MeV)=3.2 *14* (1997Pr02). L: >3 (1997Pr02);≥5 for E=1128 *7* (1972Ca01).
1149.8[m] *1*	3/2⁻	1	0.10	Jπ: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.21; Ip(rel.,26 MeV)=100 *6* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 450 (20°), 420 (30°). possibly the E=1156 *5* line reported by 1965Er03; however, 1973Ca09 deduced L=2 (J=5/2 preferred) from (pol d,p) for an E=1154 *7* level, so a separate (5/2⁺) level May exist In this vicinity.
1217.2[l] *11*	9/2⁻	≥5		Ip(26 MeV)/Ip(12 MeV)=1.6; Ip(rel.,26 MeV)=3.2 *14* (1997Pr02). L: >3 from 1997Pr02,≥5 from 1972Ca01.
1229.5[m] *3*	5/2⁻	3	0.017[c]	Ip(26 MeV)/Ip(12 MeV)=0.51; Ip(rel.,26 MeV)=15.8 *23* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09):≈14 (20°),≈30 (30°).
1337.9[m] *5*	(7/2⁻&3/2⁻)	(1+3)		E(level): 1337.1 *7* for unresolved doublet In 2011Bo09. other E: 1338 *5* (1965Er03) and 1342 *8* (L=(3)) (1972Ca01). Ip(26 MeV)/Ip(12 MeV)=0.29; Ip(rel.,26 MeV)=8.3 *23* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 25 (11°), 30 (20°), 74 (30°).
1385.7[o] *3*	9/2⁻	5	0.096	Jπ: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.79; Ip(rel.,26 MeV)=22.1 *26* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 6? (11°), 17 (20°), 44 (30°).
1439.8 *20*		(1)		E(level),L: L from 1972Ca01 for E=1443 *9*. E=1437 *5* from 1965Er03.
1470.9[n] *1*	1/2⁻	1	0.16	Jπ: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.25; Ip(rel.,26 MeV)=66 *5* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 365 (20°), 364 (30°).
1476.1[m] *8*	(9/2⁻)			Ip(rel.,26 MeV)=2.9 *20* (1997Pr02).
1483.7 *7*		(1)	0.08[c]	Ip(26 MeV)/Ip(12 MeV)=0.28; Ip(rel.,26 MeV)=10.3 *23* (1997Pr02). other E: 1486.2 *6* (2011Bo09). dσ/dΩ (μb/sr) (2011Bo09):≈130 (30°).
1514? *9*				from 1972Ca01 alone, so level shown As tentative here.
1542.8 *9*				Ip(rel.,26 MeV)=5.2 *17* (1997Pr02).
1550.3[p] *4*	5/2⁻	3[a]	0.11	Jπ: from (pol d,p) (2011Bo09). (1997Pr02). Ip(26 MeV)/Ip(12 MeV)=0.35 but Ip(12 MeV) is for doublet; Ip(rel.,26 MeV)=38 *3* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 290 (20°), 280 (30°).
1556.7[n] *4*	3/2⁻	1[a]	0.04	L: from 1972Ca01; L=(1) from 2011Bo09. Ip(26 MeV)/Ip(12 MeV)=0.35 but Ip(12 MeV) is for doublet; Ip(rel.,26 MeV)=28 *4* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 150 (20°), 140 (30°).
1577.8 *5*		5		Ip(26 MeV)/Ip(12 MeV)=0.73; Ip(REL.,26 MeV)=13.8 *5* (1997Pr02).
1601.6 *5*				Ip(rel.,26 MeV)=4.6 *14* (1997Pr02).
1628.2[m] *5*	3/2⁻	1	0.024	Jπ: from (pol d,p) (2011Bo09). E(level): probably the 1636 *5* level reported by 1965Er03. fragment of 3/2[501] orbital. Ip(26 MeV)/Ip(12 MeV)=0.13; Ip(rel.,26 MeV)=18 *3* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 150 (11°), 100 (20°), 130 (30°).
1663[&] *5*				E(level): possibly the E≈1651 (L=1) level reported by 1972Ca01.
1676.3 *4*		(1)		other E: 1674 *1* (2011Bo09). Ip(rel.,26 MeV)=15.8 *23* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 60 (11°), 30 (30°).
1680.3 *4*	(7/2⁻)	3		E(level),L: other E: 1683.1 *7* (2011Bo09) for line perturbed by impurity. 1972Ca01 report L=3 level At 1679 *10* In (d,t) but not in (d,p).

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^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01 (continued)

^{183}W Levels (continued)

E(level)[†]	Jπ[‡]	L[@]	I(p) (rel.)[#]	Comments
				Ip(26 MeV)/Ip(12 MeV)=0.29; Ip(rel.,26 MeV)=21.0 *26* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09):≈40 (11°),≈120 (20°),≈200 (30°).
1691.2 *12*				Ip(rel.,26 MeV)=3.2 *14* (1997Pr02).
1716.4 *5*	(1/2+,3/2+)	(0,2)		other E: 1719.5 *3* (1997Pr02) for unresolved doublet for which authors propose L=3 based on Ip(26 MeV)/Ip(12 MeV)=0.44 for doublet; Ip(rel.,26 MeV)=39 *3* (1997Pr02). 1723 *10* (L=3) (1972Ca01).
				dσ/dΩ (μb/sr) (2011Bo09): 70 (11°), 100 (20°), 110 (30°).
1735.7 *5*	(5/2+)	(2)	0.008	Jπ,L: from (pol d,p) (2011Bo09). however, L=1 suggested by 1997Pr02 based on Ip(26 MeV)/Ip(12 MeV)=0.15; Ip(rel.,26 MeV)=13.2 *23* (1997Pr02). E=1740 *10* (L=1) reported by 1972Ca01.
				dσ/dΩ (μb/sr) (2011Bo09): 60 (20°), 78 (30°).
1784.1 *5*	5/2+	2	0.014	Jπ: from (pol d,p) (2011Bo09). however, L=1 suggested by 1997Pr02 based on Ip(26 MeV)/Ip(12 MeV)=0.17; Ip(rel.,26 MeV)=20.1 *26* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09): 80 (11°), 140 (20°), 120 (30°).
1793.8 *6*		3		L: other L: 1 from 1972Ca01 for E=1790 *11* level. E=1789 *5* from 1965Er03.
				Ip(REL.,26 MeV)=13.5 *23* (1997Pr02).
1802.1 *7*				Ip(REL.,26 MeV)=8.9 *20* (1997Pr02).
1812.4[n] *4*	1/2−	1	0.081	Jπ,L: from (pol d,p) (2011Bo09). however, L=3 suggested by 1997Pr02 based on Ip(26 MeV)/Ip(12 MeV)=0.30; Ip(rel.,26 MeV)=36 *3* (1997Pr02). E=1812.8 *8* (2011Bo09) for line perturbed by impurity line. Other: E=1816 *11* (L≥3) reported by 1972Ca01.
				dσ/dΩ (μb/sr) (2011Bo09): 170 (11°), 180 (20°), 190 (30°).
1821.5 *5*		1		other E: 1823.3 *4* (2011Bo09), 1827 *11* (1972Ca01), 1820 *5* (1965Er03).
				Ip(26 MeV)/Ip(12 MeV)=0.07; Ip(REL.,26 MeV)=18.4 *26* (1997Pr02).
1823.3 *4*	(1/2−)	1 0	0.045	dσ/dΩ (μb/sr) (2011Bo09): 90 (11°), 120 (20°), 120 (30°).
1840.8 *3*	5/2+	2 0	0.028	other E: 1842.7 *4* (2011Bo09).
				Jπ,L: from (pol d,p) (2011Bo09). however, L=1 suggested by 1997Pr02 based on Ip(26 MeV)/Ip(12 MeV)=0.15; Ip(REL.,26 MeV)=48 *4* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09): 300 (20°), 200 (30°).
1847? *11*		1		E(level),L: from 1972Ca01 only so shown As uncertain here.
1892.1? *9*				Ip(rel.,26 MeV)=6.0 *17* (1997Pr02).
1905.7 *5*	(1/2+,3/2+)	(0,2)		Jπ: (1/2+) favored by asymmetry In (pol d,p) (2011Bo09).
				Ip(rel.,26 MeV)=13.2 *23* (1997Pr02).
				other E: 1907.6 *8* (2011Bo09).
				dσ/dΩ (μb/sr) (2011Bo09): 60 (11°), 70 (20°), 50 (30°).
1944.5[m] *3*	3/2−	1	0.032	Jπ,L: from (pol d,p) (2011Bo09). However, L=3 suggested by 1997Pr02 based on Ip(26 MeV)/Ip(12 MeV)=0.34. Ip(rel.,26 MeV)=45 *4* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09): 100 (11°), 150 (20°).
1962.1 *4*		3		Ip(26 MeV)/Ip(12 MeV)=0.37; Ip(rel.,26 MeV)=23 *3* (1997Pr02).
				other E: 1950 *12* (1972Ca01), 1960 *5* (1965Er03).
1971.6 *9*		1		L: from 1972Ca01 for E=1969 *12*.
				Ip(rel.,26 MeV)=7.5 *20* (1997Pr02).
1981.0[m] *7*	3/2−	1	0.013	Jπ,L: from (pol d,p) (2011Bo09).
				Ip(rel.,26 MeV)=11.2 *20* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09): 65 (11°), 70 (20°), 55 (30°).
1991.0 *7*				Ip(rel.,26 MeV)=11.2 *20* (1997Pr02).
2002.2 *8*		*b*		Ip(26 MeV)/Ip(12 MeV)=0.25 but Ip(12 MeV) is for doublet; Ip(rel.,26 MeV)=9.2 *23* (1997Pr02).
2009.5 *7*		2,3[b]		Ip(26 MeV)/Ip(12 MeV)=0.25 but Ip(12 MeV) is for doublet; Ip(rel.,26 MeV)=12.6 *23* (1997Pr02).
				dσ/dΩ (μb/sr) (2011Bo09): 60 (11°), 110 (20°), 80 (30°).
2024.8 *6*				Ip(rel.,26 MeV)=10.9 *20* (1997Pr02). other: E=2014 *12* (L=1,3) proposed by 1972Ca01; possibly 2010+2025 doublet.
2044.2 *6*	(1/2+,3/2+)	(0,2)		L,Jπ: from 2011Bo09. however, 1997Pr02 propose L=3 based on Ip(26

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^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01 (continued)

^{183}W Levels (continued)

E(level)[†]	Jπ[‡]	L[@]	I(p) (rel.)[#]	Comments
				MeV)/Ip(12 MeV)=0.39. other: E=2050 *12*, L=3 reported by 1972Ca01. Ip(rel.,26 MeV)=12.1 *23* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 53 (20°), 40 (30°). For unresolved doublet.
2062.5 *7*		1		Ip(26 MeV)/Ip(12 MeV)=0.14; Ip(rel.,26 MeV)=10.1 *20* (1997Pr02).
2091.0 *7*		3		Ip(26 MeV)/Ip(12 MeV)=0.29; Ip(rel.,26 MeV)=11.5 *23* (1997Pr02).
2099.9 *9*				Ip(rel.,26 MeV)=8.3 *20* (1997Pr02).
2127.4[m] *6*	3/2⁻	1	0.023	E(level): 2128.2 *8* from 2011Bo09 for line perturbed by line from a different W isotope. Jπ,L: from (pol d,p) (2011Bo09). Ip(26 MeV)/Ip(12 MeV)=0.11; Ip(rel.,26 MeV)=12.6 *23* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 120 (11°), 130 (20°), 110 (30°).
2209.6 *7*	(1/2⁺,3/2⁺)	(0,2)		Jπ: asymmetry favors J=1/2 (2011Bo09). other E: 2208.9 *8* (2011Bo09). Ip(rel.,26 MeV)=7.5 *17* (1997Pr02). dσ/dΩ (μb/sr) (2011Bo09): 30 (20°), 43 (30°).
2256[&] *5*				E(level): from 1965Er03.
2279[&] *5*				E(level): from 1965Er03.
2308[&] *5*				E(level): from 1965Er03.
2330[&] *5*				E(level): from 1965Er03.
2412[&] *5*				E(level): from 1965Er03.
2500[&] *5*				

[†] From 1997Pr02, except As noted. these data agree with those from 2011Bo09, except As noted, but are of slightly higher precision.

[‡] Values proposed in table 1 of 1997Pr02, In accord with their band assignments, except As noted. values adopted by 2011Bo09, based on deduced L and/or measured asymmetry, are indicated In comments on the relevant levels when relevant.

[#] From DWBA analysis by 2011Bo09 of their unpolarized ED=18 MeV data At θ(lab)=40°, except As noted.

[@] Deduced by 1997Pr02 from the ratio of their I(p) data for ED=26 MeV to that from 1972Ca01 for ED=12 MeV. Typically, these ratios are≤0.25 for L=1, 0.24-0.54 for L=3, >0.7 for L=5. Note that values were not established for even L transfers. Also, differences In resolution and energy scales In the two studies can make it difficult to correctly identify identical levels In the two experiments At the higher energies.

[&] From 1965Er03.

[a] L=1,3 for 1550+1557 doublet.

[b] L=1,3 for 2002+2010 doublet.

[c] From DWBA analysis by 2011Bo09 of ED=12 MeV data from 1972Ca01.

[d] For unresolved doublet.

[e] Band(A): 1/2[510] band.

[f] Band(B): 3/2[512] band.

[g] Band(C): 11/2[615] band.

[h] Band(D): 7/2[503] band.

[i] Band(E): 9/2[624] band.

[j] Band(F): 5/2[512] band.

[k] Band(G): 1/2[521] band.

[l] Band(H): 7/2[514] band.

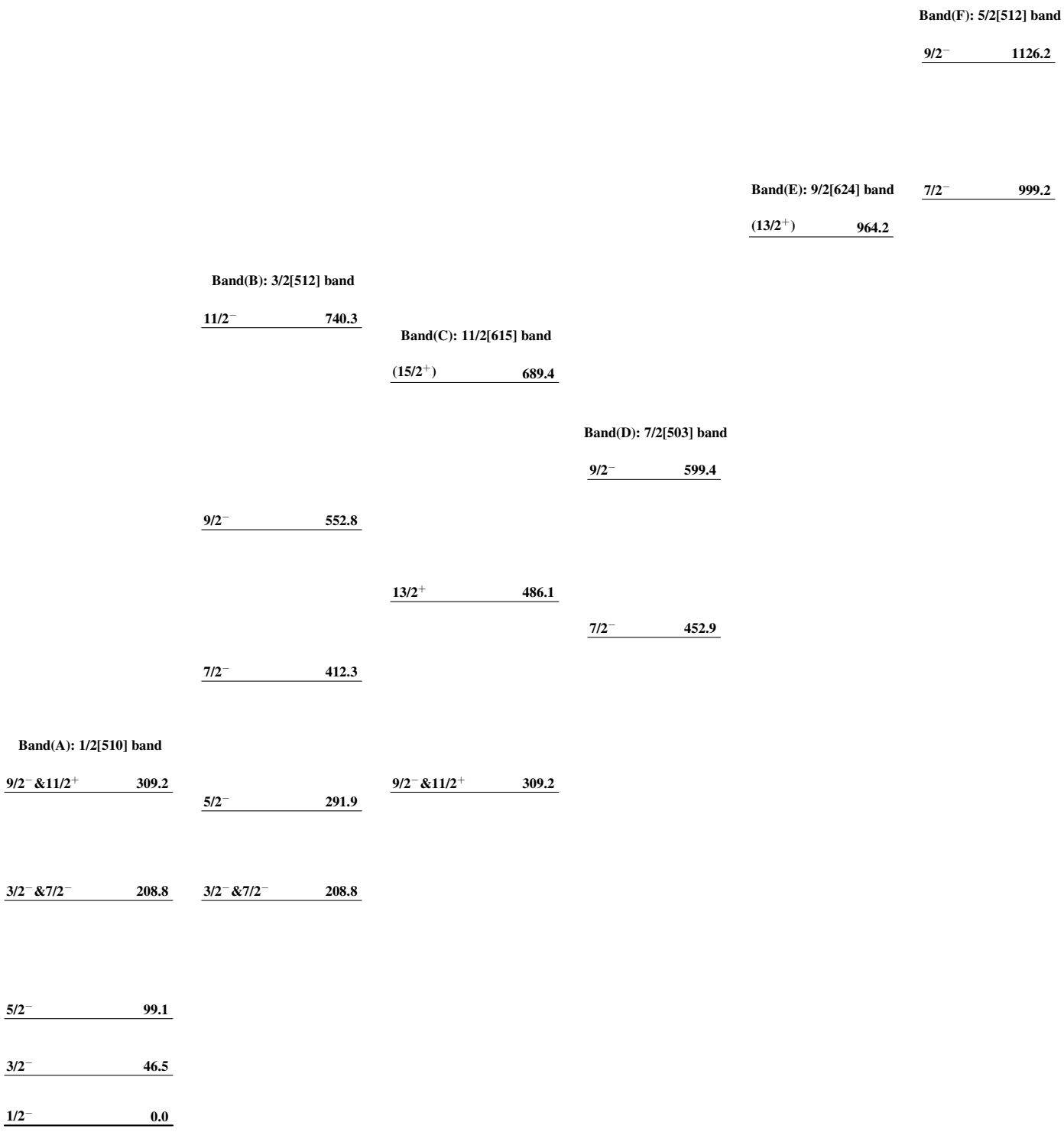
[m] Band(I): 3/2[501] band.

[n] Band(J): 1/2[501] band.

[o] Band(K): 9/2[505] band.

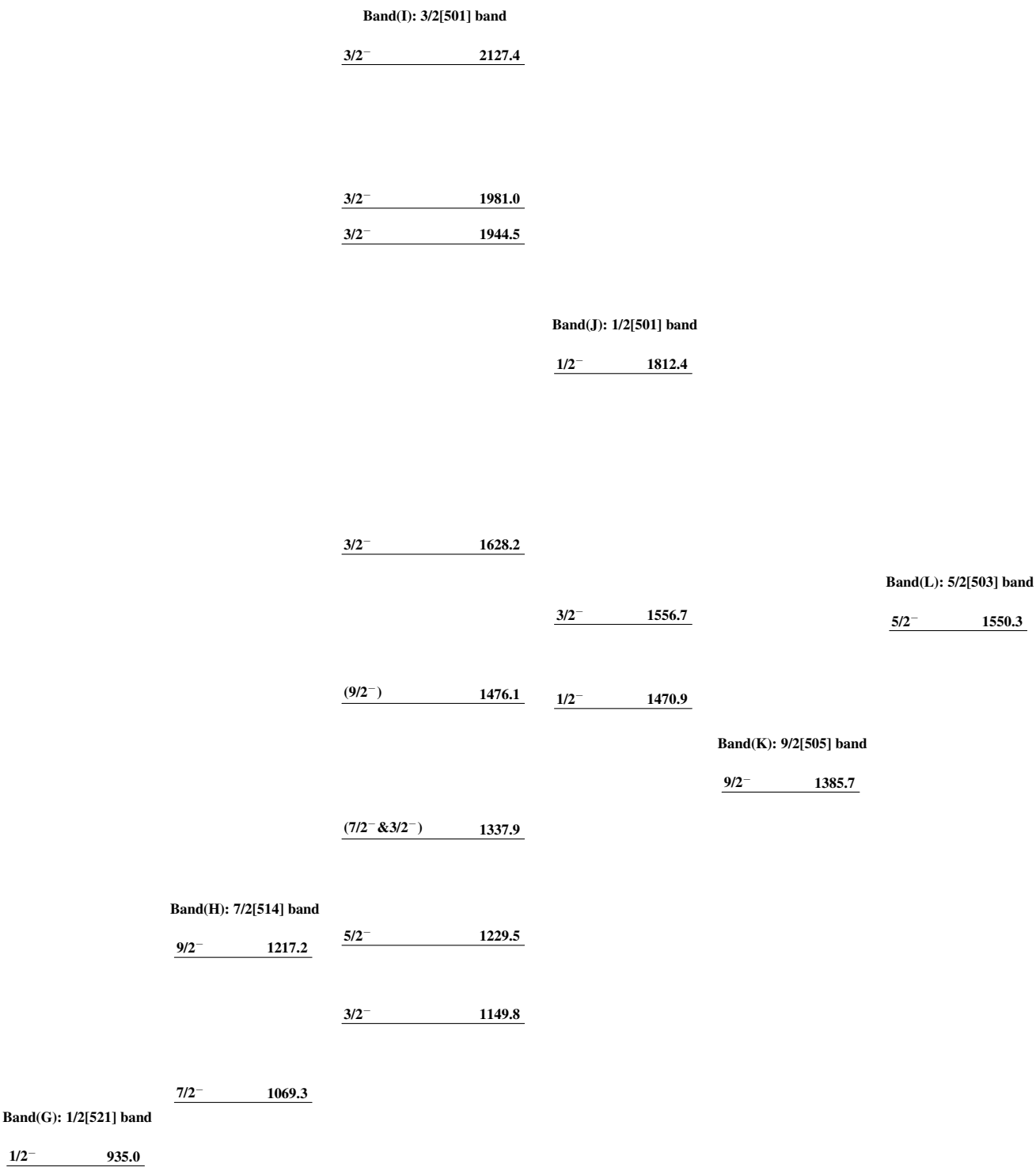
[p] Band(L): 5/2[503] band.

^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01



$^{183}_{74}W_{109}$

^{182}W(d,p), (pol d,p) 2011Bo09,1997Pr02,1972Ca01 (continued)



$^{183}_{74}W_{109}$