Nuclear Data Sheets for ^{167}Ta*

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Abstract: Nuclear structure and decay data pertaining to ^{167}Ta have been evaluated and incorporated into the ENSDF database. This evaluation supersedes that by C.M. Baglin in Nuclear Data Sheets **90**, 431 (2000) (literature cutoff date 5 July 2000), and includes all information available by 1 June 2013. the major newly incorporated references are the following: 2012Wa38, 2011Ha25, 2009Ha33. knowledge of band structure In ^{167}Ta has been greatly extended by 2011hα225 and 2009Ha33 using the ^{120}Sn(^{51}V,4nγ) reaction.

Cutoff Date: All data received by 1 June 2013 have been evaluated.

General Policies and Organization of Material: See the January issue of the *Nuclear Data Sheets* or http://www.nndc.bnl.gov/nds/NDSPolicies.pdf.

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Citations: ENSDF

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Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	ENSDF	23-May-2013

Q(β^-)=−6250 *30*; S(n)=10320 *40*; S(p)=1780 *40*; Q(α)=4020 *40* 2012Wa38

^{167}Ta is known as the ε parent of ^{167}Hf. 1969Ar22 base the nuclidic assignment on the observation of ^{167}Lu and ^{167}Yb γ rays in the tantalum fraction following 660 MeV proton spallation of Hg and Re. Detailed level and band structure has been deduced using the ^{142}Nd(^{30}Si,p4nγ) and ^{120}Sn(^{51}V,4nγ) reactions.

Recent calculations and systematics: see, for example:

2001Fe12: analysis of level energies and B(M1); deduced triaxial deformation.

2001Je09: cranked mean-field approach; analyzed bands, calculated deformation, potential energy surface.

2010Su27: particle + triaxially-deformed rotor calculations; calculated TSD bands, level enrgies, B(M1)/B(E2).

2013Ha02: comparison of level energies In π $i_{13/2}$, π $h_{9/2}$ and π $h_{11/2}$ bands In ^{167}Ta and neighboring odd-A nuclides.

^{167}Ta Levels

Quasiparticle labels:
α: first $i_{13/2}$ neutron, α=+1/2.
B: first $i_{13/2}$ neutron, α=−1/2.
C: second $i_{13/2}$ neutron, α=+1/2.
D: second $i_{13/2}$ neutron, α=+1/2.
E: lowest π=− orbital, α=+1/2.
F: lowest π=− orbital, α=−1/2.

Cross Reference (XREF) Flags

A ^{167}W ε decay
B ^{142}Nd(^{30}Si,p4nγ)
C ^{120}Sn(^{51}V,4nγ)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0.0[j]	(3/2+)	80 s *4*	ABC	%ε+%β+=100 Possible configuration=(π 1/2[411]) (1992Th02). $T_{1/2}$: from 1992HeZV. Others: 80 s *20* (1989Br19, quoted as 1.3 min *3* in 1987Es08), 1.4 min *3* (1982Li17), 2.9 min *15* (1969Ar22).
94.66[#] *15*	(5/2+)		ABC	
175.86[i] *17*	(5/2+)		C	
205.19[@] *20*	(7/2+)		ABC	
206.3[c] *3*	(9/2−)		C	
214.7 *3*			B	
232.95[j] *13*	(7/2+)		ABC	
254.68[n] *17*	(7/2+)		A C	
289.49 *24*	(5/2+,7/2+,9/2+)		A	Jπ: M1(+E2) 84γ to (7/2+) 205.
305.38[d] *24*	(11/2−)		BC	
374.73[#] *18*	(9/2+)		BC	
392.0 *4*	(≤7/2)		A	E(level): 175.4 *3* also possible; order of 175γ and 392γ uncertain. Jπ: γ to (3/2+).
431.79[m] *18*	(9/2+)		C	
496.2[c] *3*	(13/2−)		BC	
496.73[e] *16*	(5/2−)		A C	
503.13[i] *17*	(9/2+)		A C	

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Adopted Levels, Gammas (continued)

^{167}Ta Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
527.6 *4*		C	Jπ: 321γ to (9/2⁻) 206.
567.4 *5*		A	
574.64[@] *18*	(11/2⁺)	BC	
610.46[j] *20*	(11/2⁺)	C	
611.09[e] *17*	(9/2⁻)	ABC	
656.67[n] *19*	(11/2⁺)	C	
663.2 *4*		A	
678.7[d] *3*	(15/2⁻)	BC	
790.92[#] *19*	(13/2⁺)	BC	
852.95[e] *25*	(13/2⁻)	BC	
874.12[m] *21*	(13/2⁺)	C	
939.97[i] *20*	(13/2⁺)	C	
947.3[c] *3*	(17/2⁻)	BC	
1036.21[@] *21*	(15/2⁺)	BC	
1091.04[j] *23*	(15/2⁺)	C	
1133.4[b] *3*	(13/2⁻)	C	
1156.25[n] *21*	(15/2⁺)	C	
1165.5[d] *3*	(19/2⁻)	BC	
1216.5[e] *3*	(17/2⁻)	BC	
1285.07[#] *20*	(17/2⁺)	BC	
1394.16[m] *25*	(17/2⁺)	C	
1456.73[i] *21*	(17/2⁺)	C	
1493.2[c] *3*	(21/2⁻)	BC	
1557.32[@] *22*	(19/2⁺)	BC	
1638.7[j] *3*	(19/2⁺)	C	
1641.4[b] *3*	(17/2⁻)	C	
1678.7[e] *4*	(21/2⁻)	BC	
1722.7[n] *3*	(19/2⁺)	C	
1732.3[d] *3*	(23/2⁻)	BC	
1820.04[#] *23*	(21/2⁺)	BC	
1950.40[m] *24*	(21/2⁺)	C	
2019.25[i] *24*	(21/2⁺)	C	
2056.96[o] *22*	(21/2⁺)	C	
2088.86[@] *25*	(23/2⁺)	BC	
2096.5[c] *3*	(25/2⁻)	B	
2199.1[b] *3*	(21/2⁻)	C	
2213.8[e] *4*	(25/2⁻)	BC	
2222.0[j] *4*	(23/2⁺)	C	
2234.3 *4*		C	
2327.9[#] *3*	(25/2⁺)	BC	
2348.9[d] *3*	(27/2⁻)	BC	
2462.77[m] *24*	(25/2⁺)	C	
2477.37[o] *23*	(25/2⁺)	C	
2566.2[@] *3*	(27/2⁺)	BC	
2579.6[&] *3*	(25/2⁻)	BC	
2634.8 *3*	(27/2⁺)	C	
2651.8[a] *4*	(27/2⁻)	C	
2717.6[c] *4*	(29/2⁻)	BC	
2753.3[&] *3*	(29/2⁻)	BC	

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Adopted Levels, Gammas (continued)

^{167}Ta Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	Comments
2780.9[#] 3	(29/2$^+$)	BC	
2810.0[e] 4	(29/2$^-$)	BC	XREF: B(2798).
2815.0 3	(29/2$^+$)	C	
2821.0[j] 4	(27/2$^+$)	C	
2874.2[a] 4	(31/2$^-$)	BC	
2962.8[o] 3	(29/2$^+$)	C	
2968.1[@] 3	(31/2$^+$)	BC	
2979.5[d] 4	(31/2$^-$)	BC	
3007.4[l] 3	(31/2$^+$)	C	
3041.7[&] 4	(33/2$^-$)	BC	
3211.8[#] 3	(33/2$^+$)	BC	
3235.0[a] 4	(35/2$^-$)	BC	
3253.0[k] 4	(33/2$^+$)	C	
3326.2[c] 4	(33/2$^-$)	BC	
3346.2[j] 7	(31/2$^+$)	C	
3392.5[e] 4	(33/2$^-$)	BC	XREF: B(3381).
3426.7[@] 3	(35/2$^+$)	BC	
3468.7[&] 4	(37/2$^-$)	BC	
3474.0[l] 3	(35/2$^+$)	C	
3480.2[o] 4	(33/2$^+$)	C	
3594.3[d] 4	(35/2$^-$)	BC	
3720.7[#] 3	(37/2$^+$)	BC	
3733.6[a] 4	(39/2$^-$)	BC	
3772.1[k] 4	(37/2$^+$)	C	
3880.6[j] 9	(35/2$^+$)	C	
3913.1[c] 4	(37/2$^-$)	C	
3974.1[e] 5	(37/2$^-$)	BC	XREF: B(3977).
3990.9[@] 3	(39/2$^+$)	BC	
4023.4[&] 4	(41/2$^-$)	BC	
4026.0[l] 4	(39/2$^+$)	C	
4045.2[o] 4	(37/2$^+$)	C	
4133.1[p] 6	(35/2$^+$)	C	
4189.9[d] 4	(39/2$^-$)	C	
4304.7[#] 4	(41/2$^+$)	BC	
4347.9[a] 4	(43/2$^-$)	BC	
4360.3[k] 4	(41/2$^+$)	C	
4489.3[j] 10	(39/2$^+$)	C	
4501.3[c] 4	(41/2$^-$)	C	
4557.2[e] 5	(41/2$^-$)	BC	XREF: B(4608).
4607.9[@] 4	(43/2$^+$)	BC	
4658.3[l] 4	(43/2$^+$)	C	
4661.0[o] 5	(41/2$^+$)	C	
4684.1[&] 4	(45/2$^-$)	BC	
4687.7[p] 5	(39/2$^+$)	C	
4799.8[d] 4	(43/2$^-$)	C	
4920.4[#] 4	(45/2$^+$)	BC	XREF: B(4926).
5008.7[k] 4	(45/2$^+$)	C	
5053.5[a] 4	(47/2$^-$)	BC	

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Adopted Levels, Gammas (continued)

^{167}Ta Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
5126.7[c] 4	(45/2−)	C	7292.8[c] 5	(57/2−)	C	9654.1[#] 5	(69/2+)	C
5186.6[e] 5	(45/2−)	C	7389.2[@] 4	(59/2+)	C	9805.1[&] 6	(69/2−)	C
5206.6[f] 5	(45/2−)	C	7405.4[f] 9	(57/2−)	C	9954.1[p] 12	(67/2+)	C
5235.9[@] 4	(47/2+)	C	7406.1[p] 8	(55/2+)	C	9972.8[c] 6	(69/2−)	C
5293.3[p] 6	(43/2+)	C	7438.6[e] 6	(57/2−)	C	10019.8[k] 7	(69/2+)	C
5326.2[o] 5	(45/2+)	C	7471.7[h] 6	(57/2−)	C	10143.7[h] 10	(69/2−)	C
5345.1[l] 4	(47/2+)	C	7480.3[a] 5	(59/2−)	BC	10158.7[e] 9	(69/2−)	C
5426.5[&] 4	(49/2−)	BC	7565.8[o] 6	(57/2+)	C	10213.8[o] 9	(69/2+)	C
5465.0[d] 4	(47/2−)	C	7596.3[q] 8	(57/2+)	C	10223.8[a] 6	(71/2−)	C
5514.7[g] 5	(47/2−)	C	7654.4[l] 5	(59/2+)	C	10250.4[@] 6	(71/2+)	C
5550.3[#] 4	(49/2+)	C	7716.3[d] 5	(59/2−)	C	10267.3[q] 12	(69/2+)	C
5697.4[k] 4	(49/2+)	C	7785.8[#] 5	(61/2+)	C	10424.2[d] 8	(71/2−)	C
5802.3[c] 4	(49/2−)	C	7830.2[g] 6	(59/2−)	C	10681.3[#] 6	(73/2+)	C
5824.7[a] 5	(51/2−)	BC	7933.5[&] 5	(61/2−)	C	10825.6[&] 6	(73/2−)	C
5849.5[f] 5	(49/2−)	C	8085.3[k] 5	(61/2+)	C	10906.1[p] 13	(71/2+)	C
5888.3[@] 4	(51/2+)	C	8128.2[c] 5	(61/2−)	C	10986.8[c] 8	(73/2−)	C
5890.2[e] 5	(49/2−)	C	8205.6[p] 9	(59/2+)	C	11031.8?[k] 13	(73/2+)	C
5949.4[p] 6	(47/2+)	C	8263.5[@] 5	(63/2+)	C	11200.4[o] 10	(73/2+)	C
6035.6[o] 5	(49/2+)	C	8278.0[f] 10	(61/2−)	C	11225.3[a] 6	(75/2−)	C
6054.5[l] 4	(51/2+)	C	8294.2[e] 6	(61/2−)	C	11239.3?[q] 16	(73/2+)	C
6182.1[d] 4	(51/2−)	C	8324.4[h] 6	(61/2−)	C	11346.1[@] 8	(75/2+)	C
6205.7[g] 5	(51/2−)	C	8354.4[a] 5	(63/2−)	C	11434.7[d] 9	(75/2−)	C
6221.7[#] 4	(53/2+)	C	8398.6[o] 7	(61/2+)	C	11756.5[#] 6	(77/2+)	C
6226.3[&] 5	(53/2−)	BC	8437.2[q] 9	(61/2+)	C	11907.0[&] 6	(77/2−)	C
6421.7[k] 4	(53/2+)	C	8564.2[d] 5	(63/2−)	C	11910.9[p] 14	(75/2+)	C
6518.4[c] 5	(53/2−)	C	8564.3[l] 5	(63/2+)	C	12065.5[c] 9	(77/2−)	C
6593.2[f] 7	(53/2−)	C	8685.4[#] 5	(65/2+)	C	12240.4[o] 11	(77/2+)	C
6598.8[@] 4	(55/2+)	C	8744.8[g] 8	(63/2−)	C	12271.0[a] 8	(79/2−)	C
6637.6[a] 5	(55/2−)	BC	8843.6[&] 5	(65/2−)	C	12486.2[@] 9	(79/2+)	C
6642.9[e] 5	(53/2−)	BC	9020.7[c] 6	(65/2−)	C	12492.8[d] 11	(79/2−)	C
6653.7[p] 6	(51/2+)	C	9030.4[k] 5	(65/2+)	C	12871.9[#] 8	(81/2+)	C
6674.2[h] 6	(53/2−)	C	9054.3[p] 11	(63/2+)	C	12968.0[p] 15	(79/2+)	C
6779.9[o] 6	(53/2+)	C	9204.7[f] 12	(65/2−)	C	13047.3[&] 7	(81/2−)	C
6799.9[q] 6	(53/2+)	C	9206.8[e] 8	(65/2−)	C	13343.4?[o] 15	(81/2+)	C
6815.9[l] 4	(55/2+)	C	9219.6[@] 5	(67/2+)	C	13357.6[a] 9	(83/2−)	C
6919.6[d] 5	(55/2−)	C	9222.6[h] 8	(65/2−)	C	13596.2[d] 12	(83/2−)	C
6963.5[#] 4	(57/2+)	C	9267.2[a] 5	(67/2−)	C	14025.6[#] 9	(85/2+)	C
6987.6[g] 5	(55/2−)	C	9280.0[o] 7	(65/2+)	C	14229.9[&] 7	(85/2−)	C
7063.8[&] 5	(57/2−)	BC	9331.8[q] 11	(65/2+)	C	14483.0[a] 11	(87/2−)	C
7213.8[k] 4	(57/2+)	C	9466.0[d] 6	(67/2−)	C			

† From least-squares fit to Eγ data. Note that J=1/2 member of 1/2[411] band has not been identified and May lie below the g.s. level shown here.

‡ From (^{51}V,4nγ), based on deduced band structure and measured angular distribution ratios. Consistent with conclusions from (^{30}Si,p4nγ), based largely on systematics of transition energies, signature splittings and alignments in the light odd-A Ta and Lu isotopes, and on deduced transition multipolarities (except as noted).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{167}Ta Levels (continued)

[#] Band(A): 5/2[402], α=+1/2 band (2011Ha25). Band parameters: E_0=−44.0, A=18.1, B=−41.6, a=−0.66 (J=3/2 through 13/2 levels). In-band decay properties, transition energy systematics in nearby odd-A Ta isotopes, and small negative signature splitting favor $d_{5/2}$ orbital assignment over $g_{7/2}$ (1992Th02). First band crossing at $\hbar\omega$≈0.24 MeV, second crossing at $\hbar\omega$>0.24 MeV, third band crossing at $\hbar\omega$≈0.31 MeV. Configuration=$\pi d_{5/2}$ –>$\pi d_{5/2}$AB –>$\pi h_{11/2}$AE –> $\pi h_{11/2}$AEBC.

[@] Band(a): (π 5/2[402]), α=−1/2 band (2011Ha25). See comment on signature partner band.

[&] Band(B): $\pi h_{11/2}\otimes$AB, α=+1/2 (2011Ha25). Band crossing at $\hbar\omega$≈0.41 MeV. ((π 9/2[514])(ν $i_{13/2}$)^2) band in 1992Th02. Configuration=$\pi h_{11/2}$AB –>$\pi h_{11/2}$ABCD.

[a] Band(b): $\pi h_{11/2}\otimes$AB, α=−1/2. See comment on signature partner band.

[b] Band(C): α=+1/2 band.

[c] Band(D): (π 9/2[514]), α=+1/2 band (2011Ha25). Band parameters: E_0=118.5, A=13.4 (J=9/2 to 19/2 band members). First band crossing at $\hbar\omega$≈0.29 MeV (alignment gain 9 $\hbar$), second crossing at $\hbar\omega$≈0.35 MeV. Configuration=$\pi h_{11/2}$ –>$\pi h_{11/2}$BC –>$\pi h_{11/2}$BCAD.

[d] Band(d): (π 9/2[514]), α=−1/2 band (2011Ha25). See comment on signature partner band.

[e] Band(E): (π 1/2[541]), α=+1/2 band (2011Ha25). Band parameters: E_0=538, A=8.5, B=−44.9, a=5.3 (J=5/2 through 21/2 levels). Decoupled band, analogous to bands observed in many neighboring odd-A, even-N nuclei; the large decoupling parameter shifts unfavored signature levels to energies so high they are not normally observed in (HI,xnγ) studies. note that energies for J>25/2 band members differ from those deduced In (^{30}Si,p4nγ) because the J=1/2 band member not identified yet. 631γ-596γ-583γ-583γ cascade reported there has been replaced by the 629γ-583γ-582γ-583γ-596γ cascade adopted from (^{51}V,4nγ). Band crossing at $\hbar\omega$≈0.29 MeV. Configuration=$\pi h_{9/2}$ –>$\pi h_{9/2}$AB.

[f] Band(F): Band based on 45/2$^-$, α=+1/2. Possible configuration=($\pi d_{5/2}\otimes$AEBC).

[g] Band(f): Band based on (47/2$^-$), α=−1/2 See comment on signature partner band.

[h] Band(G): Band based on 53/2$^-$, α=+1/2. Possible configuration=($\pi d_{3/2}\otimes$ÂEBC).

[i] Band(H): π1/2[411], α=+1/2. J=1/2 band member has not been identified yet; decoupling parameter implies that it will be lowest-energy member of band. Band parameters: E_0=−44.2, A=21.4, B=−41.6, a=−0.66 (J=3/2 through 13/2 levels).

[j] Band(h): π1/2[411], α=−1/2. See comment on signature partner band.

[k] Band(I): $\pi h_{11/2}\otimes$AF, α=+1/2. Band crossing at $\hbar\omega$≈0.35 MeV. Configuration=$\pi h_{11/2}$AF –>$\pi h_{11/2}$AFBC.

[l] Band(i): $\pi h_{11/2}\otimes$AF, α=−1/2. See comment on α=+1/2 signature band for band crossing and configuration.

[m] Band(J): π7/2[404], α=+1/2.

[n] Band(j): π7/2[404], α=−1/2 see comment on signature partner band.

[o] Band(K): π1/2[660], α=+1/2 band parameters: E_0=517.3, A=5.73, a=−13.4 (J=21/2 to 37/2).

[p] Band(k): Triaxial $\pi i_{13/2}$ (n_w)=1 band.

[q] Band(L): $\pi i_{13/2}$? band on 53/2$^+$, α=+1/2.

Adopted Levels, Gammas (continued)

γ(^{167}Ta)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ[‡]	α[@]	Comments
94.66	(5/2$^+$)	94.4[#] *2*	100[#]	0.0	(3/2$^+$)	E2(+M1)	≥1.1	4.77 *14*	other Eγ: 94.9 *2* from (^{51}V,4nγ). Mult.: from ^{167}W ε decay.
175.86	(5/2$^+$)	175.9 *2*	100	0.0	(3/2$^+$)	(M1+E2)		0.67 *21*	
205.19	(7/2$^+$)	110.6 *2*	100	94.66	(5/2$^+$)	M1(+E2)	≤2.8	2.9 *4*	Mult.: from ^{167}W ε decay.
214.7		120.1	100	94.66	(5/2$^+$)				
232.95	(7/2$^+$)	138.1 *2*	10.7 *11*	94.66	(5/2$^+$)	(M1)		1.73	
		233.1 *2*	100 *11*	0.0	(3/2$^+$)	[E2]		0.180	
254.68	(7/2$^+$)	160.0 *2*	100	94.66	(5/2$^+$)	(M1+E2)		0.9 *3*	Eγ: presumed to be the same As the Eγ=159.7 *4* transition reported In ε decay. Mult.: Δπ from level scheme.
289.49	(5/2$^+$,7/2$^+$,9/2$^+$)	84.4[#] *2*	100[#] *7*	205.19	(7/2$^+$)	M1(+E2)	≤1.3	7.18 *14*	Mult.: from ^{167}W ε decay.
		194.6[#] *3*	55[#] *7*	94.66	(5/2$^+$)				
305.38	(11/2$^-$)	99.1 *2*	100	206.3	(9/2$^-$)	(M1+E2)		4.2 *4*	
374.73	(9/2$^+$)	120.0 *2*		254.68	(7/2$^+$)	(M1+E2)		2.2 *4*	Mult.: Δπ from level scheme.
		160.0 *2*	61	214.7					
		169.6	100	205.19	(7/2$^+$)	(M1+E2)		0.75 *23*	Mult.: Δπ from level scheme.
		280.1 *2*	31 *11*	94.66	(5/2$^+$)				
392.0	(≤7/2)	392.0[#] *4*	100[#]	0.0	(3/2$^+$)				
431.79	(9/2$^+$)	177.3 *2*	≈100	254.68	(7/2$^+$)	(M1+E2)		0.65 *21*	
		337.1 *2*	≈52	94.66	(5/2$^+$)	(E2)		0.0582	Mult.: Δπ from level scheme.
496.2	(13/2$^-$)	190.8 *2*	≈100	305.38	(11/2$^-$)	(M1+E2)		0.52 *18*	
		289.9 *2*	≈21	206.3	(9/2$^-$)				other Iγ: 42 *14* from (^{30}Si,p4nγ).
496.73	(5/2$^-$)	263.7[#] *3*	10[#] *3*	232.95	(7/2$^+$)				
		496.8 *2*	100 *9*	0.0	(3/2$^+$)	(E1+M2)		0.09 *8*	I_γ: from ε decay.
503.13	(9/2$^+$)	270.2[#] *2*	100[#] *25*	232.95	(7/2$^+$)	(M1+E2)		0.19 *8*	
		327.3 *2*	100 *25*	175.86	(5/2$^+$)	(E2)		0.0634	
527.6		321.4 *2*	100	206.3	(9/2$^-$)				
567.4		175.4[#] *3*	100[#]	392.0	(≤7/2)				
574.64	(11/2$^+$)	143.1 *2*	6.5 *6*	431.79	(9/2$^+$)	(M1+E2)		1.3 *3*	
		199.9 *2*	98 *8*	374.73	(9/2$^+$)	(M1+E2)		0.46 *16*	
		319.8 *2*	10.5 *13*	254.68	(7/2$^+$)				
		369.4 *2*	100 *6*	205.19	(7/2$^+$)				
610.46	(11/2$^+$)	377.5 *2*	100	232.95	(7/2$^+$)				
611.09	(9/2$^-$)	83.7 *5*	1.9 *6*	527.6					
		114.4 *2*	4.0 *4*	496.73	(5/2$^-$)	(E2)		2.20 *4*	
		305.7 *2*	5.0 *12*	305.38	(11/2$^-$)	(M1+E2)		0.13 *6*	
		356.4 *2*	8.1 *10*	254.68	(7/2$^+$)	(E1)		0.01467	
		378.1 *2*	100 *8*	232.95	(7/2$^+$)	(E1+M2)		0.20 *19*	
656.67	(11/2$^+$)	224.8 *2*	68 *8*	431.79	(9/2$^+$)	(M1+E2)		0.32 *12*	
		402.0 *2*	100 *18*	254.68	(7/2$^+$)				
663.2		430.2[#] *3*	100[#]	232.95	(7/2$^+$)				

$^{167}_{73}Ta_{94}$-6

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α@	Comments
678.7	(15/2$^-$)	182.5 *2*	100 *8*	496.2	(13/2$^-$)	(M1+E2)	0.60 *20*	Other Iγ: 74 *4* and 93 from (^{30}Si,p4nγ).
		373.4 *2*	100 *6*	305.38	(11/2$^-$)	(E2)	0.0436	
790.92	(13/2$^+$)	134.1 *2*	6.5 *5*	656.67	(11/2$^+$)	(M1+E2)	1.5 *4*	
		216.3 *2*	66 *5*	574.64	(11/2$^+$)			Other Iγ: 53 *6* and 73 from (^{30}Si,p4nγ).
		416.2 *2*	100 *7*	374.73	(9/2$^+$)	(E2)	0.0324	
852.95	(13/2$^-$)	241.9 *2*	100	611.09	(9/2$^-$)	(E2)	0.1597	
874.12	(13/2$^+$)	217.5 *2*	36 *5*	656.67	(11/2$^+$)	(M1+E2)	0.36 *13*	
		442.3 *2*	100 *9*	431.79	(9/2$^+$)	(E2)	0.0276	
939.97	(13/2$^+$)	329.5 *2*	24 *6*	610.46	(11/2$^+$)			
		436.9 *2*	100 *17*	503.13	(9/2$^+$)	(E2)	0.0285	
947.3	(17/2$^-$)	268.5 *2*	100 *6*	678.7	(15/2$^-$)	(M1+E2)	0.19 *8*	
		451.0 *2*	54 *4*	496.2	(13/2$^-$)	(E2)	0.0262	other Iγ: 80 *5* from (^{30}Si,p4nγ).
1036.21	(15/2$^+$)	245.2 *2*	54 *6*	790.92	(13/2$^+$)	(M1+E2)	0.25 *10*	Other Iγ: 82 from (^{30}Si,p4nγ).
		461.6 *2*	100 *8*	574.64	(11/2$^+$)	(E2)	0.0247	
1091.04	(15/2$^+$)	480.6 *2*	100	610.46	(11/2$^+$)	(E2)	0.0223	
1133.4	(13/2$^-$)	454.7 *2*	44 *8*	678.7	(15/2$^-$)			
		637.1 *2*	100 *12*	496.2	(13/2$^-$)			
1156.25	(15/2$^+$)	282.2 *2*	18 *4*	874.12	(13/2$^+$)			
		499.6 *2*	100 *11*	656.67	(11/2$^+$)			
1165.5	(19/2$^-$)	218.2 *2*	54 *4*	947.3	(17/2$^-$)	(M1+E2)	0.35 *13*	Other Iγ: 33 *3* and 49 from (^{30}Si,p4nγ).
		486.8 *2*	100 *7*	678.7	(15/2$^-$)	(E2)	0.0216	
1216.5	(17/2$^-$)	363.6 *2*	100	852.95	(13/2$^-$)	(E2)	0.0469	
1285.07	(17/2$^+$)	128.9 *2*	2.84 *21*	1156.25	(15/2$^+$)			
		248.9 *2*	52 *4*	1036.21	(15/2$^+$)	(M1+E2)	0.24 *10*	Other Iγ: 46 *5* and 66 from (^{30}Si,p4nγ).
		494.1 *2*	100 *8*	790.92	(13/2$^+$)	(E2)	0.0208	
1394.16	(17/2$^+$)	520.0 *2*	100	874.12	(13/2$^+$)	(E2)	0.0183	
1456.73	(17/2$^+$)	365.7 *2*	26 *8*	1091.04	(15/2$^+$)	(M1)	0.1186	
		516.8 *2*	100 *38*	939.97	(13/2$^+$)			
1493.2	(21/2$^-$)	327.7 *2*	100 *7*	1165.5	(19/2$^-$)	(M1+E2)	0.11 *5*	other Iγ: 85 *7* from (^{30}Si,p4nγ).
		546.0 *2*	100 *7*	947.3	(17/2$^-$)	(E2)	0.01622	
1557.32	(19/2$^+$)	272.4 *2*	41 *4*	1285.07	(17/2$^+$)	(M1+E2)	0.19 *8*	
		521.0 *2*	100 *8*	1036.21	(15/2$^+$)	(E2)	0.0182	
1638.7	(19/2$^+$)	547.7 *2*	100	1091.04	(15/2$^+$)	(E2)	0.01610	
1641.4	(17/2$^-$)	475.9 *2*	90 *10*	1165.5	(19/2$^-$)			
		508.1 *2*	63 *8*	1133.4	(13/2$^-$)			
		694.2 *2*	100 *13*	947.3	(17/2$^-$)	(M1)	0.0221	Mult.: Δπ from level scheme.
		962.7 *2*	38 *5*	678.7	(15/2$^-$)			
1678.7	(21/2$^-$)	462.2 *2*	100	1216.5	(17/2$^-$)	(E2)	0.0246	
1722.7	(19/2$^+$)	566.4 *2*	100	1156.25	(15/2$^+$)			
1732.3	(23/2$^-$)	239.1 *2*	32 *3*	1493.2	(21/2$^-$)	(M1+E2)	0.27 *11*	
		566.8 *2*	100 *8*	1165.5	(19/2$^-$)	(E2)	0.01483	
1820.04	(21/2$^+$)	262.7 *2*	39 *4*	1557.32	(19/2$^+$)	(M1+E2)	0.21 *9*	other Iγ: 43 *5* and 59 from (^{30}Si,p4nγ).
		534.9 *2*	100	1285.07	(17/2$^+$)	(E2)	0.01706	

$^{167}_{73}Ta_{94}$-7

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
1950.40	(21/2$^+$)	556.2 *2*	100	1394.16	(17/2$^+$)	(E2)	0.01552	
2019.25	(21/2$^+$)	380.5 *5*	19 *8*	1638.7	(19/2$^+$)			
		562.5 *2*	100 *17*	1456.73	(17/2$^+$)			
2056.96	(21/2$^+$)	600.3 *2*	100 *16*	1456.73	(17/2$^+$)			
		771.9 *2*	89 *11*	1285.07	(17/2$^+$)	(E2)		Mult.: Δπ from level scheme.
2088.86	(23/2$^+$)	268.8 *2*	47 *4*	1820.04	(21/2$^+$)	(M1)	0.272	
		531.6 *2*	100 *8*	1557.32	(19/2$^+$)	(E2)	0.01732	
2096.5	(25/2$^-$)	364.2 *2*	60 *5*	1732.3	(23/2$^-$)	(M1+E2)	0.08 *4*	Other Iγ: 92 *14* and 68 from (^{30}Si,p4nγ).
		603.3 *2*	100 *8*	1493.2	(21/2$^-$)			
2199.1	(21/2$^-$)	466.8 *2*	56 *6*	1732.3	(23/2$^-$)	(M1+E2)	0.043 *20*	Mult.: Δπ from level scheme.
		557.7 *2*	100 *11*	1641.4	(17/2$^-$)			
		705.8 *2*	68 *8*	1493.2	(21/2$^-$)			
2213.8	(25/2$^-$)	535.1 *2*	100	1678.7	(21/2$^-$)	(E2)	0.01704	
2222.0	(23/2$^+$)	583.3 *2*	100	1638.7	(19/2$^+$)	(E2)	0.01385	
2234.3		592.8 *2*	100	1641.4	(17/2$^-$)			
2327.9	(25/2$^+$)	239.0 *2*	71 *6*	2088.86	(23/2$^+$)			
		507.8 *2*	100 *8*	1820.04	(21/2$^+$)			
2348.9	(27/2$^-$)	252.3 *2*	26.6 *13*	2096.5	(25/2$^-$)	(M1+E2)	0.23 *10*	other Iγ: 73 *23* and 28 from (^{30}Si,p4nγ).
		616.5 *2*	100 *5*	1732.3	(23/2$^-$)	(E2)	0.01216	other Eγ: 617.3 *5* from (^{30}Si,p4nγ).
2462.77	(25/2$^+$)	512.4 *2*	65 *9*	1950.40	(21/2$^+$)			
		642.7 *2*	100 *11*	1820.04	(21/2$^+$)			
2477.37	(25/2$^+$)	420.5 *2*	83 *10*	2056.96	(21/2$^+$)	(E2)	0.0315	
		458.1 *2*	24 *5*	2019.25	(21/2$^+$)			
		526.9 *2*	100 *12*	1950.40	(21/2$^+$)	(E2)	0.01770	Mult.: Δπ from level scheme.
2566.2	(27/2$^+$)	238.3 *2*	100 *7*	2327.9	(25/2$^+$)			
		477.3 *2*	75 *6*	2088.86	(23/2$^+$)	(E2)	0.0227	
2579.6	(25/2$^-$)	345.3 *2*	10.0 *9*	2234.3				
		380.4 *2*	45 *6*	2199.1	(21/2$^-$)			
		483.2 *2*	61 *6*	2096.5	(25/2$^-$)	(M1)	0.0570	Mult.: interpreted As D, ΔJ=0 In (^{51}V,4nγ); Δπ from level scheme.
		847.2 *2*	37 *3*	1732.3	(23/2$^-$)	(M1)	0.01356	Mult.: Δπ from level scheme.
		1086.4 *2*	100 *9*	1493.2	(21/2$^-$)	(E2)		Mult.: Δπ from level scheme.
2634.8	(27/2$^+$)	546.0 *2*	100	2088.86	(23/2$^+$)			
2717.6	(29/2$^-$)	368.7 *2*	68 *6*	2348.9	(27/2$^-$)	(M1+E2)	0.08 *4*	Other Iγ: 40 *17* and 62 from (^{30}Si,p4nγ).
		621.2 *2*	100 *10*	2096.5	(25/2$^-$)	(E2)	0.01195	
2753.3	(29/2$^-$)	101.5 *2*	76 *5*	2651.8	(27/2$^-$)	(M1)	4.18	
		404.2 *2*	100 *10*	2348.9	(27/2$^-$)	(M1+E2)	0.063	
		539.6 *2*	67 *5*	2213.8	(25/2$^-$)			
		656.9 *2*	95 *10*	2096.5	(25/2$^-$)	(E2)	0.01052	Mult.: Δπ from level scheme. other Iγ: 167 from (^{30}Si,p4nγ).
2780.9	(29/2$^+$)	214.7 *2*	100 *8*	2566.2	(27/2$^+$)			
		453.0 *2*	59 *5*	2327.9	(25/2$^+$)	(E2)	0.0259	Other Iγ: 108 *33* and 75 from (^{30}Si,p4nγ).
2810.0	(29/2$^-$)	596.2 *2*	100	2213.8	(25/2$^-$)	(E2)	0.01315	
2815.0	(29/2$^+$)	180.3 *2*	29 *3*	2634.8	(27/2$^+$)			

$^{167}_{73}Ta_{94}$-8

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†	α@	Comments
2815.0	(29/2$^+$)	248.7 *2*	36 *4*	2566.2	(27/2$^+$)			
		487.1 *2*	100 *8*	2327.9	(25/2$^+$)			
2821.0	(27/2$^+$)	599.0 *2*	100	2222.0	(23/2$^+$)			Mult.: R_{ang} In (^{51}V,4nγ) implies D+Q, but placement requires ΔJ=2.
2874.2	(31/2$^-$)	120.9 *2*	100 *11*	2753.3	(29/2$^-$)	(M1+E2)	2.2 *4*	
		156.6 *2*	9.4 *11*	2717.6	(29/2$^-$)			
		222.4 *2*	≈11	2651.8	(27/2$^-$)			
2962.8	(29/2$^+$)	485.4 *2*	100 *10*	2477.37	(25/2$^+$)	(E2)		
		500.0 *2*	40 *4*	2462.77	(25/2$^+$)	Q		
2968.1	(31/2$^+$)	153.2 *2*	7.8 *6*	2815.0	(29/2$^+$)	(M1)	1.293	Mult.: Δπ from level scheme.
		187.2 *2*	100 *6*	2780.9	(29/2$^+$)	(M1+E2)	0.55 *19*	
		333.3 *2*	18.1 *16*	2634.8	(27/2$^+$)	(E2)	0.0217	other Iγ: 5.8 *5* from (^{30}Si,p4nγ). Mult.: Δπ from level scheme.
		401.9 *2*	47 *6*	2566.2	(27/2$^+$)	(E2)	0.0356	Other Iγ: 93 *27* and 50 from (^{30}Si,p4nγ).
2979.5	(31/2$^-$)	261.8 *2*	29.6 *19*	2717.6	(29/2$^-$)	(M1+E2)	0.21 *9*	Other Iγ: 48 (from (^{30}Si,p4nγ)).
		630.6 *2*	100 *7*	2348.9	(27/2$^-$)	(E2)	0.01155	
3007.4	(31/2$^+$)	226.6 *2*	100 *9*	2780.9	(29/2$^+$)	(M1+E2)	0.32 *12*	Mult.: Δπ from level scheme.
		441.3 *2*	63 *6*	2566.2	(27/2$^+$)	(E2)	0.0277	Mult.: Δπ from level scheme.
3041.7	(33/2$^-$)	167.5 *2*	100 *9*	2874.2	(31/2$^-$)	(M1+E2)	0.78 *23*	
		288.4 *2*	15.5 *17*	2753.3	(29/2$^-$)			
3211.8	(33/2$^+$)	204.5 *2*	19.7 *19*	3007.4	(31/2$^+$)	(M1)	0.576	Mult.: Δπ from level scheme.
		243.7 *2*	100 *8*	2968.1	(31/2$^+$)	(M1+E2)	0.26 *10*	
		396.6 *2*	10.6 *17*	2815.0	(29/2$^+$)			Mult.: R_{ang}=0.78 *4* In (^{51}V,4nγ) implies D+Q, but placement requires ΔJ=2.
		431.0 *2*	61 *6*	2780.9	(29/2$^+$)	(E2)	0.0295	
3235.0	(35/2$^-$)	193.3 *2*	100 *12*	3041.7	(33/2$^-$)	(M1+E2)	0.50 *17*	
		360.8 *2*	34 *3*	2874.2	(31/2$^-$)	(E2)	0.0480	
3253.0	(33/2$^+$)	245.7 *2*	100	3007.4	(31/2$^+$)	(M1+E2)	0.25 *10*	
3326.2	(33/2$^-$)	346.8 *2*	67 *8*	2979.5	(31/2$^-$)	(M1+E2)	0.10 *5*	Other Iγ: 34 *7* and 48 from (^{30}Si,p4nγ).
		608.6 *2*	100 *8*	2717.6	(29/2$^-$)	(E2)	0.01254	
3346.2	(31/2$^+$)	525.2 *5*	100	2821.0	(27/2$^+$)			
3392.5	(33/2$^-$)	582.5 *2*	100	2810.0	(29/2$^-$)			
3426.7	(35/2$^+$)	214.9 *2*	100 *13*	3211.8	(33/2$^+$)			
		458.6 *2*	100 *10*	2968.1	(31/2$^+$)	(E2)	0.0251	other Iγ: 63 from (^{30}Si,p4nγ).
3468.7	(37/2$^-$)	233.7 *2*	100 *8*	3235.0	(35/2$^-$)	(M1+E2)	0.29 *11*	
		427.0 *2*	40 *8*	3041.7	(33/2$^-$)			Other Iγ: 56 *8* and 38 from (^{30}Si,p4nγ).
3474.0	(35/2$^+$)	221.1 *2*	30 *3*	3253.0	(33/2$^+$)	(M1)	0.464	
		262.2 *2*	31 *3*	3211.8	(33/2$^+$)	(M1+E2)	0.21 *9*	Mult.: Δπ from level scheme.
		466.7 *2*	100 *11*	3007.4	(31/2$^+$)	(E2)	0.0240	
3480.2	(33/2$^+$)	517.4 *2*	100	2962.8	(29/2$^+$)	(E2)		
3594.3	(35/2$^-$)	268.1 *2*	57 *7*	3326.2	(33/2$^-$)	(M1+E2)	0.19 *8*	
		614.8 *2*	100 *10*	2979.5	(31/2$^-$)	(E2)	0.01224	
3720.7	(37/2$^+$)	246.7 *2*	20.3 *21*	3474.0	(35/2$^+$)			
		294.0 *2*	83 *7*	3426.7	(35/2$^+$)	(M1+E2)	0.15 *7*	
		508.8 *2*	100 *14*	3211.8	(33/2$^+$)			other Eγ: 509.6 from (^{30}Si,p4nγ).

$^{167}_{73}Ta_{94}$-9

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
3733.6	(39/2⁻)	264.9 *2*	100 *10*	3468.7	(37/2⁻)	(M1+E2)	0.20 *9*	
		498.5 *2*	64 *6*	3235.0	(35/2⁻)	(E2)	0.0203	
3772.1	(37/2⁺)	298.2 *2*	81 *13*	3474.0	(35/2⁺)	(M1+E2)	0.14 *6*	
		519.2 *2*	100 *13*	3253.0	(33/2⁺)	(E2)	0.0183	
3880.6	(35/2⁺)	534.4 *5*	100	3346.2	(31/2⁺)			
3913.1	(37/2⁻)	318.8 *2*	94 *6*	3594.3	(35/2⁻)	(M1+E2)	0.12 *6*	
		586.9 *2*	100 *11*	3326.2	(33/2⁻)			
3974.1	(37/2⁻)	581.6 *2*	100	3392.5	(33/2⁻)			
3990.9	(39/2⁺)	270.1 *2*	61 *5*	3720.7	(37/2⁺)	(M1+E2)	0.19 *8*	other Eγ: 269.4 from (^{30}Si,p4nγ).
		564.1 *2*	100 *8*	3426.7	(35/2⁺)	(E2)	0.01500	
4023.4	(41/2⁻)	289.8 *2*	100 *10*	3733.6	(39/2⁻)	(M1+E2)	0.16 *7*	
		554.7 *2*	94 *6*	3468.7	(37/2⁻)	(E2)	0.01562	other Eγ: 555.1 from (^{30}Si,p4nγ).
4026.0	(39/2⁺)	253.9 *2*	45 *4*	3772.1	(37/2⁺)			
		552.0 *2*	100 *11*	3474.0	(35/2⁺)	(E2)	0.01580	
4045.2	(37/2⁺)	565.0 *2*	100	3480.2	(33/2⁺)	(E2)	0.01494	
4133.1	(35/2⁺)	653.0 *5*	100	3480.2	(33/2⁺)			
4189.9	(39/2⁻)	276.8 *2*	76 *5*	3913.1	(37/2⁻)	(M1+E2)	0.18 *8*	
		595.6 *2*	100 *10*	3594.3	(35/2⁻)	(E2)	0.01319	
4304.7	(41/2⁺)	278.8 *2*	17.4 *23*	4026.0	(39/2⁺)			
		313.8 *2*	71 *13*	3990.9	(39/2⁺)			other Eγ (Iγ): 314.9 (≈133) from (^{30}Si,p4nγ).
		583.9 *2*	100 *10*	3720.7	(37/2⁺)	(E2)	0.01382	other Eγ: 584.5 from (^{30}Si,p4nγ).
4347.9	(43/2⁻)	324.5 *2*	100 *10*	4023.4	(41/2⁻)	(M1+E2)	0.11 *5*	other Eγ: 324.9 from (^{30}Si,p4nγ).
		614.4 *2*	72 *6*	3733.6	(39/2⁻)	(E2)	0.01226	other Eγ (Iγ): 615.2 (108) from (^{30}Si,p4nγ).
4360.3	(41/2⁺)	334.2 *2*	45 *5*	4026.0	(39/2⁺)	(M1+E2)	0.11 *5*	
		588.2[&] *2*	100[&] *9*	3772.1	(37/2⁺)	(E2)	0.01358	
4489.3	(39/2⁺)	608.7 *5*	100	3880.6	(35/2⁺)			
4501.3	(41/2⁻)	311.5 *2*	92 *8*	4189.9	(39/2⁻)	(M1+E2)	0.13 *6*	
		588.2[&] *2*	100[&] *8*	3913.1	(37/2⁻)			
4557.2	(41/2⁻)	583.0 *2*	100	3974.1	(37/2⁻)			
4607.9	(43/2⁺)	247.6 *2*	8.3 *17*	4360.3	(41/2⁺)			
		303.3 *2*	100 *9*	4304.7	(41/2⁺)	(M1+E2)	0.14 *6*	
		582.0 *2*	41 *4*	4026.0	(39/2⁺)			Mult.: R_{ang}=0.80 *8* In (^{51}V,4nγ) suggests D+Q but placement requires Q, ΔJ=2.
		617.0 *2*	25 *3*	3990.9	(39/2⁺)			
4658.3	(43/2⁺)	298.0 *2*	33 *4*	4360.3	(41/2⁺)	(M1+E2)	0.14 *6*	
		632.3 *2*	49 *5*	4026.0	(39/2⁺)	(E2)	0.01147	
		667.3 *2*	100 *14*	3990.9	(39/2⁺)	(E2)	0.01015	Mult.: Δπ from level scheme.
4661.0	(41/2⁺)	615.8 *2*	100	4045.2	(37/2⁺)	(E2)	0.01220	
4684.1	(45/2⁻)	336.1 *2*	98 *8*	4347.9	(43/2⁻)	(M1+E2)	0.10 *5*	other Iγ: 72 *14* from (^{30}Si,p4nγ).
		660.7 *2*	100 *8*	4023.4	(41/2⁻)	(E2)	0.01038	other Eγ: 661.3 from (^{30}Si,p4nγ).
4687.7	(39/2⁺)	554.6 *5*	50 *17*	4133.1	(35/2⁺)			
		642.6 *5*	100 *17*	4045.2	(37/2⁺)	(M1)	0.0273	Mult.: Δπ from level scheme.
4799.8	(43/2⁻)	298.5 *2*	55 *5*	4501.3	(41/2⁻)	(M1+E2)	0.14 *6*	

$^{167}_{73}Ta_{94}$-10

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
4799.8	(43/2$^-$)	609.9 *2*	100 *7*	4189.9	(39/2$^-$)	(E2)	0.01247	
4920.4	(45/2$^+$)	312.5 *2*	97 *17*	4607.9	(43/2$^+$)			other Eγ (Iγ): 303.9 (≈67) from (^{30}Si,p4nγ).
		615.8 *2*	100 *17*	4304.7	(41/2$^+$)			other Eγ: 617.0 from (^{30}Si,p4nγ).
5008.7	(45/2$^+$)	350.4 *2*	90 *9*	4658.3	(43/2$^+$)			R_{ang}=0.94 *14* In (^{51}V,4nγ); placement requires ΔJ=1.
		648.4 *2*	100 *10*	4360.3	(41/2$^+$)			R_{ang}=0.80 *6* In (^{51}V,4nγ); placement requires ΔJ=2.
5053.5	(47/2$^-$)	369.4 *2*	70 *7*	4684.1	(45/2$^-$)	(M1+E2)	0.08 *4*	
		705.6 *2*	100 *9*	4347.9	(43/2$^-$)	(E2)		other Eγ: 706.5 from (^{30}Si,p4nγ).
5126.7	(45/2$^-$)	327.0 *2*	56 *6*	4799.8	(43/2$^-$)	(M1+E2)	0.11 *5*	
		625.4 *2*	100 *9*	4501.3	(41/2$^-$)	(E2)	0.01177	
5186.6	(45/2$^-$)	629.4 *2*	100	4557.2	(41/2$^-$)	(E2)	0.01160	
5206.6	(45/2$^-$)	649.4 *2*	100	4557.2	(41/2$^-$)	(E2)	0.01079	Mult.: Δπ from level scheme.
5235.9	(47/2$^+$)	315.5 *2*	100 *18*	4920.4	(45/2$^+$)			
		627.9 *2*	24 *9*	4607.9	(43/2$^+$)	(E2)	0.01166	
5293.3	(43/2$^+$)	605.7 *5*	100 *13*	4687.7	(39/2$^+$)			
		632.3 *5*	100 *13*	4661.0	(41/2$^+$)	(M1(+E2))	0.020 *9*	Mult.: Δπ from level scheme.
5326.2	(45/2$^+$)	665.2 *2*	100	4661.0	(41/2$^+$)	(E2)	0.01022	
5345.1	(47/2$^+$)	336.4[&] *2*	40[&] *5*	5008.7	(45/2$^+$)			
		686.8 *2*	100 *9*	4658.3	(43/2$^+$)			
5426.5	(49/2$^-$)	373.0 *2*	68 *8*	5053.5	(47/2$^-$)	(M1+E2)	0.08 *4*	other Iγ: 55 *19* from (^{30}Si,p4nγ).
		742.4 *2*	100 *8*	4684.1	(45/2$^-$)	(E2)		other Eγ: 373.5 from (^{30}Si,p4nγ).
5465.0	(47/2$^-$)	338.3 *2*	57 *6*	5126.7	(45/2$^-$)			
		665.2 *2*	100 *10*	4799.8	(43/2$^-$)	(E2)	0.01022	
5514.7	(47/2$^-$)	308.1 *5*	100 *13*	5206.6	(45/2$^-$)			
		328.0 *5*	75 *13*	5186.6	(45/2$^-$)			
5550.3	(49/2$^+$)	314.4 *2*	65 *15*	5235.9	(47/2$^+$)			
		629.9 *2*	100 *10*	4920.4	(45/2$^+$)	(E2)	0.01157	
5697.4	(49/2$^+$)	352.4 *2*	16.4 *16*	5345.1	(47/2$^+$)			
		688.7 *2*	100 *10*	5008.7	(45/2$^+$)			
5802.3	(49/2$^-$)	337.4 *2*	39 *5*	5465.0	(47/2$^-$)			
		675.5 *2*	100 *10*	5126.7	(45/2$^-$)	(E2)		
5824.7	(51/2$^-$)	398.2 *2*	56 *6*	5426.5	(49/2$^-$)	(M1+E2)	0.07 *3*	
		771.2 *2*	100 *8*	5053.5	(47/2$^-$)	(E2)		
5849.5	(49/2$^-$)	334.8 *5*	38.5 *8*	5514.7	(47/2$^-$)			
		642.9 *5*	30.8 *8*	5206.6	(45/2$^-$)			
		662.9 *2*	100 *15*	5186.6	(45/2$^-$)			
5888.3	(51/2$^+$)	338.0 *2*	70 *5*	5550.3	(49/2$^+$)	(M1+E2)	0.10 *5*	
		652.4 *2*	100 *10*	5235.9	(47/2$^+$)	(E2)	0.01068	
5890.2	(49/2$^-$)	683.7 *2*	14 *6*	5206.6	(45/2$^-$)			
		703.6 *2*	100 *12*	5186.6	(45/2$^-$)	(E2)		
5949.4	(47/2$^+$)	623.2 *5*	67 *8*	5326.2	(45/2$^+$)			
		656.1 *2*	100 *17*	5293.3	(43/2$^+$)			
6035.6	(49/2$^+$)	709.4[&] *2*	100[&]	5326.2	(45/2$^+$)	(E2)		
6054.5	(51/2$^+$)	357.1 *2*	24.6 *29*	5697.4	(49/2$^+$)			

$^{167}_{73}Ta_{94}$-11

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
6054.5	(51/2$^+$)	709.4[&] *2*	100[&] *10*	5345.1	(47/2$^+$)	(E2)		
6182.1	(51/2$^-$)	379.8 *2*	45 *6*	5802.3	(49/2$^-$)			
		667.2 *5*	9.0 *15*	5514.7	(47/2$^-$)			
		717.1 *2*	100 *10*	5465.0	(47/2$^-$)			
6205.7	(51/2$^-$)	740.7 *2*	100	5465.0	(47/2$^-$)			
6221.7	(53/2$^+$)	333.4 *2*	65 *12*	5888.3	(51/2$^+$)	(M1+E2)	0.11 *5*	
		671.3 *2*	100 *12*	5550.3	(49/2$^+$)	(E2)	0.01001	
6226.3	(53/2$^-$)	401.7 *2*	38 *3*	5824.7	(51/2$^-$)	(M1+E2)	0.06 *3*	
		799.8 *2*	100 *9*	5426.5	(49/2$^-$)	(E2)		
6421.7	(53/2$^+$)	367.2 *2*	69 *8*	6054.5	(51/2$^+$)			
		724.4 *2*	100 *10*	5697.4	(49/2$^+$)			
6518.4	(53/2$^-$)	336.4[&] *2*	35[&] *6*	6182.1	(51/2$^-$)			
		716.1 *2*	100 *11*	5802.3	(49/2$^-$)			
6593.2	(53/2$^-$)	743.7 *5*	100	5849.5	(49/2$^-$)			
6598.8	(55/2$^+$)	377.2 *2*	100.0 *24*	6221.7	(53/2$^+$)	(M1)	0.1093	
		710.5 *2*	100.0 *24*	5888.3	(51/2$^+$)	(E2)		
6637.6	(55/2$^-$)	411.3 *2*	38 *4*	6226.3	(53/2$^-$)			other Iγ: 50 from (^{30}Si,p4nγ).
		812.9 *2*	100 *12*	5824.7	(51/2$^-$)	(E2)		
6642.9	(53/2$^-$)	752.7 *2*	100	5890.2	(49/2$^-$)	(E2)		
6653.7	(51/2$^+$)	618[a] *1*	<27	6035.6	(49/2$^+$)			
		704.3 *2*	100 *18*	5949.4	(47/2$^+$)			
6674.2	(53/2$^-$)	784.0 *2*	100	5890.2	(49/2$^-$)			R_{ang}=0.84 *5* In (^{51}V,4nγ) but placement requires ΔJ=2.
6779.9	(53/2$^+$)	744.3 *2*	100	6035.6	(49/2$^+$)	(E2)		
6799.9	(53/2$^+$)	764.3 *2*	100	6035.6	(49/2$^+$)	(E2)		Mult.: Δπ from level scheme.
6815.9	(55/2$^+$)	394.2 *5*	23.7 *26*	6421.7	(53/2$^+$)			
		761.4 *2*	100 *11*	6054.5	(51/2$^+$)			
6919.6	(55/2$^-$)	401.2 *2*	38 *5*	6518.4	(53/2$^-$)			
		737.5 *2*	100 *13*	6182.1	(51/2$^-$)			
6963.5	(57/2$^+$)	364.7 *2*	87 *13*	6598.8	(55/2$^+$)	(M1)	0.1195	
		741.8 *2*	100 *13*	6221.7	(53/2$^+$)	(E2)		
6987.6	(55/2$^-$)	781.9 *2*	100	6205.7	(51/2$^-$)			
7063.8	(57/2$^-$)	426.2 *2*	31 *4*	6637.6	(55/2$^-$)			Iγ: ≈33 In (^{30}Si,p4nγ).
		837.5 *2*	100 *9*	6226.3	(53/2$^-$)			R_{ang}=0.86 *5* In (^{51}V,4nγ); placement requires ΔJ=2.
7213.8	(57/2$^+$)	397.9 *2*	68 *8*	6815.9	(55/2$^+$)			
		792.1 *2*	100 *12*	6421.7	(53/2$^+$)			
7292.8	(57/2$^-$)	373.3 *2*	22 *4*	6919.6	(55/2$^-$)			
		774.4 *2*	100 *11*	6518.4	(53/2$^-$)	(E2)		
7389.2	(59/2$^+$)	425.7 *2*	83 *8*	6963.5	(57/2$^+$)			
		790.3 *2*	100 *8*	6598.8	(55/2$^+$)	(E2)		
7405.4	(57/2$^-$)	812.2 *5*	100	6593.2	(53/2$^-$)			
7406.1	(55/2$^+$)	752.4 *5*	100	6653.7	(51/2$^+$)			
7438.6	(57/2$^-$)	764.4 *5*	<11	6674.2	(53/2$^-$)			
		795.7 *2*	100 *14*	6642.9	(53/2$^-$)	(E2)		

$^{167}_{73}Ta_{94}$-12

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
7471.7	(57/2⁻)	797.4 *5*	75 *17*	6674.2	(53/2⁻)			
		828.8 *2*	100 *8*	6642.9	(53/2⁻)			
7480.3	(59/2⁻)	416.5 *2*	36 *4*	7063.8	(57/2⁻)			
		842.7 *2*	100 *12*	6637.6	(55/2⁻)	(E2)		
7565.8	(57/2⁺)	785.9 *2*	100	6779.9	(53/2⁺)	(E2)		
7596.3	(57/2⁺)	796.4 *5*	100 *13*	6799.9	(53/2⁺)	(E2)		
		816[a] *1*	<38	6779.9	(53/2⁺)			
7654.4	(59/2⁺)	838.5 *2*	100	6815.9	(55/2⁺)			
7716.3	(59/2⁻)	423.5[&] *2*	25[&] *5*	7292.8	(57/2⁻)			
		796.7 *2*	100 *13*	6919.6	(55/2⁻)			
7785.8	(61/2⁺)	396.7 *2*	51 *5*	7389.2	(59/2⁺)	(M1+E2)	0.07 *3*	
		822.4 *2*	100 *14*	6963.5	(57/2⁺)	(E2)		
7830.2	(59/2⁻)	842.6 *2*	100	6987.6	(55/2⁻)			
7933.5	(61/2⁻)	453.1 *2*	33 *4*	7480.3	(59/2⁻)			
		869.7 *2*	100 *8*	7063.8	(57/2⁻)	(E2)		
8085.3	(61/2⁺)	871.5 *2*	100	7213.8	(57/2⁺)			
8128.2	(61/2⁻)	835.4 *2*	100	7292.8	(57/2⁻)			R_{ang}=0.82 *10* In (^{51}V,4nγ); placement requires ΔJ=2.
8205.6	(59/2⁺)	799.5 *5*	100	7406.1	(55/2⁺)			
8263.5	(63/2⁺)	477.7 *2*	58 *8*	7785.8	(61/2⁺)			
		874.3 *2*	100 *10*	7389.2	(59/2⁺)	(E2)		
8278.0	(61/2⁻)	872.6 *5*	100	7405.4	(57/2⁻)			
8294.2	(61/2⁻)	855.6 *2*	100	7438.6	(57/2⁻)	(E2)		
8324.4	(61/2⁻)	852.7 *2*	100	7471.7	(57/2⁻)			
8354.4	(63/2⁻)	420.9 *2*	42 *4*	7933.5	(61/2⁻)			
		874.2 *2*	100 *9*	7480.3	(59/2⁻)	(E2)		
8398.6	(61/2⁺)	832.8 *2*	100	7565.8	(57/2⁺)	(E2)		
8437.2	(61/2⁺)	840.9 *5*	100	7596.3	(57/2⁺)			
8564.2	(63/2⁻)	847.9 *2*	100	7716.3	(59/2⁻)			
8564.3	(63/2⁺)	909.9 *2*	100	7654.4	(59/2⁺)			
8685.4	(65/2⁺)	421.9 *2*	32 *5*	8263.5	(63/2⁺)			
		899.6 *2*	100 *10*	7785.8	(61/2⁺)	(E2)		
8744.8	(63/2⁻)	914.6 *5*	100	7830.2	(59/2⁻)			
8843.6	(65/2⁻)	489.2 *2*	49 *5*	8354.4	(63/2⁻)			
		910.1 *2*	100 *8*	7933.5	(61/2⁻)	(E2)		
9020.7	(65/2⁻)	892.4 *2*	100	8128.2	(61/2⁻)			
9030.4	(65/2⁺)	945.1 *2*	100	8085.3	(61/2⁺)			
9054.3	(63/2⁺)	848.7 *5*	100	8205.6	(59/2⁺)			
9204.7	(65/2⁻)	926.7 *5*	100	8278.0	(61/2⁻)			
9206.8	(65/2⁻)	912.6 *5*	100	8294.2	(61/2⁻)			
9219.6	(67/2⁺)	956.1 *2*	100	8263.5	(63/2⁺)	(E2)		
9222.6	(65/2⁻)	898.2 *5*	100	8324.4	(61/2⁻)			
9267.2	(67/2⁻)	423.5[&] *2*	15.6[&] *26*	8843.6	(65/2⁻)			
		912.8 *2*	100 *10*	8354.4	(63/2⁻)	(E2)		

$^{167}_{73}Ta_{94}$-13

Adopted Levels, Gammas (continued)

γ(^{167}Ta) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.†
9280.0	(65/2$^+$)	881.4 *2*	100	8398.6	(61/2$^+$)	(E2)
9331.8	(65/2$^+$)	894.6 *5*	100	8437.2	(61/2$^+$)	
9466.0	(67/2$^-$)	901.8 *2*	100	8564.2	(63/2$^-$)	
9654.1	(69/2$^+$)	968.7 *2*	100	8685.4	(65/2$^+$)	
9805.1	(69/2$^-$)	961.4 *2*	100	8843.6	(65/2$^-$)	
9954.1	(67/2$^+$)	899.8 *5*	100	9054.3	(63/2$^+$)	
9972.8	(69/2$^-$)	952.1 *2*	100	9020.7	(65/2$^-$)	
10019.8	(69/2$^+$)	989.4 *5*	100	9030.4	(65/2$^+$)	
10143.7	(69/2$^-$)	921.1 *5*	100	9222.6	(65/2$^-$)	
10158.7	(69/2$^-$)	951.9 *5*	100	9206.8	(65/2$^-$)	
10213.8	(69/2$^+$)	933.8 *5*	100	9280.0	(65/2$^+$)	
10223.8	(71/2$^-$)	956.6 *2*	100	9267.2	(67/2$^-$)	
10250.4	(71/2$^+$)	1030.8 *2*	100	9219.6	(67/2$^+$)	
10267.3	(69/2$^+$)	935.5 *5*	100	9331.8	(65/2$^+$)	
10424.2	(71/2$^-$)	958.2 *5*	100	9466.0	(67/2$^-$)	
10681.3	(73/2$^+$)	1027.2 *2*	100	9654.1	(69/2$^+$)	
10825.6	(73/2$^-$)	1020.5 *2*	100	9805.1	(69/2$^-$)	
10906.1	(71/2$^+$)	952.0 *5*	100	9954.1	(67/2$^+$)	
10986.8	(73/2$^-$)	1014.0 *5*	100	9972.8	(69/2$^-$)	
11031.8?	(73/2$^+$)	1012[a] *1*	100	10019.8	(69/2$^+$)	
11200.4	(73/2$^+$)	986.6 *5*	100	10213.8	(69/2$^+$)	
11225.3	(75/2$^-$)	1001.5 *2*	100	10223.8	(71/2$^-$)	
11239.3?	(73/2$^+$)	972[a] *1*	100	10267.3	(69/2$^+$)	
11346.1	(75/2$^+$)	1095.7 *5*	100	10250.4	(71/2$^+$)	
11434.7	(75/2$^-$)	1010.5 *5*	100	10424.2	(71/2$^-$)	
11756.5	(77/2$^+$)	1075.2 *2*	100	10681.3	(73/2$^+$)	
11907.0	(77/2$^-$)	1081.4 *2*	100	10825.6	(73/2$^-$)	
11910.9	(75/2$^+$)	1004.7 *5*	100	10906.1	(71/2$^+$)	
12065.5	(77/2$^-$)	1078.7 *5*	100	10986.8	(73/2$^-$)	
12240.4	(77/2$^+$)	1040.0 *5*	100	11200.4	(73/2$^+$)	
12271.0	(79/2$^-$)	1045.7 *5*	100	11225.3	(75/2$^-$)	
12486.2	(79/2$^+$)	1140.1 *5*	100	11346.1	(75/2$^+$)	
12492.8	(79/2$^-$)	1058.1 *5*	100	11434.7	(75/2$^-$)	
12871.9	(81/2$^+$)	1115.4 *5*	100	11756.5	(77/2$^+$)	
12968.0	(79/2$^+$)	1057.1 *5*	100	11910.9	(75/2$^+$)	
13047.3	(81/2$^-$)	1140.3 *2*	100	11907.0	(77/2$^-$)	
13343.4?	(81/2$^+$)	1103[a] *1*	100	12240.4	(77/2$^+$)	
13357.6	(83/2$^-$)	1086.6 *5*	100	12271.0	(79/2$^-$)	
13596.2	(83/2$^-$)	1103.4 *5*	100	12492.8	(79/2$^-$)	
14025.6	(85/2$^+$)	1153.7 *5*	100	12871.9	(81/2$^+$)	
14229.9	(85/2$^-$)	1182.6 *2*	100	13047.3	(81/2$^-$)	
14483.0	(87/2$^-$)	1125.4 *5*	100	13357.6	(83/2$^-$)	

† From (^{51}V,4nγ), except as noted. For many levels, additional estimates of γ branching are available from (^{30}Si,p4nγ); inconsistencies are noted. Δπ=(No) has been assigned for intraband transitions.

‡ From α(K)exp in ^{167}W ε decay.

From ^{167}W ε decay.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

& Multiply placed with intensity suitably divided.

a Placement of transition in the level scheme is uncertain.

$^{167}_{73}Ta_{94}$-14

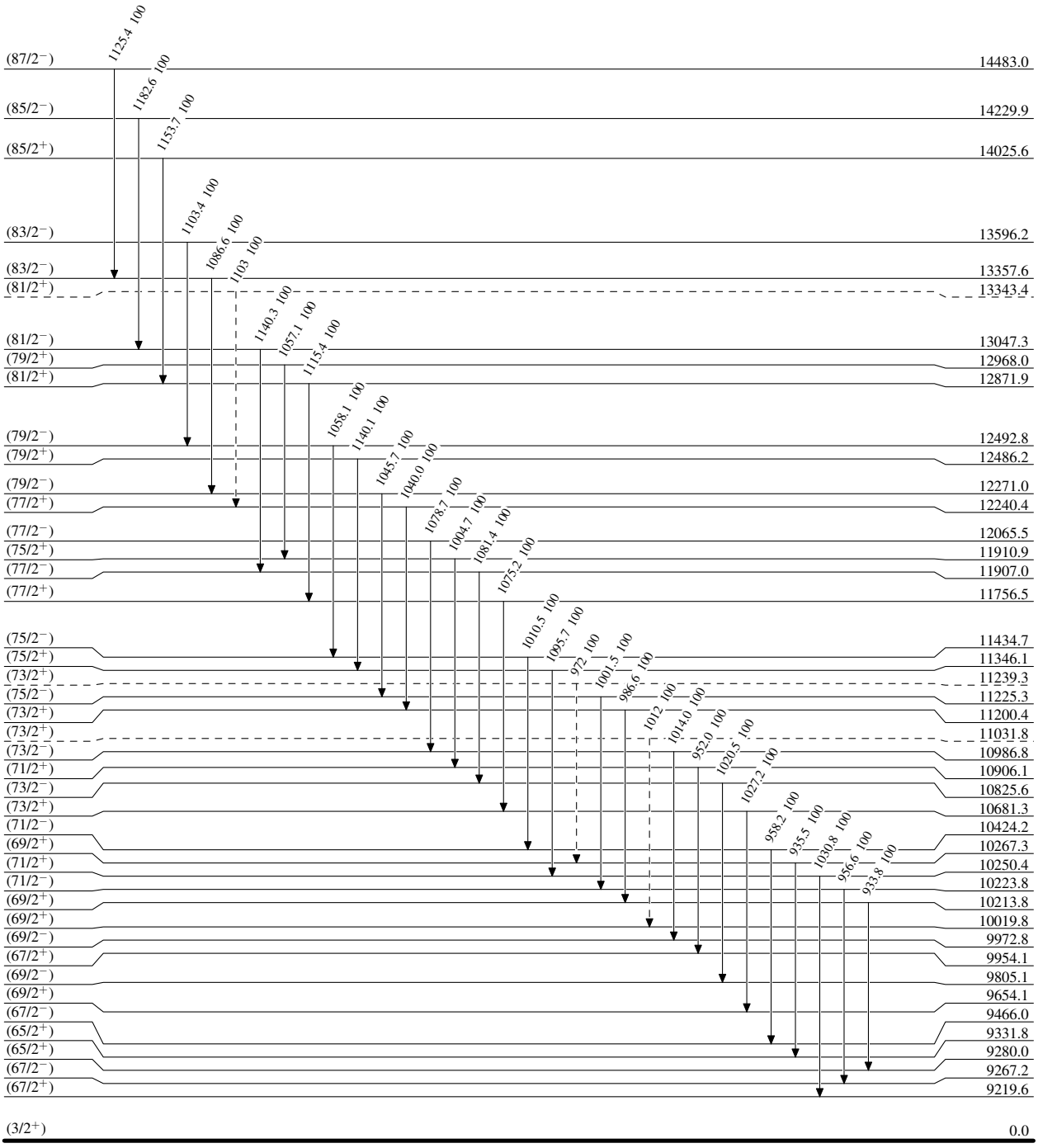
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)

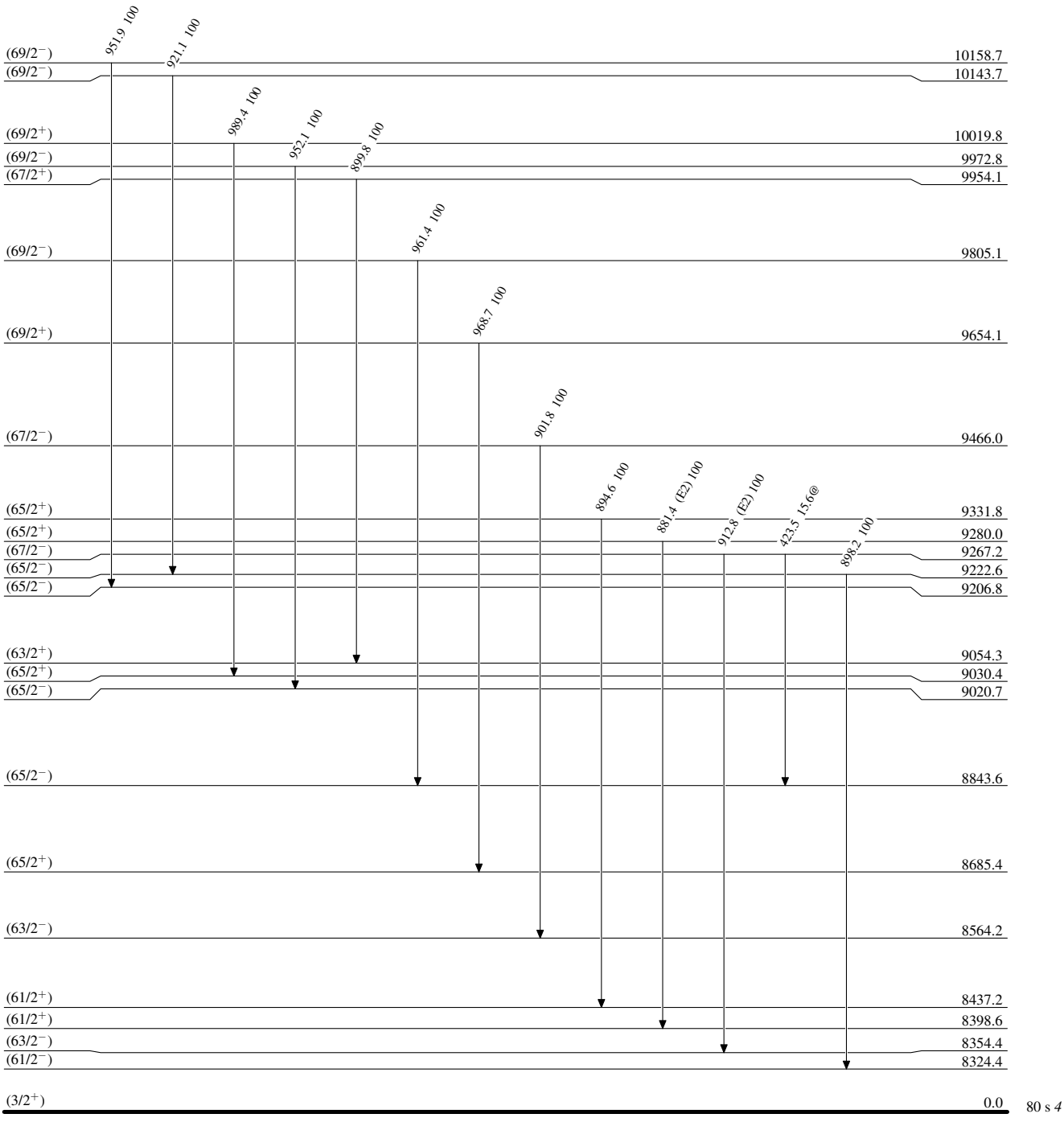


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

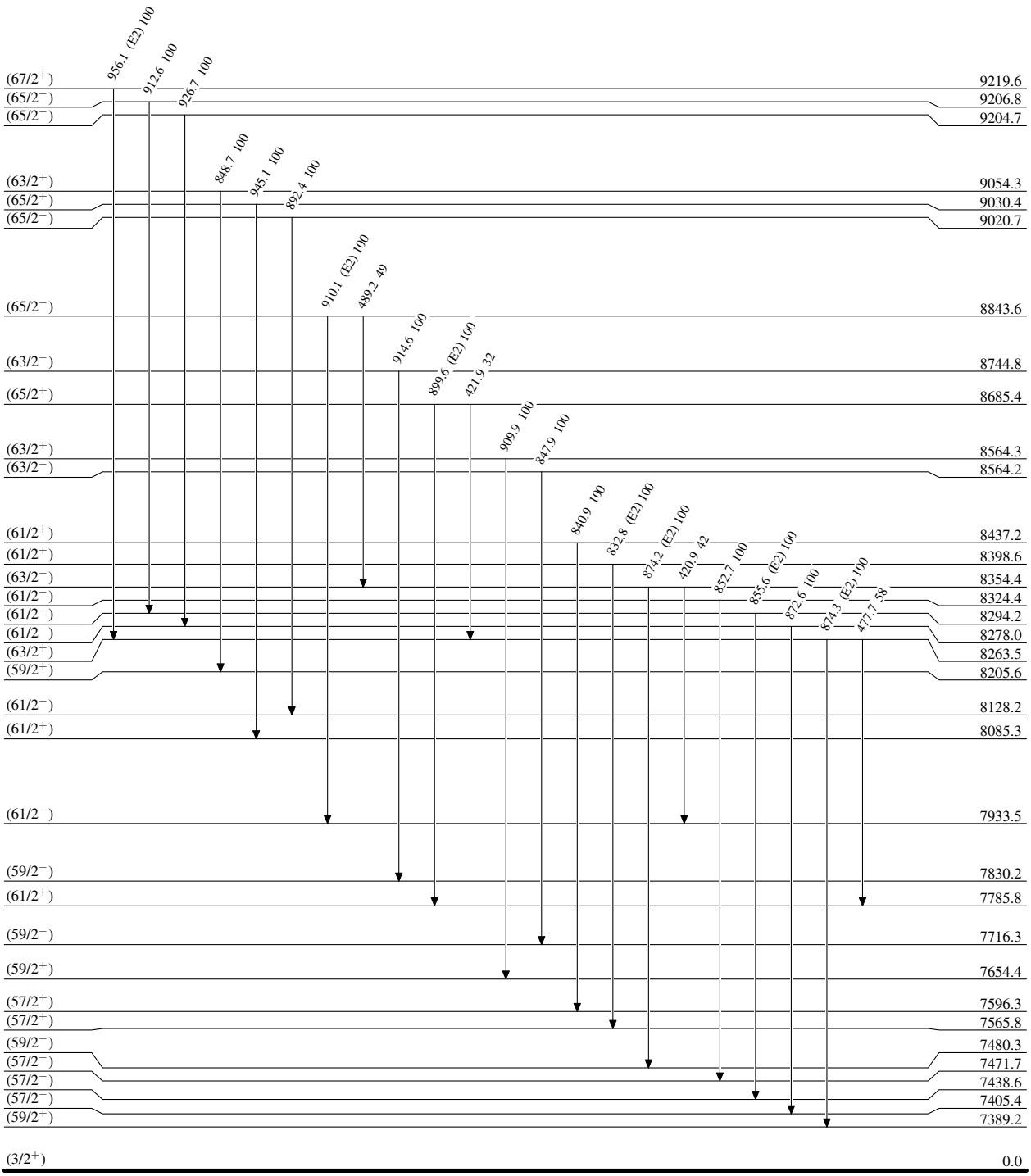


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



$^{167}_{73}Ta_{94}$

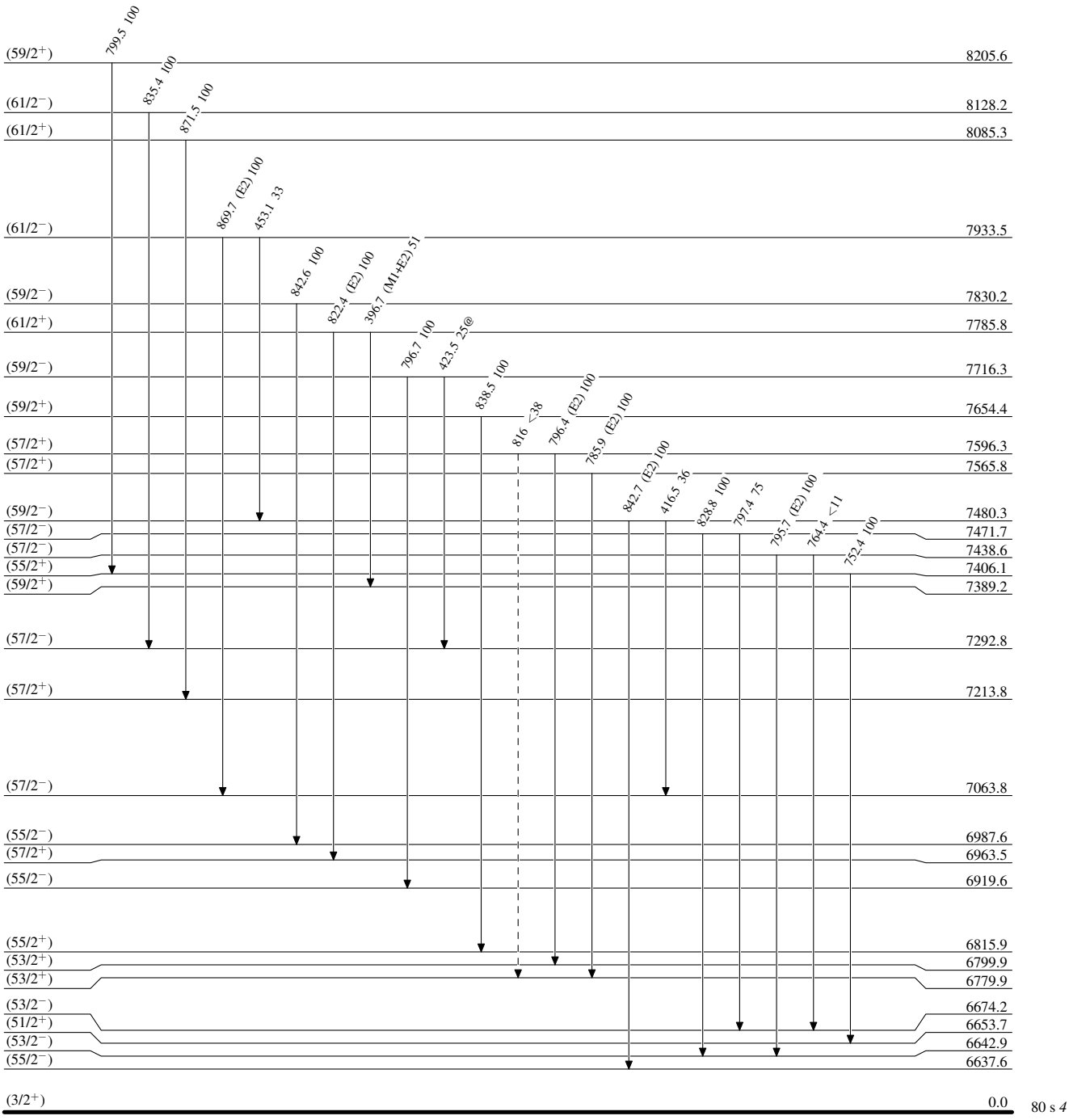
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

– – – – – – ► γ Decay (Uncertain)



$^{167}_{73}Ta_{94}$

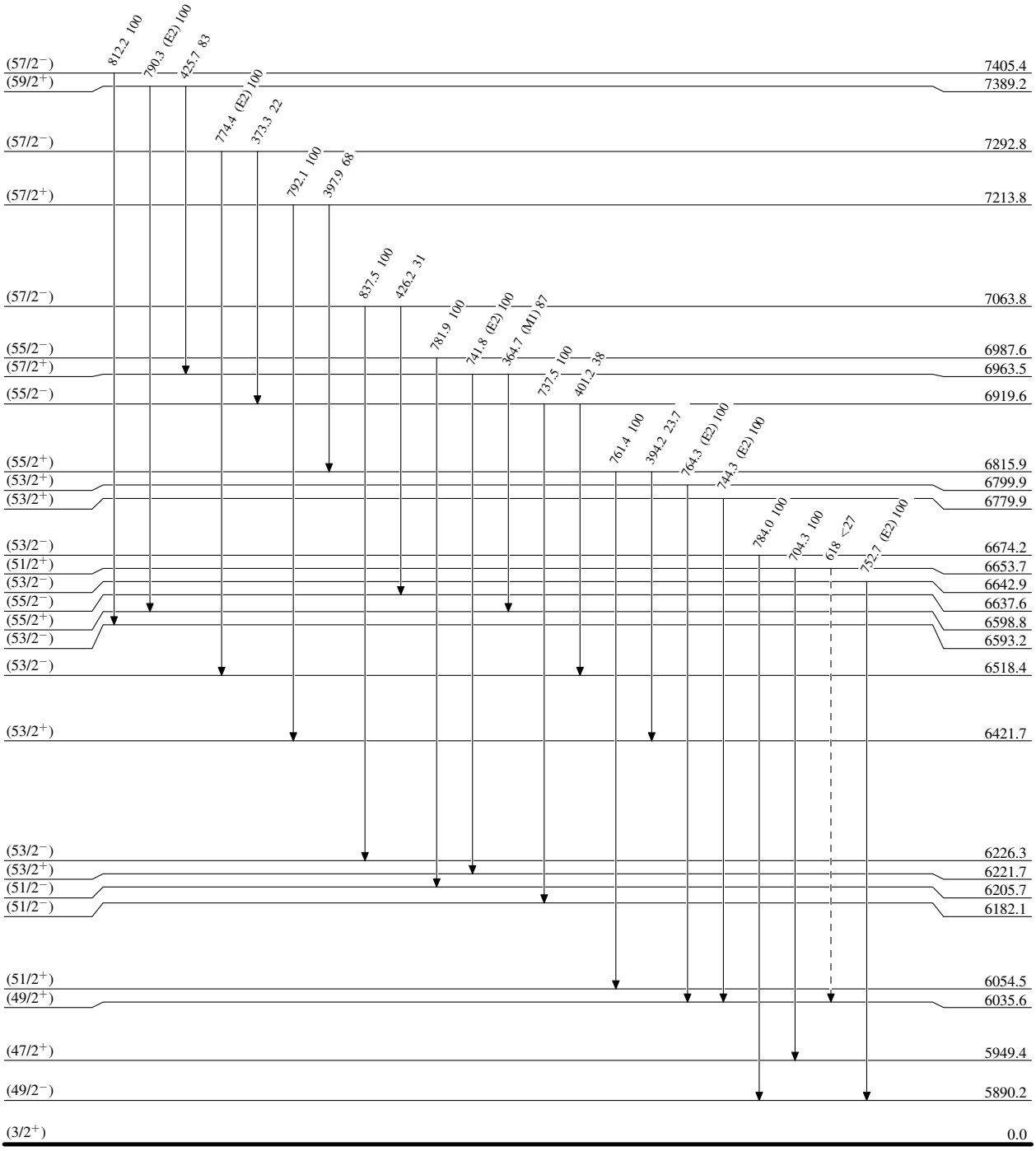
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

- - - - - - ► γ Decay (Uncertain)

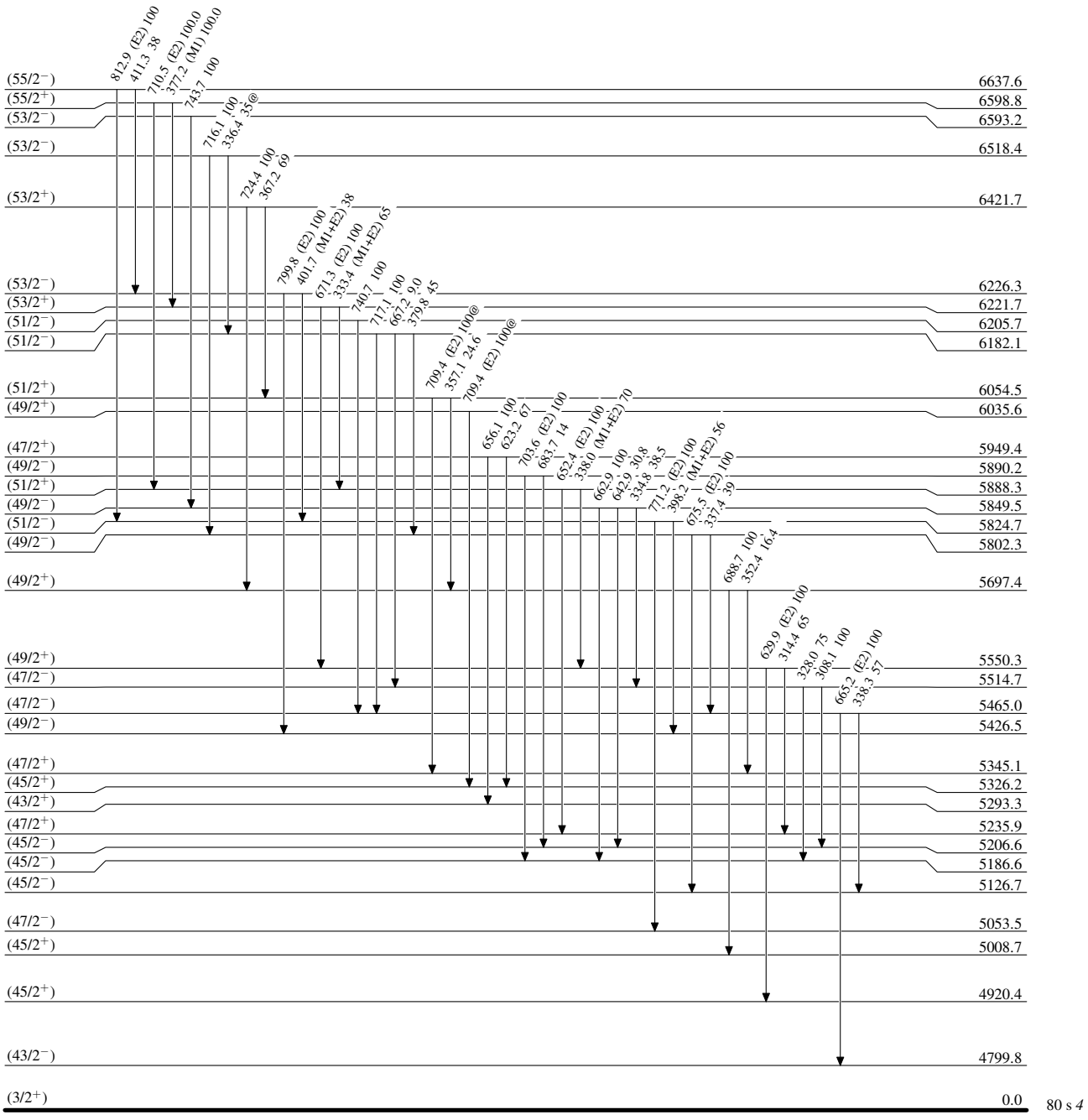


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

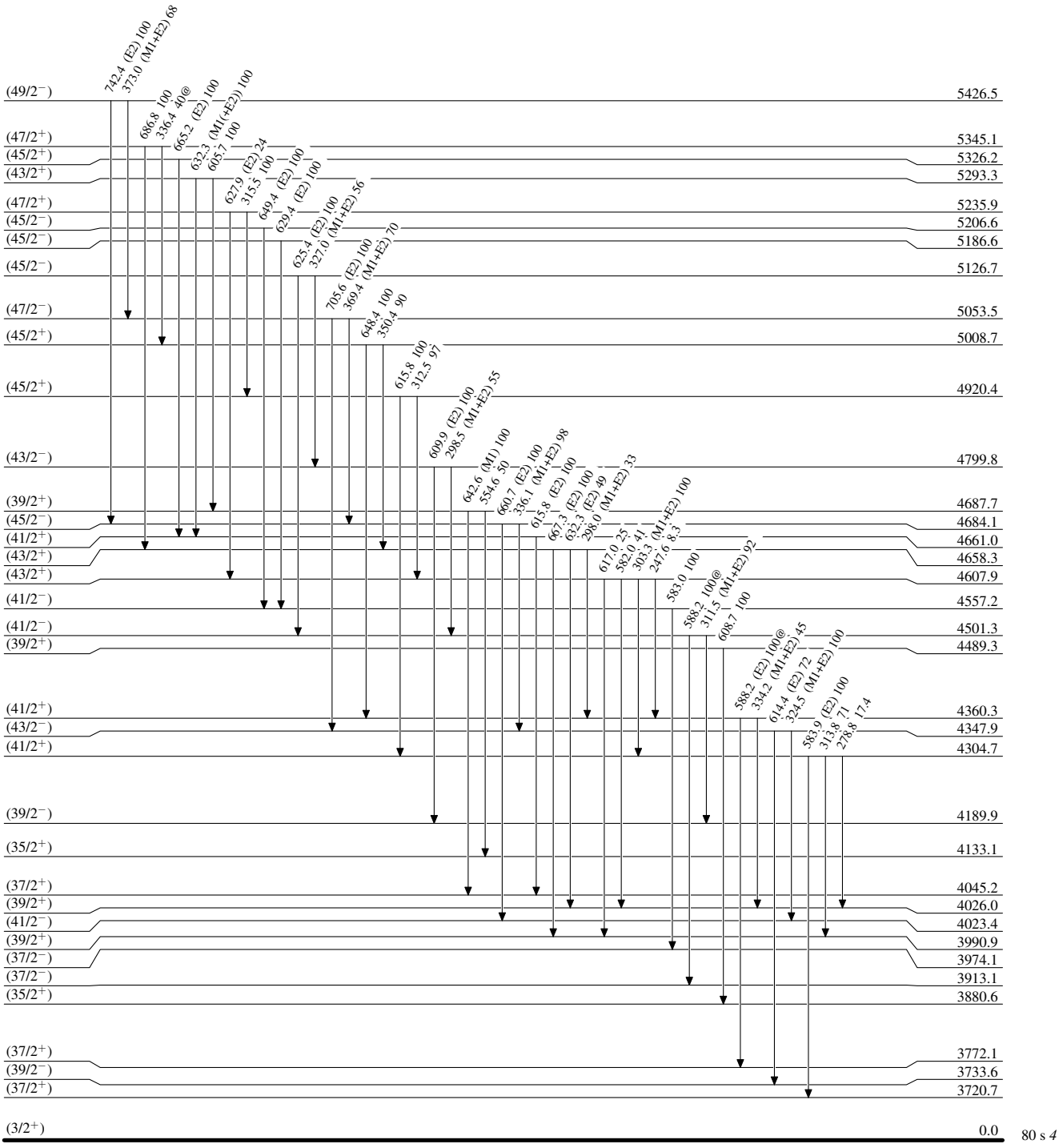


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

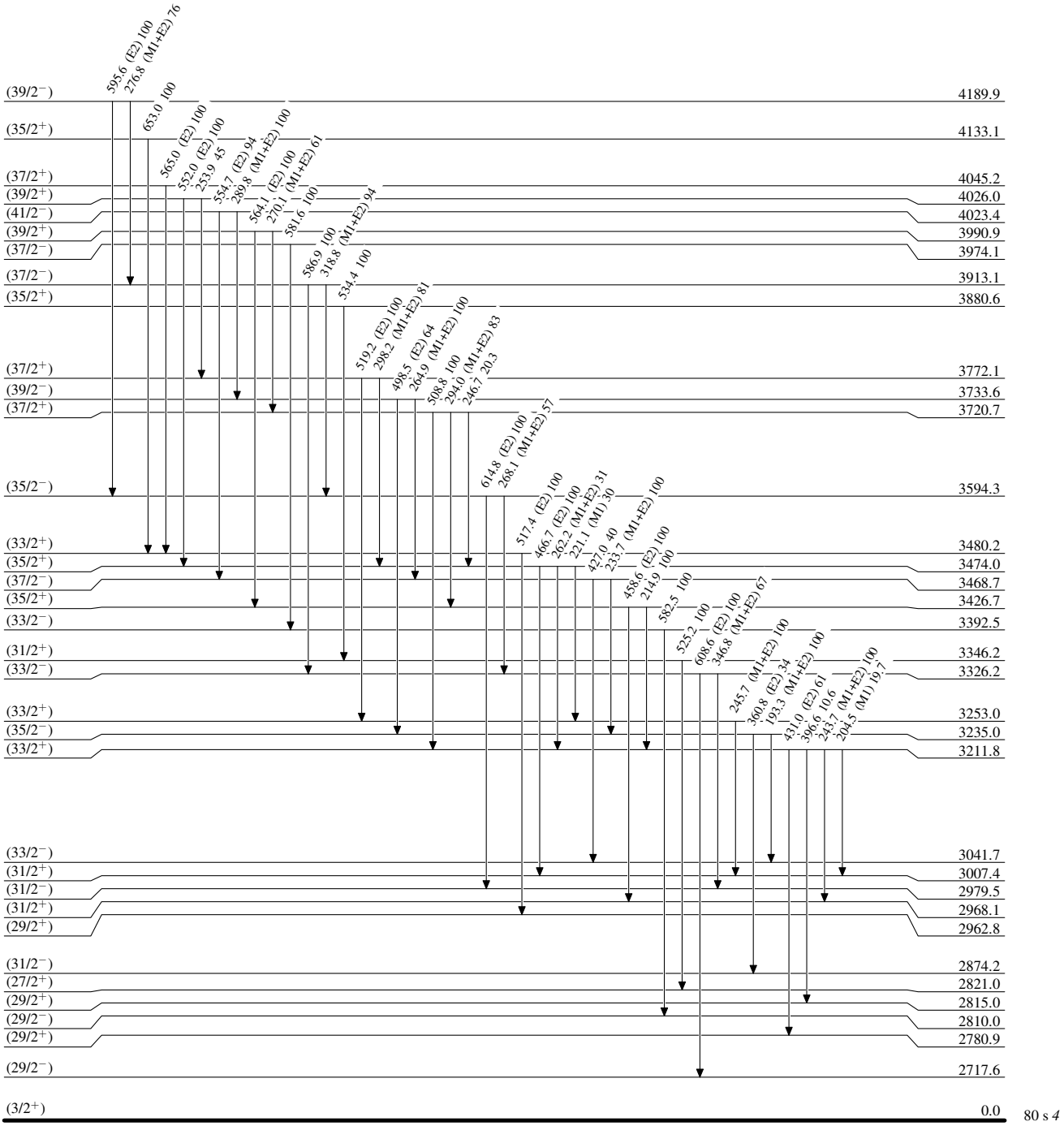


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

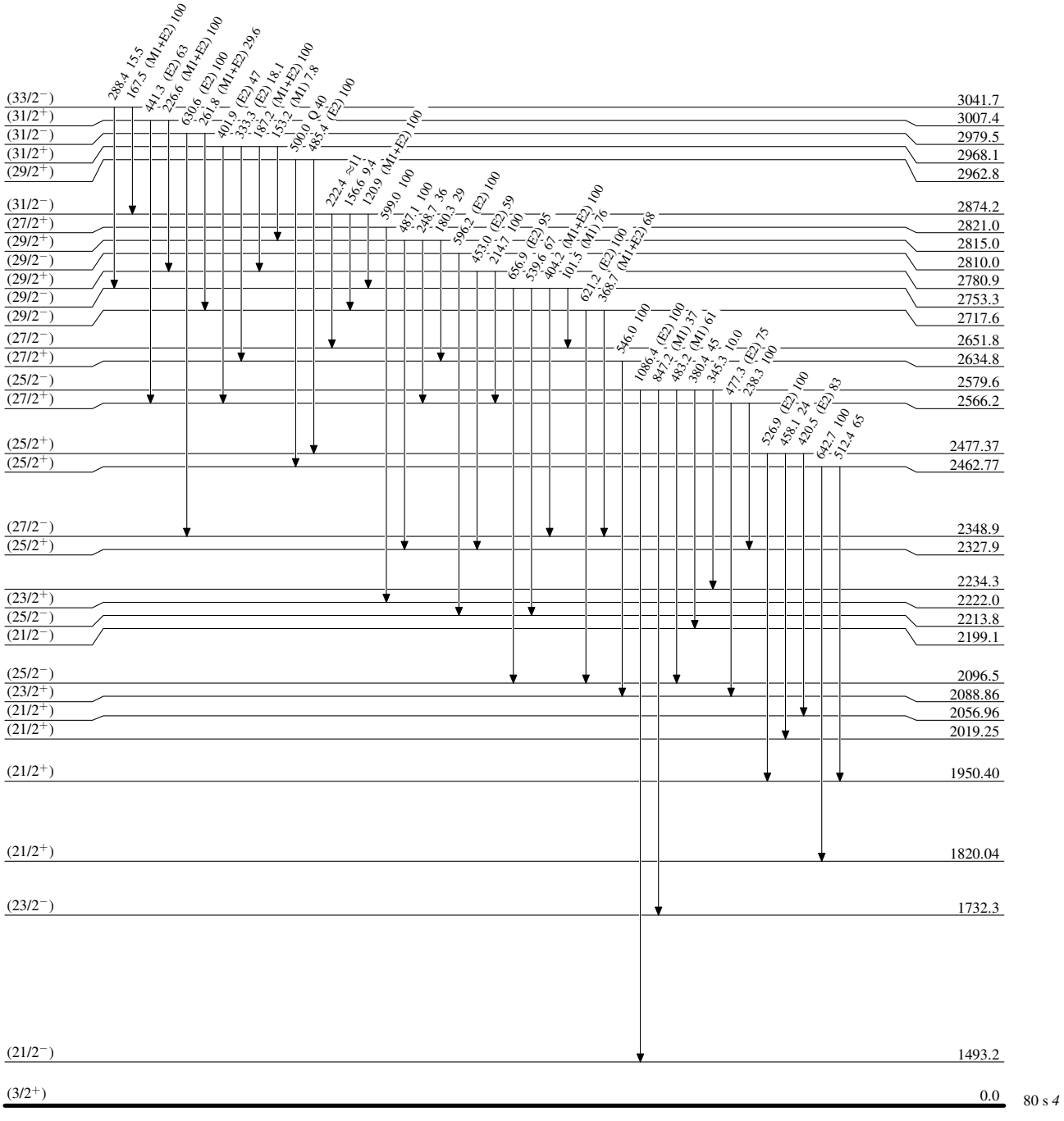


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

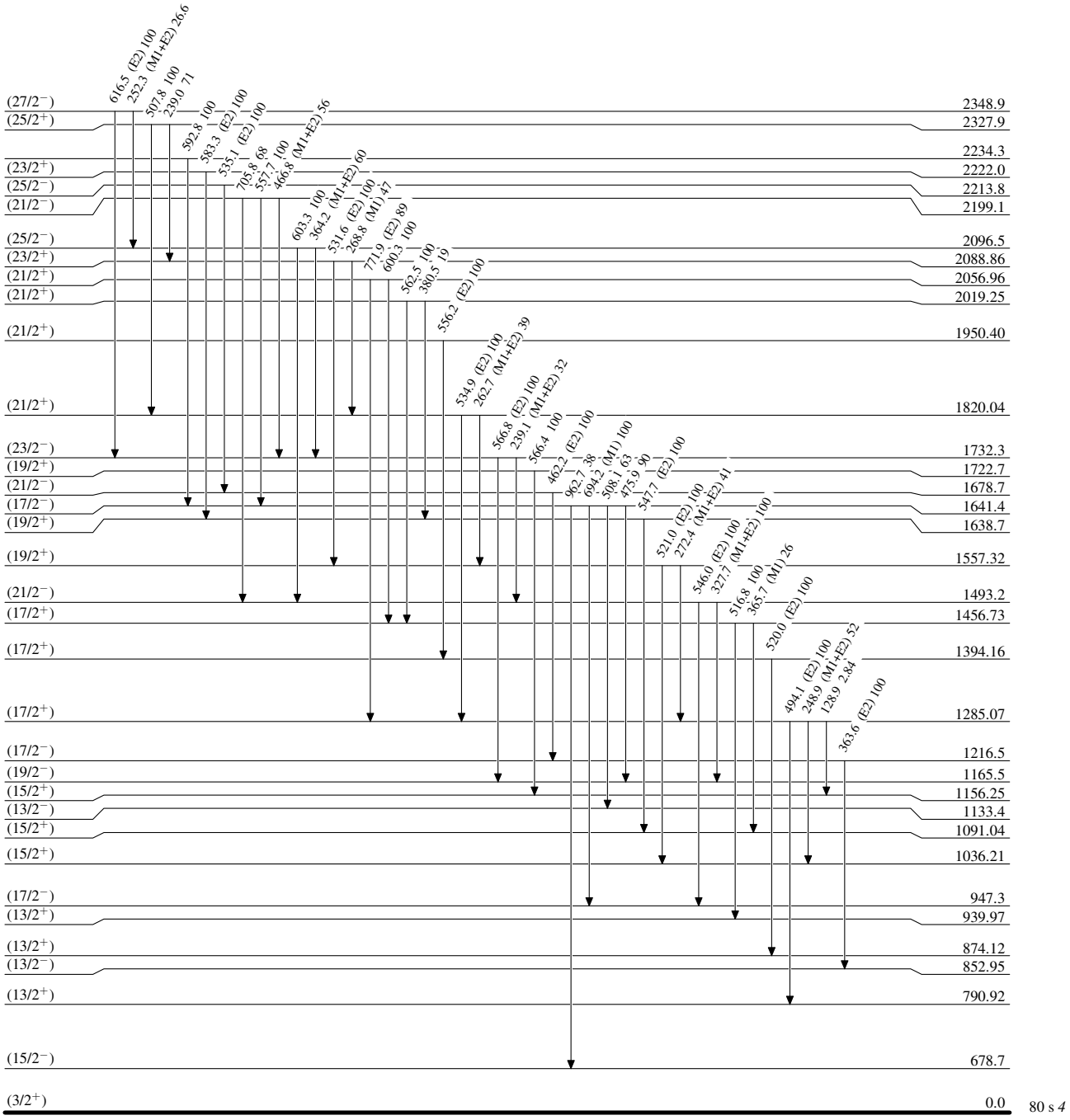


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

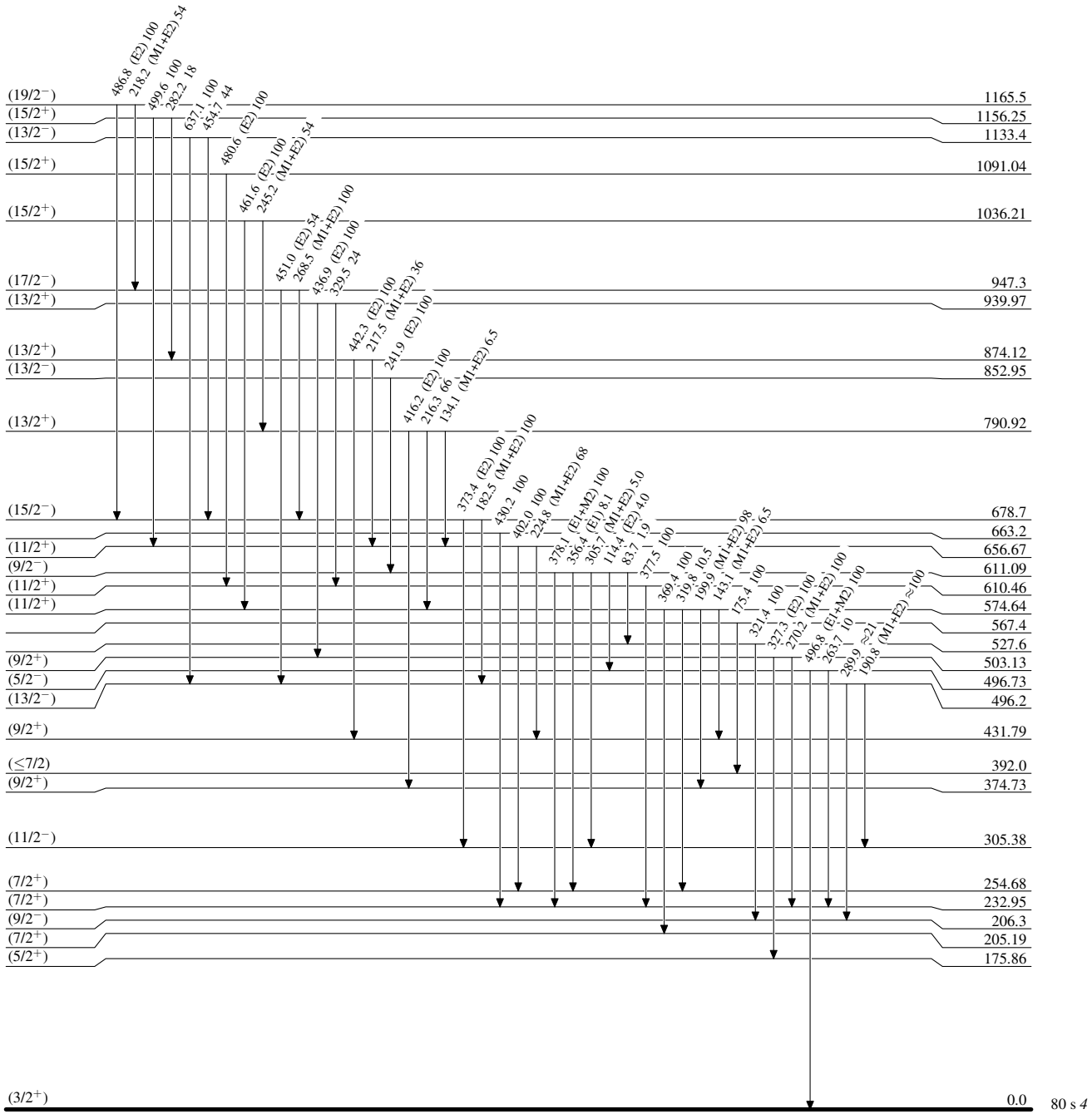


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

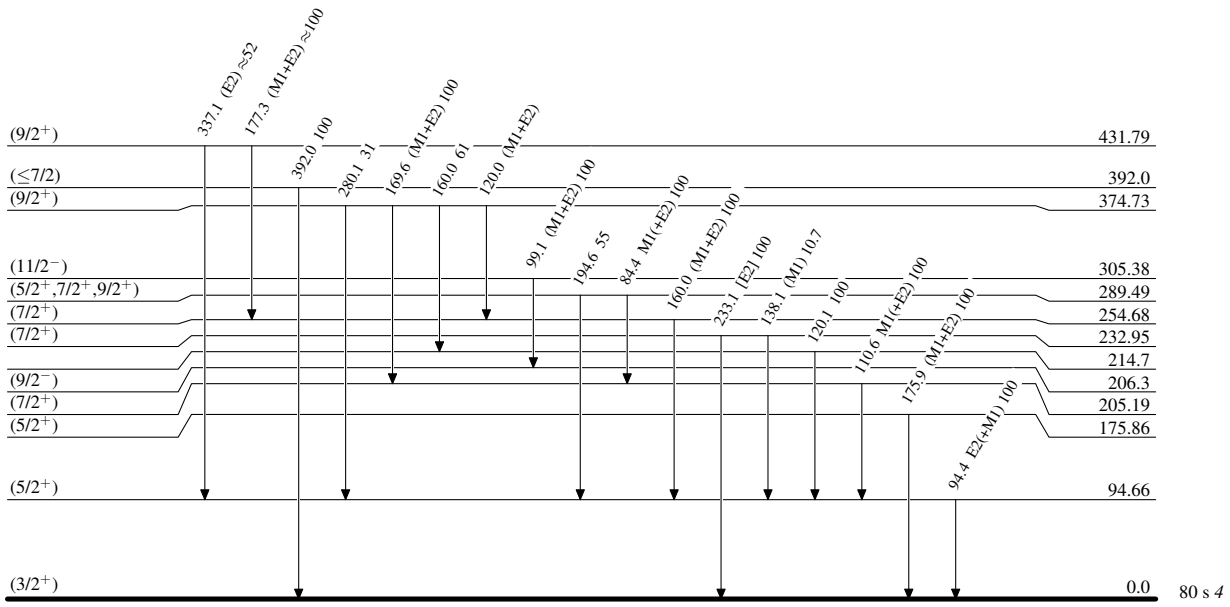


$^{167}_{73}Ta_{94}$

Adopted Levels, Gammas

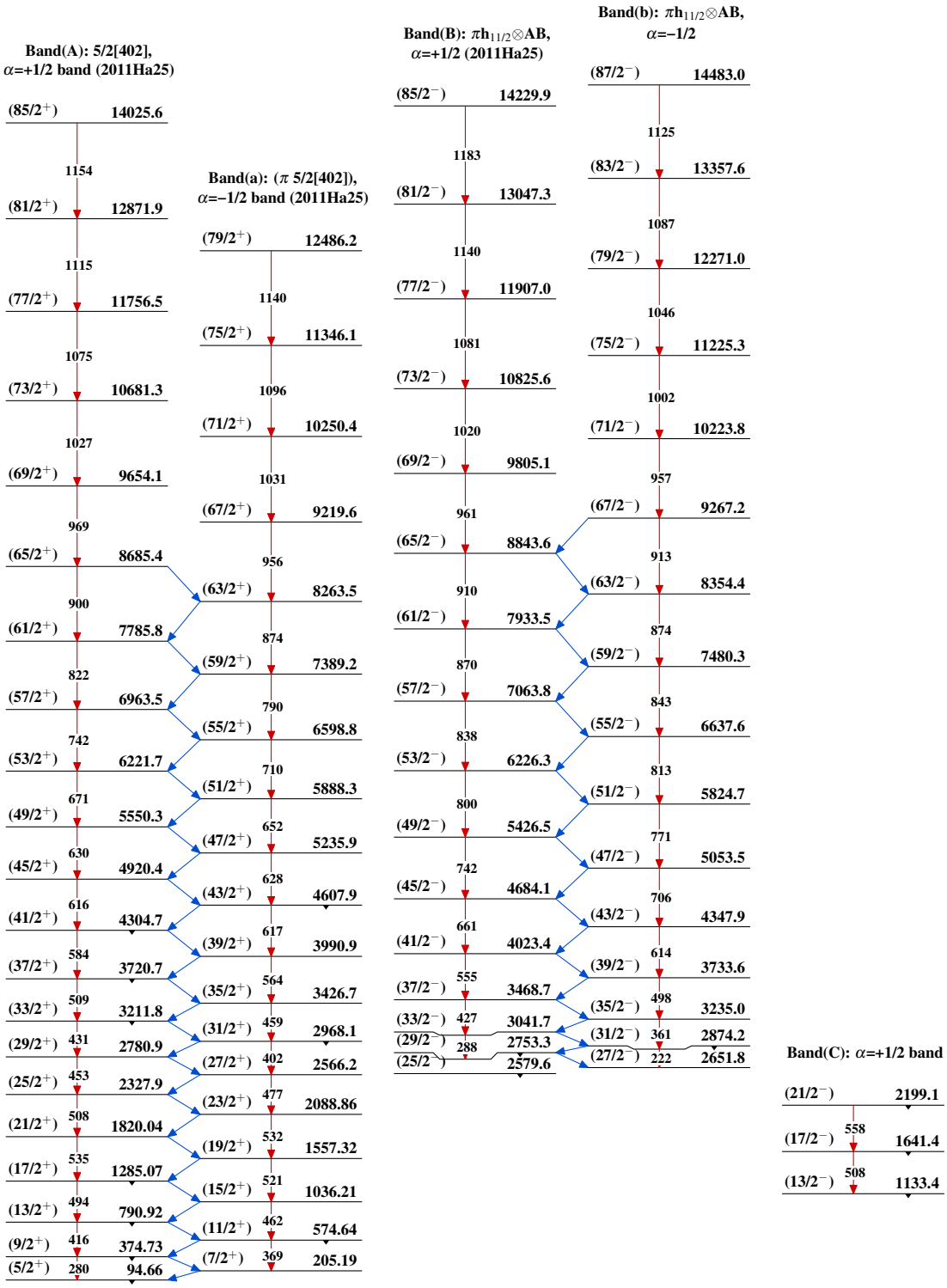
Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

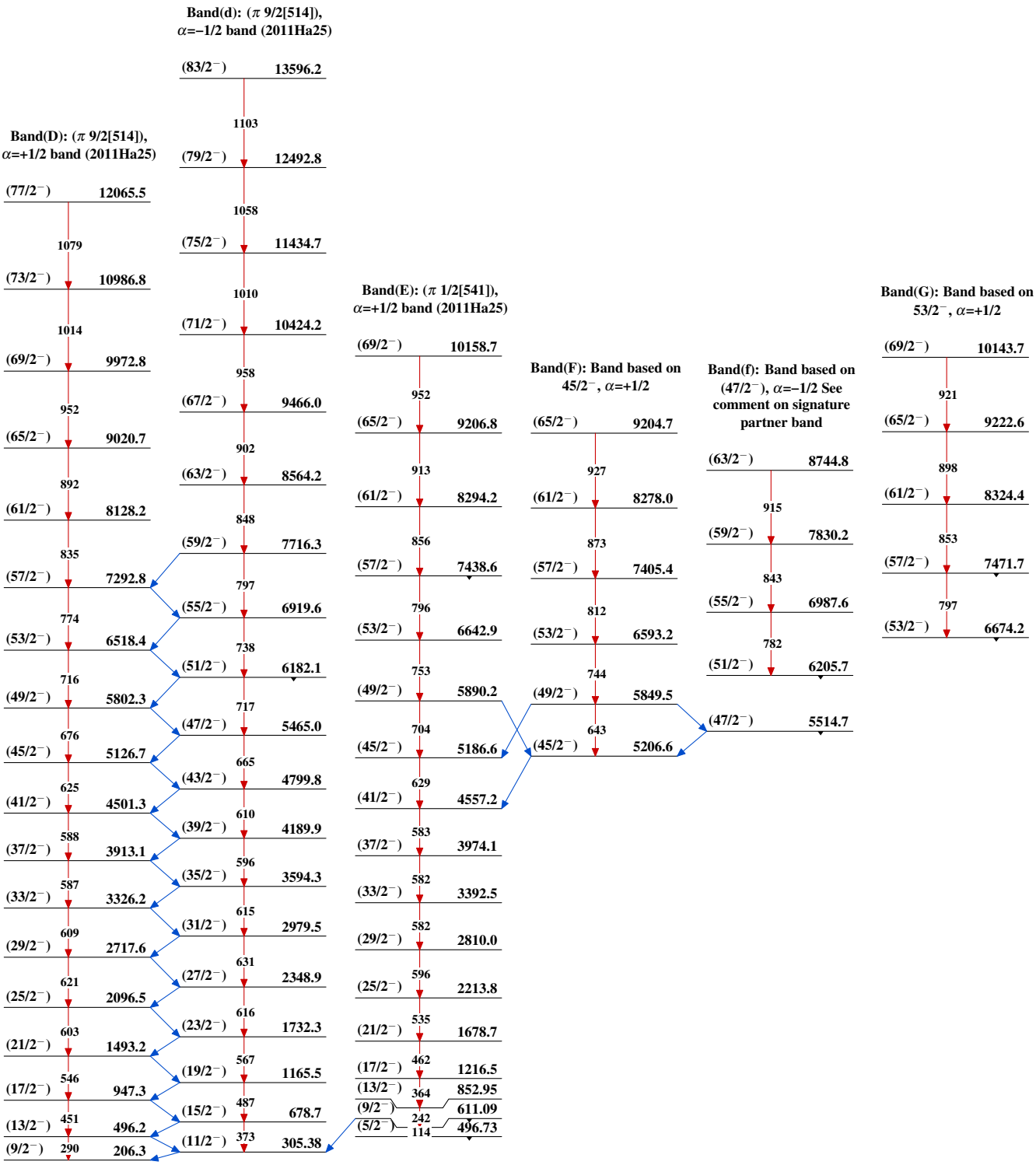


$^{167}_{73}Ta_{94}$

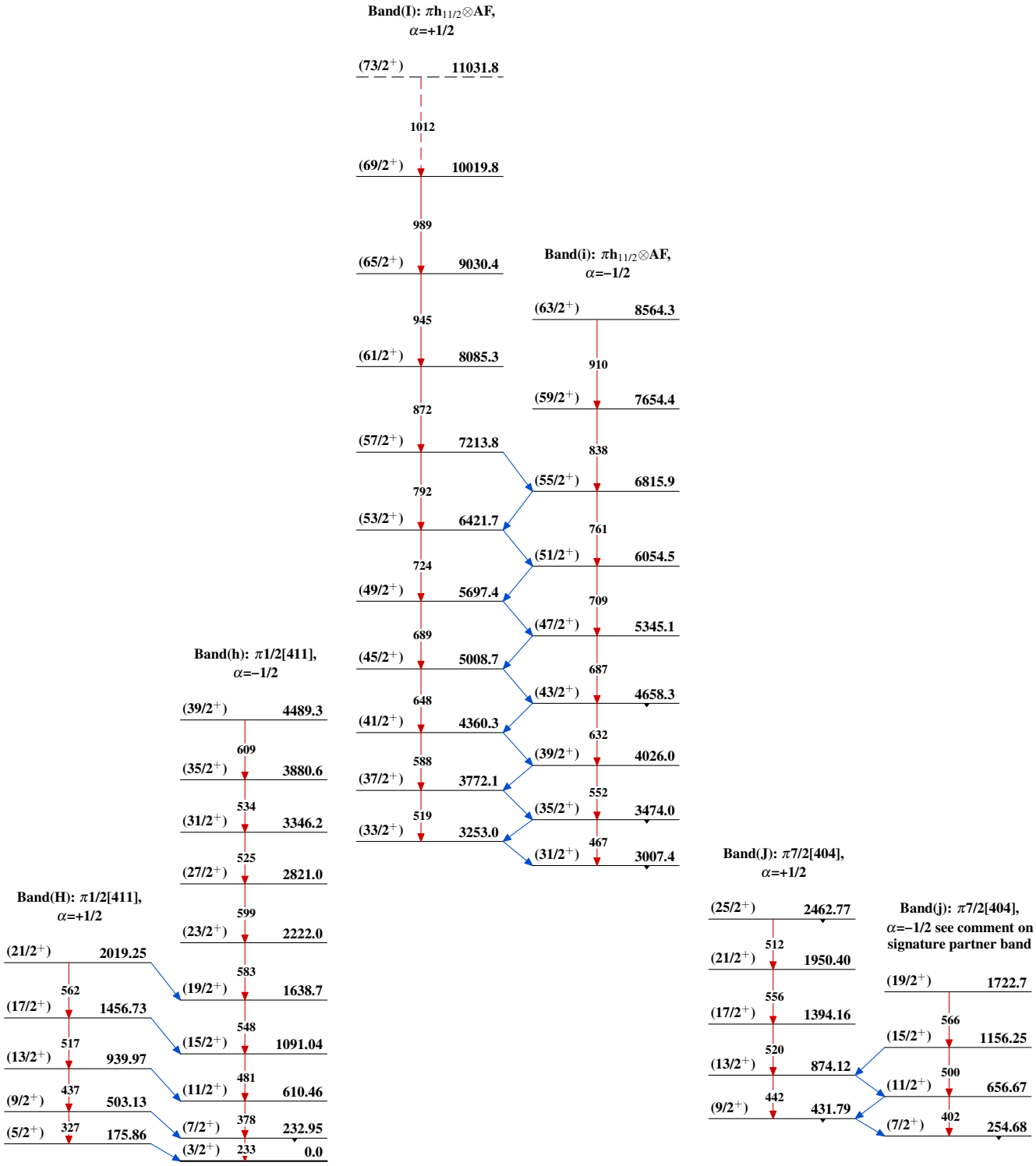
Adopted Levels, Gammas



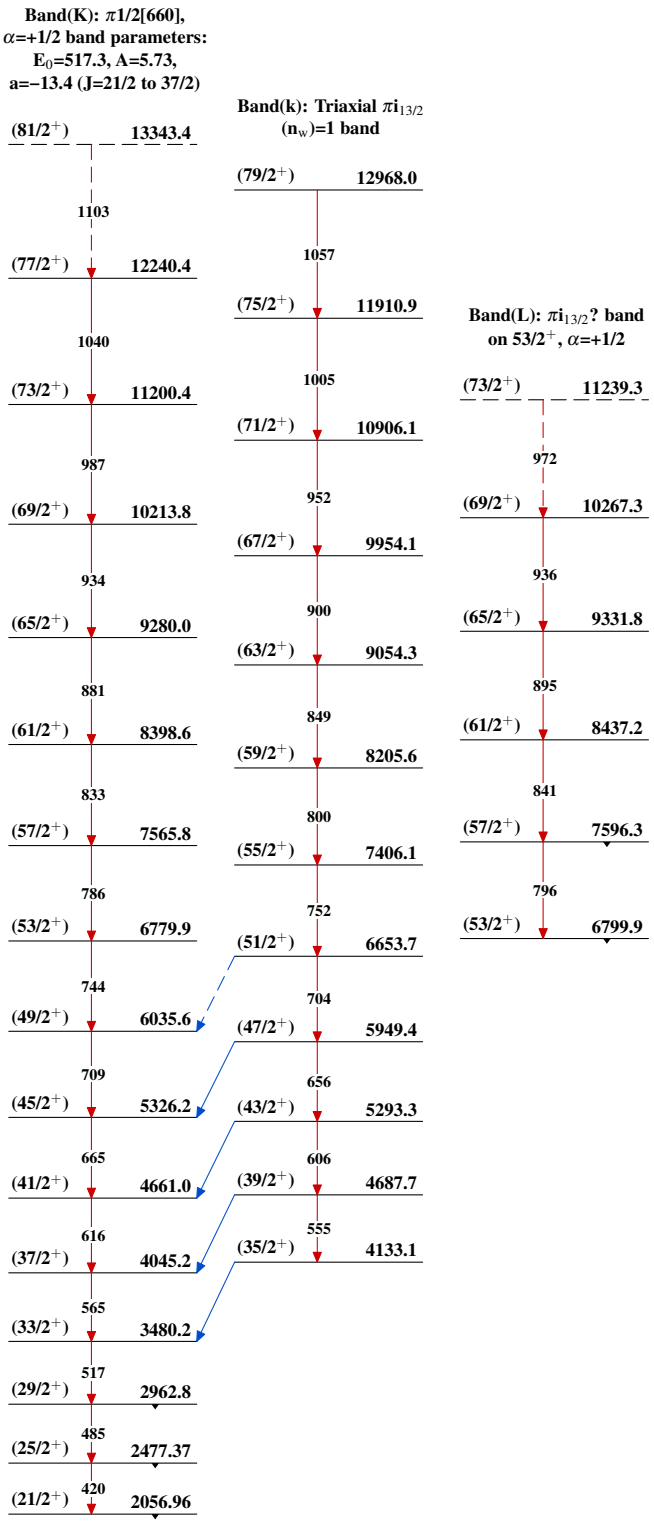
Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)



$^{167}_{73}Ta_{94}$

^{167}W ε decay 1989Me02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	ENSDF	23-May-2013

Parent: ^{167}W: E=0.0; J^π=(+); $T_{1/2}$=19.9 s *5*; Q(ε)=6250 *30*; %ε+%$β^+$ decay=99.96 *1*

^{167}W-%ε+%$β^+$ decay: Based on %α(^{167}W)=0.04 *1* (1989Me02).

Others: 1987Es08 (see also 1989Br19); 1992HeZV.

The decay scheme is based on that of 1989Me02. No ε branch to the ^{167}Ta g.s. is known but, if it exceeded 7.2%, it would be an allowed branch; also, provided it were <84%, the branch to the 289 level (which has the same parity as the g.s.) would be allowed. Thus, ^{167}W(g.s.), ^{167}Ta(g.s.) and ^{167}Ta(289 level) must have the same parity. 1989Me02 assumed $J^\pi=5/2^-$ for the ^{167}W parent, based on systematics; this is not adopted here because J^π(^{167}Ta g.s.)=$(3/2^+)$ is favored in a (HI,xnγ) study by 1992Th02. In view of the likelihood of g.s. ε+$β^+$ feeding, the decay scheme has not been normalized.

^{167}Ta Levels

E(level)	J^π†	Comments
0.0	$(3/2^+)$	
94.4 *2*	$(5/2^+)$	
204.6 *3*	$(7/2^+)$	
232.83 *25*	$(7/2^+)$	
254.1 *5*		
289.0 *3*	$(5/2^+,7/2^+,9/2^+)$	
392.0 *4*	(≤7/2)	E(level): 175.4 *3* also possible; order of 175γ and 392γ uncertain.
496.57 *25*		
503.0 *5*		
567.4 *5*		
611.2 *5*	$(9/2^-)$	
663.0 *4*		

† From Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	Comments
(5.59×10^3† *3*)	663.0	
(5.64×10^3† *3*)	611.2	
(5.68×10^3† *3*)	567.4	
(5.75×10^3† *3*)	503.0	
(5.75×10^3 *3*)	496.57	εK/$β^+$=0.57 *11* (1989Me02) from I(K x ray, Ta) and I($γ^\pm$) in coincidence with 497γ. This implies Q=5590 *+300−240* (1989Me02) for ^{167}W ε decay, cf. 6250 *30* from 2012Wa38.
(5.96×10^3 *3*)	289.0	
(6.00×10^3† *3*)	254.1	
(6.05×10^3 *3*)	204.6	
(6.16×10^3 *3*)	94.4	
(6.25×10^3† *3*)	0.0	

† Existence of this branch is questionable.

^{167}W ε decay 1989Me02 (continued)

γ(^{167}Ta)

All gammas reported by 1989Me02 are in coincidence with K x ray(Ta) and $\gamma^{\pm}$.

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	α#	Comments
84.4 *2*	29 *2*	289.0	(5/2$^+$,7/2$^+$,9/2$^+$)	204.6	(7/2$^+$)	M1(+E2)	≤1.3	7.18 *14*	α(K)=4.4 *15*; α(L)=2.1 *12*; α(M)=0.5 *3*; α(N+..)=0.14 *8* α(N)=0.12 *7*; α(O)=0.017 *9*; α(P)=0.00041 *15* α(K)exp=6 *3* (1989Me02)
94.4 *2*	100	94.4	(5/2$^+$)	0.0	(3/2$^+$)	E2(+M1)	≥1.1	4.77 *14*	α(K)=1.8 *8*; α(L)=2.3 *5*; α(M)=0.57 *13*; α(N+..)=0.15 *4* α(N)=0.13 *3*; α(O)=0.018 *4*; α(P)=0.00015 *8* α(exp)=4.5 *5* (1989Me02)
110.2 *2*	94 *4*	204.6	(7/2$^+$)	94.4	(5/2$^+$)	M1(+E2)	≤2.8	3.0 *4*	α(K)=1.9 *9*; α(L)=0.8 *4*; α(M)=0.21 *11*; α(N+..)=0.06 *3* α(N)=0.048 *25*; α(O)=0.007 *3*; α(P)=0.00017 *9* α(K)exp=2 *1* (1989Me02)
x141.6 *4*									Reported by 1987Es08 (and 1989Br19). Probably does not belong to ^{167}Ta; 1989Me02 report 141.6γ in coincidence with K x ray(Hf) and 139.5γ(^{167}Hf), so they assign it to ^{167}Ta ε decay.
159.7 *4*	21 *2*	254.1		94.4	(5/2$^+$)				I_γ: after correction for contribution from 158.7γ from ^{166}Ta decay.
175.4 *3*		567.4		392.0	(≤7/2)				I_γ: not determined; contaminant present. Iγ<17 expected based on intensity balance at the 392 level.
194.6 *3*	16 *2*	289.0	(5/2$^+$,7/2$^+$,9/2$^+$)	94.4	(5/2$^+$)				
232.8 *3*	46 *2*	232.83	(7/2$^+$)	0.0	(3/2$^+$)	[E2]		0.181	α(K)=0.1110 *16*; α(L)=0.0531 *8*; α(M)=0.01303 *20*; α(N+..)=0.00349 *6* α(N)=0.00306 *5*; α(O)=0.000422 *7*; α(P)=8.33×10^{-6} *12*
263.7 *3*	4 *1*	496.57		232.83	(7/2$^+$)				
270.2 *4*	13 *4*	503.0		232.83	(7/2$^+$)				
x275.6 *3*	22 *1*								
378.4 *4*	18 *5*	611.2	(9/2$^-$)	232.83	(7/2$^+$)				
392.0 *4*	17 *2*	392.0	(≤7/2)	0.0	(3/2$^+$)				
430.2 *3*	17 *2*	663.0		232.83	(7/2$^+$)				
496.6 *3*	34 *3*	496.57		0.0	(3/2$^+$)				
x533.7 *4*	21 *2*								

† From 1989Me02.

Continued on next page (footnotes at end of table)

^{167}W ε decay 1989Me02 (continued)

$\gamma(^{167}Ta)$ (continued)

‡ From α(K)exp (1989Me02).
# Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
x γ ray not placed in level scheme.

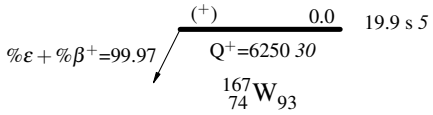
^{167}W ε decay 1989Me02

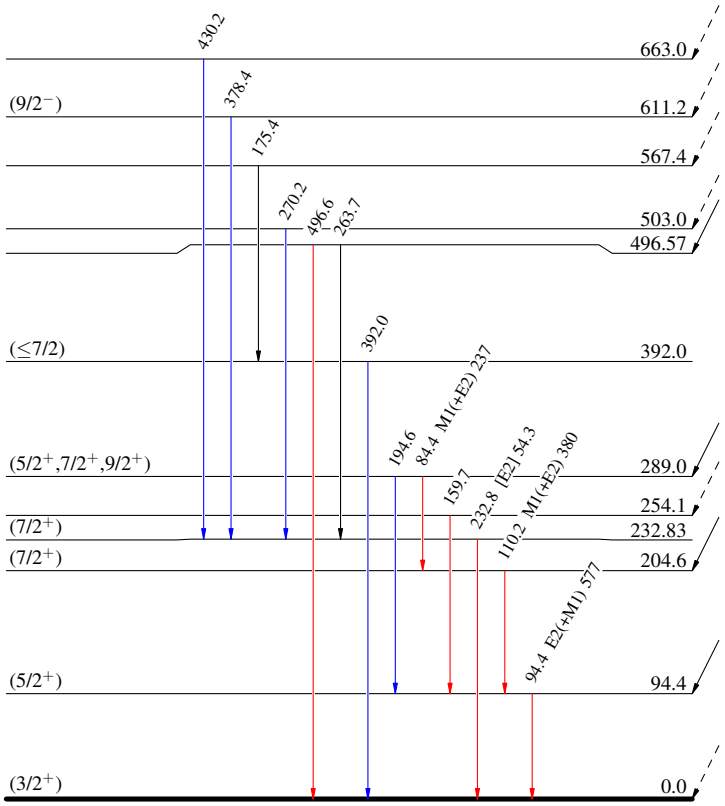
Decay Scheme

Intensities: Relative $I_{(\gamma+ce)}$

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$





$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	ENSDF	23-May-2013

2011Ha25: E=235 MeV, ATLAS facility at ANL, Gammasphere array with 101 Compton-suppressed HPGe detectors. Measured Eγ, Iγ, γγ coin, γγ(θ).
2009Ha33: preliminary report of some data from the study reported In detail by 2011Ha25.

^{167}Ta Levels

Quasiparticle labels used:
α: first $i_{13/2}$ neutron, α=+1/2.
B: first $i_{13/2}$ neutron, α=−1/2.
C: second $i_{13/2}$ neutron, α=+1/2.
D: second $i_{13/2}$ neutron, α=+1/2.
E: lowest π=− orbital, α=+1/2.
F: lowest π=− orbital, α=−1/2.

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0[h]	3/2+	1394.40[m] 25	17/2+	2815.3 3	29/2+	4304.9[i] 4	41/2+
94.92[i] 15	5/2+	1456.88[g] 21	17/2+	2821.2[h] 4	27/2+	4348.1[a] 4	43/2−
175.90[g] 17	5/2+	1493.4[#] 3	21/2−	2874.4[a] 4	31/2−	4360.5[k] 4	41/2+
205.48[j] 19	7/2+	1557.58[j] 22	19/2+	2963.0[o] 3	29/2+	4489.5[h] 10	39/2+
206.4[#] 3	9/2−	1638.9[h] 3	19/2+	2968.4[j] 3	31/2+	4501.5[#] 4	41/2−
233.07[h] 14	7/2+	1641.6[b] 3	17/2−	2979.6[@] 4	31/2−	4557.3[c] 5	41/2−
254.92[n] 17	7/2+	1678.9[c] 4	21/2−	3007.6[l] 3	31/2+	4608.2[j] 4	43/2+
305.52[@] 24	11/2−	1722.9[n] 3	19/2+	3041.9[&] 4	33/2−	4658.5[l] 4	43/2+
375.00[i] 18	9/2+	1732.5[@] 3	23/2−	3212.1[i] 3	33/2+	4661.2[o] 5	41/2+
432.05[m] 18	9/2+	1820.29[i] 23	21/2+	3235.2[a] 4	35/2−	4684.3[&] 4	45/2−
496.4[#] 3	13/2−	1950.62[m] 24	21/2+	3253.2[k] 3	33/2+	4687.9[p] 5	39/2+
496.81[c] 16	5/2−	2019.42[g] 24	21/2+	3326.4[#] 4	33/2−	4799.9[@] 4	43/2−
503.21[g] 17	9/2+	2057.16[o] 22	21/2+	3346.4[h] 7	31/2+	4920.7[i] 4	45/2+
527.8 4		2089.12[j] 25	23/2+	3392.7[c] 4	33/2−	5008.9[k] 4	45/2+
574.91[j] 18	11/2+	2096.6[#] 3	25/2−	3427.0[j] 3	35/2+	5053.7[a] 4	47/2−
610.57[h] 20	11/2+	2199.3[b] 3	21/2−	3468.9[&] 4	37/2−	5126.9[#] 4	45/2−
611.23[c] 17	9/2−	2213.9[c] 4	25/2−	3474.3[l] 3	35/2+	5186.8[c] 5	45/2−
656.93[n] 19	11/2+	2222.2[h] 4	23/2+	3480.4[o] 4	33/2+	5206.7[d] 5	45/2−
678.9[@] 3	15/2−	2234.4 4		3594.4[@] 4	35/2−	5236.2[j] 4	47/2+
791.19[i] 19	13/2+	2328.1[i] 3	25/2+	3721.0[i] 3	37/2+	5293.6[p] 6	43/2+
853.11[c] 25	13/2−	2349.0[@] 3	27/2−	3733.7[a] 4	39/2−	5326.4[o] 5	45/2+
874.37[m] 21	13/2+	2463.00[m] 24	25/2+	3772.4[k] 4	37/2+	5345.3[l] 4	47/2+
940.05[g] 20	13/2+	2477.57[o] 23	25/2+	3880.8[h] 9	35/2+	5426.7[&] 5	49/2−
947.4[#] 3	17/2−	2566.4[j] 3	27/2+	3913.2[#] 4	37/2−	5465.1[@] 4	47/2−
1036.50[j] 20	15/2+	2579.7[&] 3	25/2−	3974.3[c] 5	37/2−	5514.9[e] 5	(47/2−)
1091.17[h] 23	15/2+	2635.1 3	27/2+	3991.1[j] 3	39/2+	5550.6[i] 4	49/2+
1133.5[b] 3	13/2−	2652.0[a] 4	27/2−	4023.6[&] 4	41/2−	5697.6[k] 4	49/2+
1156.51[n] 21	15/2+	2717.8[#] 4	29/2−	4026.2[l] 3	39/2+	5802.4[#] 4	49/2−
1165.7[@] 3	19/2−	2753.5[&] 3	29/2−	4045.4[o] 4	37/2+	5824.9[a] 5	51/2−
1216.7[c] 3	17/2−	2781.1[i] 3	29/2+	4133.4[p] 6	35/2+	5849.7[d] 5	(49/2−)
1285.32[i] 20	17/2+	2810.2[c] 4	29/2−	4190.0[@] 4	39/2−	5888.6[j] 4	51/2+

Continued on next page (footnotes at end of table)

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

^{167}Ta Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
5890.4[c] 5	49/2$^-$	7405.6[d] 9	(57/2$^-$)	8843.8[&] 5	65/2$^-$	10906.4[p] 13	71/2$^+$
5949.7[p] 6	47/2$^+$	7406.4[p] 8	55/2$^+$	9020.8[#] 6	65/2$^-$	10986.9[#] 8	73/2$^-$
6035.8[o] 5	49/2$^+$	7438.8[c] 6	57/2$^-$	9030.7[k] 5	65/2$^+$	11032.1?[k] 13	(73/2$^+$)
6054.8[l] 4	51/2$^+$	7471.9[f] 6	57/2$^-$	9054.6[p] 11	63/2$^+$	11200.6[o] 10	73/2$^+$
6182.2[@] 4	51/2$^-$	7480.5[a] 5	59/2$^-$	9204.9[d] 12	(65/2$^-$)	11225.5[a] 6	75/2$^-$
6205.8[e] 5	(51/2$^-$)	7566.0[o] 6	57/2$^+$	9207.0[c] 8	65/2$^-$	11239.5?[q] 16	(73/2$^+$)
6221.9[i] 4	53/2$^+$	7596.5[q] 8	57/2$^+$	9219.9[j] 5	67/2$^+$	11346.4[j] 8	75/2$^+$
6226.5[&] 5	53/2$^-$	7654.7[l] 5	59/2$^+$	9222.8[f] 8	65/2$^-$	11434.9[@] 9	75/2$^-$
6422.0[k] 4	53/2$^+$	7716.5[@] 5	59/2$^-$	9267.4[a] 5	67/2$^-$	11756.8[i] 6	77/2$^+$
6518.6[#] 5	53/2$^-$	7786.1[i] 5	61/2$^+$	9280.2[o] 7	65/2$^+$	11907.1[&] 6	77/2$^-$
6593.4[d] 7	(53/2$^-$)	7830.3[e] 6	(59/2$^-$)	9332.0[q] 11	65/2$^+$	11911.1[p] 14	75/2$^+$
6599.1[j] 4	55/2$^+$	7933.7[&] 5	61/2$^-$	9466.2[@] 6	67/2$^-$	12065.6[#] 9	77/2$^-$
6637.8[a] 5	55/2$^-$	8085.6[k] 5	61/2$^+$	9654.4[i] 5	69/2$^+$	12240.6[o] 11	77/2$^+$
6643.1[c] 6	53/2$^-$	8128.4[#] 5	61/2$^-$	9805.2[&] 6	69/2$^-$	12271.2[a] 8	79/2$^-$
6654.0[p] 6	51/2$^+$	8205.9[p] 9	59/2$^+$	9954.4[p] 12	67/2$^+$	12486.5[j] 9	79/2$^+$
6674.4[f] 6	53/2$^-$	8263.8[j] 5	63/2$^+$	9972.9[#] 6	69/2$^-$	12493.0[@] 11	79/2$^-$
6780.1[o] 6	53/2$^+$	8278.2[d] 10	(61/2$^-$)	10020.1[k] 7	69/2$^+$	12872.2[i] 8	81/2$^+$
6800.1[q] 6	53/2$^+$	8294.4[c] 6	61/2$^-$	10143.9[f] 10	69/2$^-$	12968.2[p] 15	79/2$^+$
6816.2[l] 4	55/2$^+$	8324.6[f] 6	61/2$^-$	10158.9[c] 10	69/2$^-$	13047.4[&] 7	81/2$^-$
6919.7[@] 5	55/2$^-$	8354.6[a] 5	63/2$^-$	10214.0[o] 9	69/2$^+$	13343.6?[o] 15	(81/2$^+$)
6963.7[i] 4	57/2$^+$	8398.8[o] 7	61/2$^+$	10224.0[a] 6	71/2$^-$	13357.8[a] 10	83/2$^-$
6987.7[e] 5	(55/2$^-$)	8437.4[q] 9	61/2$^+$	10250.7[j] 6	71/2$^+$	13596.4[@] 12	83/2$^-$
7064.0[&] 5	57/2$^-$	8564.4[@] 5	63/2$^-$	10267.5[q] 12	69/2$^+$	14025.9[i] 9	85/2$^+$
7214.1[k] 4	57/2$^+$	8564.6[l] 5	63/2$^+$	10424.4[@] 8	71/2$^-$	14230.0[&] 7	85/2$^-$
7293.0[#] 5	57/2$^-$	8685.7[i] 5	65/2$^+$	10681.6[i] 6	73/2$^+$	14483.2[a] 11	87/2$^-$
7389.4[j] 4	59/2$^+$	8744.9[e] 8	(63/2$^-$)	10825.7[&] 6	73/2$^-$		

† From ;east-squares fit to Eγ.

‡ Authors′ proposed values; see Adopted Levels for evluator′s adopted values.

Band(A): π9/2[514], α=+1/2. First band crossing at ħω≈0.29 MeV (alignment gain 9 ħ), second crossing at ħω≈0.35 MeV. Configuration=πh$_{11/2}$ –>πh$_{11/2}$BC –>πh$_{11/2}$BCAD.

@ Band(a): π9/2[514], α=−1/2. See comments for α=+1/2 signature band for band crossings and configurations.

& Band(B): πh$_{11/2}$⊗AB, α=+1/2. Band crossing at ħω≈0.41 MeV. Configuration=πh$_{11/2}$AB –>πh$_{11/2}$ABCD.

a Band(b): πh$_{11/2}$⊗AB, α=−1/2. See comment on signature partner band.

b Band(C): α=+1/2 band. Continuation of πh$_{11/2}$⊗AB, α=+1/2 band.

c Band(D): π1/2[541], α=+1/2. Band crossing at ħω≈0.29 MeV. Configuration=πh$_{9/2}$ –>πh$_{9/2}$AB.

d Band(E): Band based on 45/2$^-$, α=+1/2. Possible configuration=(πd$_{5/2}$⊗AEBC).

e Band(e): Band based on (45/2$^-$), α=−1/2 See comment for signature partner band.

f Band(F): Band based on 53/2$^-$, α=+1/2. Possible configuration=(πd$_{3/2}$⊗ÂEBC).

g Band(G): π1/2[411], α=+1/2.

h Band(g): π1/2[411], α=−1/2.

i Band(H): π5/2[402], α=+1/2. First band crossing at ħω≈0.24 MeV, second crossing at ħω>0.24 MeV, third band crossing at ħω≈0.31 MeV. Configuration=πd$_{5/2}$ –>πd$_{5/2}$AB –>πh$_{11/2}$AE –> πh$_{11/2}$AEBC.

j Band(h): π5/2[402], α=−1/2. See comment on α=−1/2 signature band for band crossings and configurations.

k Band(I): πh$_{11/2}$⊗AF, α=+1/2. Band crossing at ħω≈0.35 MeV. Configuration=πh$_{11/2}$AF –>πh$_{11/2}$AFBC.

l Band(i): πh$_{11/2}$⊗AF, α=−1/2. See comment on α=+1/2 signature band for band crossing and configuration.

Continued on next page (footnotes at end of table)

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

^{167}Ta Levels (continued)

[m] Band(J): π7/2[404], α=+1/2.
[n] Band(j): π7/2[404], α=−1/2.
[o] Band(K): π1/2[660], α=+1/2. Reported As TSD-1 band based on $\pi i_{13/2}$ orbital by 2009Ha33.
[p] Band(k): Triaxial $\pi i_{13/2}$, α=−1/2. Reported As TSD-2 band by 2009Ha33; shares a common structure with TSD-1 band. One-phonon wobbling-mode excitation (n_w)=1 band).
[q] Band(L): $\pi i_{13/2}$? band on 53/2$^+$, α=+1/2. Reported As TSD-3 band by 2009Ha33.

γ(^{167}Ta)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
83.7 *5*	1.0 *3*	611.23	9/2$^-$	527.8			
94.9 *2*	≈64	94.92	5/2$^+$	0.0	3/2$^+$	D+Q	R_{ang}=0.73 *5* (2011Ha25).
97.0 *5*	<0.3	1036.50	15/2$^+$	940.05	13/2$^+$		
99.1 *2*	≈58	305.52	11/2$^-$	206.4	9/2$^-$	D+Q	R_{ang}=0.75 *5* (2011Ha25).
101.5 *2*	16 *1*	2753.5	29/2$^-$	2652.0	27/2$^-$	D	R_{ang}=0.60 *5* (2011Ha25).
110.6 *2*	≈47	205.48	7/2$^+$	94.92	5/2$^+$	D+Q	R_{ang}=0.74 *4* (2011Ha25).
114.4 *2*	2.1 *2*	611.23	9/2$^-$	496.81	5/2$^-$	(Q)	R_{ang}=0.88 *7* (2011Ha25).
120.0 *2*	28 *1*	375.00	9/2$^+$	254.92	7/2$^+$	(D+Q)	R_{ang}=0.84 *6* (2011Ha25).
120.9 *2*	36 *4*	2874.4	31/2$^-$	2753.5	29/2$^-$	D+Q	R_{ang}=0.72 *3* (2011Ha25).
128.9 *2*	2.7 *2*	1285.32	17/2$^+$	1156.51	15/2$^+$		
134.1 *2*	5.4 *4*	791.19	13/2$^+$	656.93	11/2$^+$	D+Q	R_{ang}=0.81 *8* (2011Ha25).
138.1 *2*	6.0 *6*	233.07	7/2$^+$	94.92	5/2$^+$	D	R_{ang}=0.69 *4* (2011Ha25).
143.1 *2*	4.1 *4*	574.91	11/2$^+$	432.05	9/2$^+$	(D+Q)	R_{ang}=0.86 *9* (2011Ha25).
153.2 *2*	2.5 *2*	2968.4	31/2$^+$	2815.3	29/2$^+$	D	R_{ang}=0.62 *10* (2011Ha25).
156.6 *2*	3.4 *4*	2874.4	31/2$^-$	2717.8	29/2$^-$		
160.0 *2*	≈68	254.92	7/2$^+$	94.92	5/2$^+$	D+Q	R_{ang}=0.76 *3* (2011Ha25).
167.5 *2*	58 *5*	3041.9	33/2$^-$	2874.4	31/2$^-$	D+Q	R_{ang}=0.71 *2* (2011Ha25).
169.6 *2*	69 *4*	375.00	9/2$^+$	205.48	7/2$^+$	D+Q	R_{ang}=0.81 *2* (2011Ha25).
175.9 *2*	≈4	175.90	5/2$^+$	0.0	3/2$^+$	D+Q	R_{ang}=0.72 *7* (2011Ha25).
177.3 *2*	≈21	432.05	9/2$^+$	254.92	7/2$^+$	D+Q	R_{ang}=0.75 *4* (2011Ha25).
180.3 *2*	3.8 *4*	2815.3	29/2$^+$	2635.1	27/2$^+$		
182.5 *2*	86 *7*	678.9	15/2$^-$	496.4	13/2$^-$	D+Q	R_{ang}=0.75 *4* (2011Ha25).
187.2 *2*	32 *2*	2968.4	31/2$^+$	2781.1	29/2$^+$	D+Q	R_{ang}=0.71 *2* (2011Ha25).
190.8 *2*	≈136	496.4	13/2$^-$	305.52	11/2$^-$	D+Q	R_{ang}=0.81 *3* (2011Ha25).
193.3 *2*	59 *7*	3235.2	35/2$^-$	3041.9	33/2$^-$	D+Q	R_{ang}=0.69 *2* (2011Ha25).
199.9 *2*	62 *5*	574.91	11/2$^+$	375.00	9/2$^+$	D+Q	R_{ang}=0.82 *2* (2011Ha25).
204.5 *2*	7.1 *7*	3212.1	33/2$^+$	3007.6	31/2$^+$	D	R_{ang}=0.66 *4* (2011Ha25).
214.7 *2*	61 *5*	2781.1	29/2$^+$	2566.4	27/2$^+$		R_{ang}=0.79 *1* for 214.7γ+216.3γ+214.9γ (2011Ha25).
214.9 *2*	30 *4*	3427.0	35/2$^+$	3212.1	33/2$^+$		R_{ang}=0.79 *1* for 214.7γ+216.3γ+214.9γ (2011Ha25).
216.3 *2*	55 *4*	791.19	13/2$^+$	574.91	11/2$^+$		R_{ang}=0.79 *1* for 214.7γ+216.3γ+214.9γ (2011Ha25).
217.5 *2*	4.0 *5*	874.37	13/2$^+$	656.93	11/2$^+$	(D+Q)	R_{ang}=0.92 *8* (2011Ha25).
218.2 *2*	52 *4*	1165.7	19/2$^-$	947.4	17/2$^-$	D+Q	R_{ang}=0.82 *5* (2011Ha25).
221.1 *2*	8.3 *9*	3474.3	35/2$^+$	3253.2	33/2$^+$	D	R_{ang}=0.59 *8* (2011Ha25).
222.4 *2*	≈4	2874.4	31/2$^-$	2652.0	27/2$^-$		
224.8 *2*	7.5 *9*	656.93	11/2$^+$	432.05	9/2$^+$	D+Q	R_{ang}=0.86 *20* (2011Ha25).
226.6 *2*	32 *3*	3007.6	31/2$^+$	2781.1	29/2$^+$	D+Q	R_{ang}=0.72 *2* (2011Ha25).
233.1 *2*	56 *6*	233.07	7/2$^+$	0.0	3/2$^+$		R_{ang}=0.83 *2* (2011Ha25).
233.7 *2*	63 *5*	3468.9	37/2$^-$	3235.2	35/2$^-$	D+Q	R_{ang}=0.76 *2* (2011Ha25).
238.3 *2*	65 *5*	2566.4	27/2$^+$	2328.1	25/2$^+$		R_{ang}=0.77 *2* for 239.0γ+238.3γ (2011Ha25).
239.0 *2*	55 *5*	2328.1	25/2$^+$	2089.12	23/2$^+$		R_{ang}=0.77 *2* for 239.0γ+238.3γ (2011Ha25).
239.1 *2*	30 *3*	1732.5	23/2$^-$	1493.4	21/2$^-$	D+Q	R_{ang}=0.73 *3* (2011Ha25).
241.9 *2*	52 *4*	853.11	13/2$^-$	611.23	9/2$^-$		R_{ang}=0.85 *1* (2011Ha25).
243.7 *2*	36 *3*	3212.1	33/2$^+$	2968.4	31/2$^+$	D+Q	R_{ang}=0.75 *12* (2011Ha25).
245.2 *2*	50 *5*	1036.50	15/2$^+$	791.19	13/2$^+$	D+Q	R_{ang}=0.72 *3* (2011Ha25).
245.7 *2*	24 *3*	3253.2	33/2$^+$	3007.6	31/2$^+$	D+Q	R_{ang}=0.74 *5* (2011Ha25).

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^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	Comments
246.7 *2*	5.9 *6*	3721.0	$37/2^+$	3474.3	$35/2^+$		
247.6 *2*	1.9 *4*	4608.2	$43/2^+$	4360.5	$41/2^+$		
248.7 *2*	4.7 *5*	2815.3	$29/2^+$	2566.4	$27/2^+$		
248.9 *2*	49 *4*	1285.32	$17/2^+$	1036.50	$15/2^+$	D+Q	R_{ang}=0.79 *2* (2011Ha25).
252.3 *2*	21 *1*	2349.0	$27/2^-$	2096.6	$25/2^-$	D+Q	R_{ang}=0.74 *4* (2011Ha25).
253.9 *2*	8.6 *8*	4026.2	$39/2^+$	3772.4	$37/2^+$		
261.8 *2*	16 *1*	2979.6	$31/2^-$	2717.8	$29/2^-$	D+Q	R_{ang}=0.77 *5* (2011Ha25).
262.2 *2*	8.8 *9*	3474.3	$35/2^+$	3212.1	$33/2^+$	D+Q	R_{ang}=0.64 *4* (2011Ha25).
262.7 *2*	39 *4*	1820.29	$21/2^+$	1557.58	$19/2^+$	D+Q	R_{ang}=0.79 *4* (2011Ha25).
263.6 *5*	<0.3	496.81	$5/2^-$	233.07	$7/2^+$		
264.9 *2*	50 *5*	3733.7	$39/2^-$	3468.9	$37/2^-$	D+Q	R_{ang}=0.73 *2* (2011Ha25).
268.1 *2*	17 *2*	3594.4	$35/2^-$	3326.4	$33/2^-$	D+Q	R_{ang}=0.84 *4* (2011Ha25).
268.5 *2*	112 *8*	947.4	$17/2^-$	678.9	$15/2^-$	D+Q	R_{ang}=0.84 *4* (2011Ha25).
268.8 *2*	42 *4*	2089.12	$23/2^+$	1820.29	$21/2^+$	D	R_{ang}=0.66 *5* (2011Ha25).
270.1 *2*	23 *2*	3991.1	$39/2^+$	3721.0	$37/2^+$	D+Q	R_{ang}=0.68 *3* (2011Ha25).
270.2 *2*	8 *2*	503.21	$9/2^+$	233.07	$7/2^+$	D+Q	R_{ang}=0.81 *5* (2011Ha25).
272.4 *2*	38 *4*	1557.58	$19/2^+$	1285.32	$17/2^+$	D+Q	R_{ang}=0.81 *6* (2011Ha25).
276.8 *2*	16 *1*	4190.0	$39/2^-$	3913.2	$37/2^-$	D+Q	R_{ang}=0.71 *5* (2011Ha25).
278.8 *2*	5.4 *7*	4304.9	$41/2^+$	4026.2	$39/2^+$		R_{ang}=0.83 *4* for 280.1γ+278.8γ (2011Ha25).
280.1 *2*	26 *2*	375.00	$9/2^+$	94.92	$5/2^+$		R_{ang}=0.83 *4* for 280.1γ+278.8γ (2011Ha25).
282.2 *2*	1.4 *3*	1156.51	$15/2^+$	874.37	$13/2^+$		
288.4 *2*	9 *1*	3041.9	$33/2^-$	2753.5	$29/2^-$		R_{ang}=0.86 *7* for 288.4γ+289.9γ (2011Ha25).
289.8 *2*	48 *5*	4023.6	$41/2^-$	3733.7	$39/2^-$	D+Q	R_{ang}=0.77 *2* (2011Ha25).
289.9 *2*	≈29	496.4	$13/2^-$	206.4	$9/2^-$		R_{ang}=0.86 *7* for 289.9γ+288.4γ (2011Ha25).
294.0 *2*	24 *2*	3721.0	$37/2^+$	3427.0	$35/2^+$	D+Q	R_{ang}=0.72 *4* (2011Ha25).
298.0 *2*	4.6 *5*	4658.5	$43/2^+$	4360.5	$41/2^+$	D+Q	R_{ang}=0.80 *4* (2011Ha25).
298.2 *2*	13 *2*	3772.4	$37/2^+$	3474.3	$35/2^+$	D+Q	R_{ang}=0.80 *4* (2011Ha25).
298.5 *2*	8.3 *8*	4799.9	$43/2^-$	4501.5	$41/2^-$	D+Q	R_{ang}=0.66 *6* (2011Ha25).
303.3 *2*	23 *2*	4608.2	$43/2^+$	4304.9	$41/2^+$	D+Q	R_{ang}=0.74 *2* (2011Ha25).
305.7 *2*	2.6 *6*	611.23	$9/2^-$	305.52	$11/2^-$	D+Q	R_{ang}=0.81 *5* (2011Ha25).
308.1 *5*	0.8 *1*	5514.9	$(47/2^-)$	5206.7	$45/2^-$		
311.5 *2*	12 *1*	4501.5	$41/2^-$	4190.0	$39/2^-$	D+Q	R_{ang}=0.81 *5* (2011Ha25).
312.5 *2*	20 *4*	4920.7	$45/2^+$	4608.2	$43/2^+$		R_{ang}=0.74 *2* for 312.5γ+313.8γ+314.4γ+315.5γ.
313.8 *2*	22 *4*	4304.9	$41/2^+$	3991.1	$39/2^+$		R_{ang}=0.74 *2* for 312.5γ+313.8γ+314.4γ+315.5γ (2011Ha25).
314.4 *2*	13 *3*	5550.6	$49/2^+$	5236.2	$47/2^+$		R_{ang}=0.74 *2* (2011Ha25) for 312.5γ+313.8γ+314.4γ+315.5γ.
315.5 *2*	22 *4*	5236.2	$47/2^+$	4920.7	$45/2^+$		R_{ang}=0.74 *2* for 312.5γ+313.8γ+314.4γ+315.5γ (2011Ha25).
318.8 *2*	17 *1*	3913.2	$37/2^-$	3594.4	$35/2^-$	D+Q	R_{ang}=0.77 *5* (2011Ha25).
319.8 *2*	6.6 *8*	574.91	$11/2^+$	254.92	$7/2^+$		
321.4 *2*	≈9	527.8		206.4	$9/2^-$		
324.5 *2*	50 *5*	4348.1	$43/2^-$	4023.6	$41/2^-$	D+Q	R_{ang}=0.70 *3* (2011Ha25).
327.0 *2*	7.3 *7*	5126.9	$45/2^-$	4799.9	$43/2^-$	D+Q	R_{ang}=0.83 *3* (2011Ha25).
327.3 *2*	8 *2*	503.21	$9/2^+$	175.90	$5/2^+$	(Q)	R_{ang}=0.85 *5* (2011Ha25).
327.7 *2*	69 *5*	1493.4	$21/2^-$	1165.7	$19/2^-$	D+Q	R_{ang}=0.83 *3* (2011Ha25).
328.0 *5*	0.6 *1*	5514.9	$(47/2^-)$	5186.8	$45/2^-$		
329.5 *2*	2.9 *7*	940.05	$13/2^+$	610.57	$11/2^+$		
333.3 *2*	5.8 *5*	2968.4	$31/2^+$	2635.1	$27/2^+$	Q	R_{ang}=0.90 *5* (2011Ha25).
333.4 *2*	11 *2*	6221.9	$53/2^+$	5888.6	$51/2^+$	D+Q	R_{ang}=0.73 *3* (2011Ha25).
334.2 *2*	5.0 *5*	4360.5	$41/2^+$	4026.2	$39/2^+$	D+Q	R_{ang}=0.78 *8* (2011Ha25).
334.8 *5*	0.5 *1*	5849.7	$(49/2^-)$	5514.9	$(47/2^-)$		
336.1 *2*	39 *3*	4684.3	$45/2^-$	4348.1	$43/2^-$	D+Q	R_{ang}=0.76 *3* (2011Ha25).
336.4# *2*	4.4# *5*	5345.3	$47/2^+$	5008.9	$45/2^+$		
336.4# *2*	2.5# *4*	6518.6	$53/2^-$	6182.2	$51/2^-$		R_{ang}=0.76 *3* (2011Ha25) for 337.4γ+336.4γ.

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^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	Comments
337.1 *2*	≈11	432.05	9/2$^+$	94.92	5/2$^+$	Q	R_{ang}=0.99 *8* (2011Ha25).
337.4 *2*	3.6 *5*	5802.4	49/2$^-$	5465.1	47/2$^-$		R_{ang}=0.76 *3* (2011Ha25) for 337.4γ+336.4γ.
338.0 *2*	14 *1*	5888.6	51/2$^+$	5550.6	49/2$^+$	D+Q	R_{ang}=0.75 *3* (2011Ha25).
338.3 *2*	5.4 *6*	5465.1	47/2$^-$	5126.9	45/2$^-$		R_{ang}=0.76 *3* (2011Ha25) for unresolved doublet.
345.3 *2*	3.3 *3*	2579.7	25/2$^-$	2234.4			
346.8 *2*	16 *2*	3326.4	33/2$^-$	2979.6	31/2$^-$	D+Q	R_{ang}=0.64 *4* (2011Ha25).
350.4 *2*	6.0 *6*	5008.9	45/2$^+$	4658.5	43/2$^+$		R_{ang}=0.94 *14* (2011Ha25).
352.4 *2*	1.0 *1*	5697.6	49/2$^+$	5345.3	47/2$^+$		
356.4 *2*	4.2 *5*	611.23	9/2$^-$	254.92	7/2$^+$	D	R_{ang}=0.69 *3* (2011Ha25).
357.1 *2*	1.7 *2*	6054.8	51/2$^+$	5697.6	49/2$^+$		
360.8 *2*	20 *2*	3235.2	35/2$^-$	2874.4	31/2$^-$	Q	R_{ang}=1.06 *7* (2011Ha25).
363.6 *2*	58 *5*	1216.7	17/2$^-$	853.11	13/2$^-$	Q	R_{ang}=0.92 *1* (2011Ha25).
364.2 *2*	36 *3*	2096.6	25/2$^-$	1732.5	23/2$^-$	D+Q	R_{ang}=0.79 *3* (2011Ha25).
364.7 *2*	13 *2*	6963.7	57/2$^+$	6599.1	55/2$^+$	D	R_{ang}=0.68 *5* (2011Ha25).
365.7 *2*	2.1 *6*	1456.88	17/2$^+$	1091.17	15/2$^+$	D	R_{ang}=0.62 *4* (2011Ha25).
367.2 *2*	3.3 *4*	6422.0	53/2$^+$	6054.8	51/2$^+$		
368.7 *2*	21 *2*	2717.8	29/2$^-$	2349.0	27/2$^-$	D+Q	R_{ang}=0.75 *3* (2011Ha25).
369.4 *2*	63 *4*	574.91	11/2$^+$	205.48	7/2$^+$		R_{ang}=0.84 *3* (2011Ha25).
369.4 *2*	31 *3*	5053.7	47/2$^-$	4684.3	45/2$^-$	D+Q	R_{ang}=0.75 *3* (2011Ha25).
373.0 *2*	27 *3*	5426.7	49/2$^-$	5053.7	47/2$^-$	D+Q	R_{ang}=0.85 *5* (2011Ha25).
373.3 *2*	1.2 *2*	7293.0	57/2$^-$	6919.7	55/2$^-$		
373.4 *2*	86 *5*	678.9	15/2$^-$	305.52	11/2$^-$	(Q)	R_{ang}=0.85 *5* (2011Ha25).
377.2 *2*	13 *1*	6599.1	55/2$^+$	6221.9	53/2$^+$	D	R_{ang}=0.69 *3* (2011Ha25).
377.5 *2*	22 *2*	610.57	11/2$^+$	233.07	7/2$^+$		R_{ang}=0.84 *2* (2011Ha25).
378.1 *2*	52 *4*	611.23	9/2$^-$	233.07	7/2$^+$	D+Q	R_{ang}=0.75 *1* (2011Ha25).
379.8 *2*	3.0 *4*	6182.2	51/2$^-$	5802.4	49/2$^-$		
380.4 *2*	15 *2*	2579.7	25/2$^-$	2199.3	21/2$^-$		
380.5 *5*	0.9 *4*	2019.42	21/2$^+$	1638.9	19/2$^+$		
394.2 *5*	0.9 *1*	6816.2	55/2$^+$	6422.0	53/2$^+$		
396.6 *2*	3.8 *6*	3212.1	33/2$^+$	2815.3	29/2$^+$		Mult.: R_{ang}=0.78 *4* implies D+Q (2011Ha25), but placement requires ΔJ=2.
396.7 *2*	7.1 *7*	7786.1	61/2$^+$	7389.4	59/2$^+$	D+Q	R_{ang}=0.77 *4* (2011Ha25).
397.9 *2*	1.7 *2*	7214.1	57/2$^+$	6816.2	55/2$^+$		
398.2 *2*	20 *2*	5824.9	51/2$^-$	5426.7	49/2$^-$	D+Q	R_{ang}=0.74 *4* (2011Ha25).
401.2 *2*	1.5 *2*	6919.7	55/2$^-$	6518.6	53/2$^-$		
401.7 *2*	12 *1*	6226.5	53/2$^-$	5824.9	51/2$^-$	D+Q	R_{ang}=0.70 *8* (2011Ha25).
401.9 *2*	15 *2*	2968.4	31/2$^+$	2566.4	27/2$^+$	(Q)	R_{ang}=0.87 *4* (2011Ha25).
402.0 *2*	11 *2*	656.93	11/2$^+$	254.92	7/2$^+$		
404.4 *2*	21 *2*	2753.5	29/2$^-$	2349.0	27/2$^-$	(D+Q)	R_{ang}=0.89 *5* (2011Ha25); consistent with Q or D+Q but level scheme implies ΔJ=1.
411.3 *2*	9.4 *9*	6637.8	55/2$^-$	6226.5	53/2$^-$		
416.2 *2*	83 *6*	791.19	13/2$^+$	375.00	9/2$^+$	Q	R_{ang}=0.91 *2* (2011Ha25).
416.5 *2*	6.1 *6*	7480.5	59/2$^-$	7064.0	57/2$^-$		
420.5 *2*	3.5 *4*	2477.57	25/2$^+$	2057.16	21/2$^+$	Q	R_{ang}=0.96 *3* (2011Ha25).
420.9 *2*	4.0 *4*	8354.6	63/2$^-$	7933.7	61/2$^-$		
421.9 *2*	2.7 *4*	8685.7	65/2$^+$	8263.8	63/2$^+$		
423.5# *2*	1.0# *2*	7716.5	59/2$^-$	7293.0	57/2$^-$		
423.5# *2*	1.2# *2*	9267.4	67/2$^-$	8843.8	65/2$^-$		
425.7 *2*	10 *1*	7389.4	59/2$^+$	6963.7	57/2$^+$		
426.2 *2*	6.7 *8*	7064.0	57/2$^-$	6637.8	55/2$^-$		R_{ang}=0.94 *4* for 427.0γ+426.2γ (2011Ha25).
427.0 *2*	25 *2*	3468.9	37/2$^-$	3041.9	33/2$^-$		R_{ang}=0.94 *4* for 427.0γ+426.2γ (2011Ha25).
431.0 *2*	22 *2*	3212.1	33/2$^+$	2781.1	29/2$^+$	Q	R_{ang}=0.91 *4* (2011Ha25).
436.9 *2*	12 *2*	940.05	13/2$^+$	503.21	9/2$^+$	Q	R_{ang}=0.97 *6* (2011Ha25).
441.3 *2*	20 *2*	3007.6	31/2$^+$	2566.4	27/2$^+$	Q	R_{ang}=1.00 *5* (2011Ha25).
442.3 *2*	11 *1*	874.37	13/2$^+$	432.05	9/2$^+$	(Q)	R_{ang}=0.87 *4* (2011Ha25).

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^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
451.0 *2*	78 *5*	947.4	17/2$^-$	496.4	13/2$^-$	Q	R_{ang}=0.91 *5* (2011Ha25).
453.0 *2*	36 *3*	2781.1	29/2$^+$	2328.1	25/2$^+$	Q	R_{ang}=0.97 *3* (2011Ha25).
453.1 *2*	4.0 *5*	7933.7	61/2$^-$	7480.5	59/2$^-$		
454.7 *2*	1.1 *2*	1133.5	13/2$^-$	678.9	15/2$^-$		
458.1 *2*	1.0 *2*	2477.57	25/2$^+$	2019.42	21/2$^+$		
458.6 *2*	30 *3*	3427.0	35/2$^+$	2968.4	31/2$^+$	Q	R_{ang}=1.09 *8* (2011Ha25).
461.6 *2*	93 *7*	1036.50	15/2$^+$	574.91	11/2$^+$	Q	R_{ang}=0.90 *3* (2011Ha25).
462.2 *2*	57 *5*	1678.9	21/2$^-$	1216.7	17/2$^-$	Q	R_{ang}=0.98 *2* (2011Ha25).
466.7 *2*	28 *3*	3474.3	35/2$^+$	3007.6	31/2$^+$	Q	R_{ang}=0.99 *4* (2011Ha25).
466.8 *2*	5.0 *5*	2199.3	21/2$^-$	1732.5	23/2$^-$	(D+Q)	R_{ang}=0.81 *9* (2011Ha25).
475.9 *2*	3.6 *4*	1641.6	17/2$^-$	1165.7	19/2$^-$		
477.3 *2*	49 *4*	2566.4	27/2$^+$	2089.12	23/2$^+$	(Q)	R_{ang}=1.22 *7* (2011Ha25).
477.7 *2*	5.8 *8*	8263.8	63/2$^+$	7786.1	61/2$^+$		
480.6 *2*	19 *2*	1091.17	15/2$^+$	610.57	11/2$^+$	Q	R_{ang}=0.95 *5* (2011Ha25).
483.2 *2*	20 *2*	2579.7	25/2$^-$	2096.6	25/2$^-$	Q	R_{ang}=1.02 *6* (2011Ha25).
485.4 *2*	8.3 *8*	2963.0	29/2$^+$	2477.57	25/2$^+$	Q	R_{ang}=0.96 *2* (2011Ha25).
486.8 *2*	97 *7*	1165.7	19/2$^-$	678.9	15/2$^-$	Q	R_{ang}=0.91 *5* (2011Ha25).
487.1 *2*	13 *1*	2815.3	29/2$^+$	2328.1	25/2$^+$		
489.2 *2*	3.6 *4*	8843.8	65/2$^-$	8354.6	63/2$^-$		
494.1 *2*	95 *7*	1285.32	17/2$^+$	791.19	13/2$^+$	Q	R_{ang}=0.93 *2* (2011Ha25).
496.8 *2*	≈7	496.81	5/2$^-$	0.0	3/2$^+$	D+Q	R_{ang}=0.72 *3* (2011Ha25).
498.5 *2*	32 *3*	3733.7	39/2$^-$	3235.2	35/2$^-$	Q	R_{ang}=1.11 *4* (2011Ha25).
499.6 *2*	7.9 *9*	1156.51	15/2$^+$	656.93	11/2$^+$		
500.0 *2*	3.3 *3*	2963.0	29/2$^+$	2463.00	25/2$^+$	Q	R_{ang}=1.04 *4* (2011Ha25, 2009Ha33).
507.8 *2*	77 *6*	2328.1	25/2$^+$	1820.29	21/2$^+$		R_{ang}=1.01 *5* for 507.8γ+508.8γ (2011Ha25).
508.1 *2*	2.5 *3*	1641.6	17/2$^-$	1133.5	13/2$^-$		
508.8 *2*	29 *4*	3721.0	37/2$^+$	3212.1	33/2$^+$		R_{ang}=1.01 *5* for 508.8γ+507.8γ (2011Ha25).
512.4 *2*	3.5 *5*	2463.00	25/2$^+$	1950.62	21/2$^+$		
516.8 *2*	8 *3*	1456.88	17/2$^+$	940.05	13/2$^+$		
517.4 *2*	12 *1*	3480.4	33/2$^+$	2963.0	29/2$^+$	Q	R_{ang}=0.95 *2* (2011Ha25).
519.2 *2*	16 *2*	3772.4	37/2$^+$	3253.2	33/2$^+$	Q	R_{ang}=1.12 *9* (2011Ha25).
520.0 *2*	9 *1*	1394.40	17/2$^+$	874.37	13/2$^+$	(Q)	R_{ang}=0.87 *4* (2011Ha25).
521.0 *2*	93 *7*	1557.58	19/2$^+$	1036.50	15/2$^+$	(Q)	R_{ang}=1.33 *3* (2011Ha25).
525.2 *5*	0.9 *4*	3346.4	31/2$^+$	2821.2	27/2$^+$		
526.9 *2*	4.2 *5*	2477.57	25/2$^+$	1950.62	21/2$^+$	Q	R_{ang}=0.96 *3* (2011Ha25, 2009Ha33).
531.6 *2*	90 *7*	2089.12	23/2$^+$	1557.58	19/2$^+$	Q	R_{ang}=1.09 *7* (2011Ha25).
534.4 *5*	0.3 *2*	3880.8	35/2$^+$	3346.4	31/2$^+$		
534.9 *2*	100	1820.29	21/2$^+$	1285.32	17/2$^+$	Q	R_{ang}=0.95 *4* (2011Ha25).
535.1 *2*	50 *5*	2213.9	25/2$^-$	1678.9	21/2$^-$	Q	R_{ang}=1.07 *2* (2011Ha25).
539.6 *2*	14 *1*	2753.5	29/2$^-$	2213.9	25/2$^-$		R_{ang}=0.94 *3* (2011Ha25).
546.0[#] *2*	69[#] *5*	1493.4	21/2$^-$	947.4	17/2$^-$	Q	R_{ang}=1.01 *5* (2011Ha25).
546.0[#] *2*	16[#] *2*	2635.1	27/2$^+$	2089.12	23/2$^+$		
547.7 *2*	15 *2*	1638.9	19/2$^+$	1091.17	15/2$^+$	Q	R_{ang}=1.02 *3* (2011Ha25).
552.0 *2*	19 *2*	4026.2	39/2$^+$	3474.3	35/2$^+$	Q	R_{ang}=0.99 *6* (2011Ha25).
554.6 *5*	0.3 *1*	4687.9	39/2$^+$	4133.4	35/2$^+$		
554.7 *2*	45 *3*	4023.6	41/2$^-$	3468.9	37/2$^-$	Q	R_{ang}=1.16 *5* (2011Ha25).
556.2 *2*	5.8 *7*	1950.62	21/2$^+$	1394.40	17/2$^+$	Q	R_{ang}=1.12 *7* (2011Ha25).
557.7 *2*	9 *1*	2199.3	21/2$^-$	1641.6	17/2$^-$		
562.5 *2*	4.8 *8*	2019.42	21/2$^+$	1456.88	17/2$^+$		
564.1 *2*	38 *3*	3991.1	39/2$^+$	3427.0	35/2$^+$	Q	R_{ang}=1.19 *5* (2011Ha25).
565.0 *2*	11 *1*	4045.4	37/2$^+$	3480.4	33/2$^+$	Q	R_{ang}=0.93 *2* (2011Ha25).
566.4 *2*	3.3 *4*	1722.9	19/2$^+$	1156.51	15/2$^+$		
566.8 *2*	93 *7*	1732.5	23/2$^-$	1165.7	19/2$^-$	Q	R_{ang}=0.93 *3* (2011Ha25).
581.6 *2*	21 *6*	3974.3	37/2$^-$	3392.7	33/2$^-$		R_{ang}=1.04 *1* for 582.5γ+581.6γ+583.0γ (2011Ha25).
582.0 *2*	9.4 *9*	4608.2	43/2$^+$	4026.2	39/2$^+$		R_{ang}=0.80 *8* (2011Ha25).

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^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

γ(^{167}Ta) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
582.5 *2*	26 *6*	3392.7	33/2$^-$	2810.2	29/2$^-$		R_{ang}=1.04 *1* for 582.5γ+581.6γ+583.0γ (2011Ha25).
583.0 *2*	17 *4*	4557.3	41/2$^-$	3974.3	37/2$^-$		R_{ang}=1.04 *1* for 582.5γ+581.6γ+583.0γ (2011Ha25).
583.3 *2*	9.6 *9*	2222.2	23/2$^+$	1638.9	19/2$^+$	Q	R_{ang}=1.09 *3* (2011Ha25).
583.9 *2*	31 *3*	4304.9	41/2$^+$	3721.0	37/2$^+$	Q	R_{ang}=1.14 *4* (2011Ha25).
586.9 *2*	18 *2*	3913.2	37/2$^-$	3326.4	33/2$^-$		R_{ang}=1.21 *7* for 588.2γ+586.9γ (2011Ha25).
588.2[#] *2*	11[#] *1*	4360.5	41/2$^+$	3772.4	37/2$^+$	Q	R_{ang}=1.09 *15* (2011Ha25).
588.2[#] *2*	13[#] *1*	4501.5	41/2$^-$	3913.2	37/2$^-$		R_{ang}=1.21 *7* for 588.2γ+586.9γ (2011Ha25).
592.8 *2*	3.2 *3*	2234.4		1641.6	17/2$^-$		
595.6 *2*	21 *2*	4190.0	39/2$^-$	3594.4	35/2$^-$	Q	R_{ang}=0.89 *2* (2011Ha25).
596.2 *2*	27 *2*	2810.2	29/2$^-$	2213.9	25/2$^-$	Q	R_{ang}=0.93 *2* (2011Ha25).
599.0 *2*	2.9 *5*	2821.2	27/2$^+$	2222.2	23/2$^+$		Mult.: R_{ang}=0.78 *4* implies D+Q (2011Ha25), but placement requires ΔJ=2.
600.3 *2*	1.9 *3*	2057.16	21/2$^+$	1456.88	17/2$^+$		
603.3 *2*	60 *5*	2096.6	25/2$^-$	1493.4	21/2$^-$		R_{ang}=0.78 *2*; suggests D+Q, but level scheme requires ΔJ=2.
605.7 *5*	0.8 *1*	5293.6	43/2$^+$	4687.9	39/2$^+$		
608.6 *2*	24 *2*	3326.4	33/2$^-$	2717.8	29/2$^-$	Q	R_{ang}=0.96 *4* (2011Ha25).
608.7 *5*	<0.3	4489.5	39/2$^+$	3880.8	35/2$^+$		
609.9 *2*	15 *1*	4799.9	43/2$^-$	4190.0	39/2$^-$	Q	R_{ang}=1.05 *6* (2011Ha25).
614.4 *2*	36 *3*	4348.1	43/2$^-$	3733.7	39/2$^-$	Q	R_{ang}=0.96 *5* (2011Ha25).
614.8 *2*	30 *3*	3594.4	35/2$^-$	2979.6	31/2$^-$	Q	R_{ang}=0.96 *5* (2011Ha25).
615.8 *2*	10 *1*	4661.2	41/2$^+$	4045.4	37/2$^+$	Q	R_{ang}=1.09 *2* (2011Ha25).
615.8 *2*	23 *4*	4920.7	45/2$^+$	4304.9	41/2$^+$		R_{ang}=1.07 *3* for 617.0γ+615.8γ.
616.5 *2*	79 *4*	2349.0	27/2$^-$	1732.5	23/2$^-$	Q	R_{ang}=1.04 *3* (2011Ha25).
617.0 *2*	25 *3*	4608.2	43/2$^+$	3991.1	39/2$^+$		R_{ang}=1.07 *3* for 617.0γ+615.8γ (2011Ha25).
618[@] *1*	<0.3	6654.0	51/2$^+$	6035.8	49/2$^+$		
621.2 *2*	31 *3*	2717.8	29/2$^-$	2096.6	25/2$^-$	Q	R_{ang}=1.20 *7* (2011Ha25).
623.2 *5*	0.8 *1*	5949.7	47/2$^+$	5326.4	45/2$^+$		
625.4 *2*	11 *1*	5126.9	45/2$^-$	4501.5	41/2$^-$	Q	R_{ang}=1.19 *10* (2011Ha25).
627.9 *2*	23 *2*	5236.2	47/2$^+$	4608.2	43/2$^+$	Q	R_{ang}=1.04 *9* (2011Ha25).
629.4 *2*	13 *1*	5186.8	45/2$^-$	4557.3	41/2$^-$	Q	R_{ang}=1.11 *2* (2011Ha25).
629.9 *2*	20 *2*	5550.6	49/2$^+$	4920.7	45/2$^+$	Q	R_{ang}=1.03 *14* (2011Ha25).
630.6 *2*	54 *4*	2979.6	31/2$^-$	2349.0	27/2$^-$	Q	R_{ang}=1.00 *5* (2011Ha25).
632.3 *2*	6.9 *7*	4658.5	43/2$^+$	4026.2	39/2$^+$	Q	R_{ang}=0.97 *10* (2011Ha25).
632.3 *5*	0.8 *1*	5293.6	43/2$^+$	4661.2	41/2$^+$	D(+Q)	R_{ang}=0.71 *8*; ΔJ=1 transition (2011Ha25, 2009Ha33).
637.1 *2*	2.5 *3*	1133.5	13/2$^-$	496.4	13/2$^-$		
642.6 *5*	0.6 *1*	4687.9	39/2$^+$	4045.4	37/2$^+$	D	R_{ang}=0.50 *8* (2011Ha25, 2009Ha33).
642.7 *2*	5.4 *6*	2463.00	25/2$^+$	1820.29	21/2$^+$		
642.9 *5*	0.4 *1*	5849.7	(49/2$^-$)	5206.7	45/2$^-$		
648.4 *2*	6.7 *7*	5008.9	45/2$^+$	4360.5	41/2$^+$		R_{ang}=0.80 *6* (2011Ha25); suggests D+Q, but level scheme requires ΔJ=2.
649.4 *2*	2.2 *3*	5206.7	45/2$^-$	4557.3	41/2$^-$	Q	R_{ang}=0.94 *4* (2011Ha25).
652.4 *2*	20 *2*	5888.6	51/2$^+$	5236.2	47/2$^+$	Q	R_{ang}=1.10 *8* (2011Ha25).
653.0 *5*	0.4 *1*	4133.4	35/2$^+$	3480.4	33/2$^+$		
656.1 *2*	1.2 *2*	5949.7	47/2$^+$	5293.6	43/2$^+$		
656.9 *2*	20 *2*	2753.5	29/2$^-$	2096.6	25/2$^-$	Q	R_{ang}=1.04 *7* (2011Ha25).
660.7 *2*	40 *3*	4684.3	45/2$^-$	4023.6	41/2$^-$	Q	R_{ang}=0.98 *6* (2011Ha25).
662.9 *2*	1.3 *2*	5849.7	(49/2$^-$)	5186.8	45/2$^-$		
665.2 *2*	9.0 *9*	5326.4	45/2$^+$	4661.2	41/2$^+$	Q	R_{ang}=1.08 *2* (2011Ha25).
665.2 *2*	9.4 *9*	5465.1	47/2$^-$	4799.9	43/2$^-$	Q	R_{ang}=1.06 *8* (2011Ha25).
667.2 *5*	0.6 *1*	6182.2	51/2$^-$	5514.9	(47/2$^-$)		
667.3 *2*	14 *2*	4658.5	43/2$^+$	3991.1	39/2$^+$	Q	R_{ang}=1.00 *7* (2011Ha25).
671.3 *2*	17 *2*	6221.9	53/2$^+$	5550.6	49/2$^+$	Q	R_{ang}=0.98 *6* (2011Ha25).
675.5 *2*	9.2 *9*	5802.4	49/2$^-$	5126.9	45/2$^-$	Q	R_{ang}=1.15 *13* (2011Ha25).
683.7 *2*	0.9 *4*	5890.4	49/2$^-$	5206.7	45/2$^-$		

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^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

γ(^{167}Ta) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
686.8 *2*	11 *1*	5345.3	47/2$^+$	4658.5	43/2$^+$		R_{ang}=1.03 *11* (2011Ha25) for 686.8γ+688.7γ.
688.7 *2*	6.1 *6*	5697.6	49/2$^+$	5008.9	45/2$^+$		R_{ang}=1.03 *11* (2011Ha25) for 686.8γ+688.7γ.
694.2 *2*	4.0 *5*	1641.6	17/2$^-$	947.4	17/2$^-$	(D)	R_{ang}=1.1 *1* (2011Ha25); interpreted by authors As D, ΔJ=0 transition.
703.6 *2*	6.5 *8*	5890.4	49/2$^-$	5186.8	45/2$^-$	Q	R_{ang}=1.01 *3* (2011Ha25).
704.3 *2*	1.1 *2*	6654.0	51/2$^+$	5949.7	47/2$^+$		
705.6 *2*	44 *4*	5053.7	47/2$^-$	4348.1	43/2$^-$	Q	R_{ang}=1.17 *5* (2011Ha25).
705.8 *2*	6.1 *7*	2199.3	21/2$^-$	1493.4	21/2$^-$		
709.4# *2*	6.9# *7*	6035.8	49/2$^+$	5326.4	45/2$^+$	Q	R_{ang}=1.19 *4* (2011Ha25).
709.4# *2*	6.9# *7*	6054.8	51/2$^+$	5345.3	47/2$^+$	Q	R_{ang}=1.13 *13* (2011Ha25).
710.5 *2*	13 *1*	6599.1	55/2$^+$	5888.6	51/2$^+$	Q	R_{ang}=1.16 *5* (2011Ha25).
716.1 *2*	7.1 *8*	6518.6	53/2$^-$	5802.4	49/2$^-$		R_{ang}=1.18 *10* (2011Ha25) for 716.1γ+717.1γ.
717.1 *2*	6.7 *7*	6182.2	51/2$^-$	5465.1	47/2$^-$		R_{ang}=1.18 *10* for 716.1γ+711.1γ (2011Ha25).
724.4 *2*	4.8 *5*	6422.0	53/2$^+$	5697.6	49/2$^+$		
737.5 *2*	4.0 *5*	6919.7	55/2$^-$	6182.2	51/2$^-$		
740.7 *2*	1.7 *2*	6205.8	(51/2$^-$)	5465.1	47/2$^-$		
741.8 *2*	15 *2*	6963.7	57/2$^+$	6221.9	53/2$^+$	Q	R_{ang}=1.06 *6* (2011Ha25).
742.4 *2*	40 *3*	5426.7	49/2$^-$	4684.3	45/2$^-$	Q	R_{ang}=1.18 *6* (2011Ha25).
743.7 *5*	0.8 *1*	6593.4	(53/2$^-$)	5849.7	(49/2$^-$)		
744.3 *2*	6.1 *6*	6780.1	53/2$^+$	6035.8	49/2$^+$	Q	R_{ang}=1.02 *3* (2011Ha25).
752.4 *5*	0.9 *2*	7406.4	55/2$^+$	6654.0	51/2$^+$		
752.7 *2*	5.3 *5*	6643.1	53/2$^-$	5890.4	49/2$^-$	Q	R_{ang}=1.04 *3* (2011Ha25).
761.4 *2*	3.8 *4*	6816.2	55/2$^+$	6054.8	51/2$^+$		
764.3 *2*	1.1 *1*	6800.1	53/2$^+$	6035.8	49/2$^+$	Q	R_{ang}=1.03 *6* (2011Ha25, 2009Ha33).
764.4 *5*	<0.3	7438.8	57/2$^-$	6674.4	53/2$^-$		
771.2 *2*	36 *3*	5824.9	51/2$^-$	5053.7	47/2$^-$	Q	R_{ang}=0.96 *7* (2011Ha25).
771.9 *2*	1.7 *2*	2057.16	21/2$^+$	1285.32	17/2$^+$	Q	R_{ang}=1.06 *8* (2011Ha25, 2009Ha33).
774.4 *2*	5.4 *6*	7293.0	57/2$^-$	6518.6	53/2$^-$	Q	R_{ang}=1.11 *12* (2011Ha25).
781.9 *2*	1.5 *2*	6987.7	(55/2$^-$)	6205.8	(51/2$^-$)		
784.0 *2*	1.5 *2*	6674.4	53/2$^-$	5890.4	49/2$^-$		R_{ang}=0.84 *5* (2011Ha25).
785.9 *2*	4.0 *2*	7566.0	57/2$^+$	6780.1	53/2$^+$	Q	R_{ang}=0.96 *6* (2011Ha25).
790.3 *2*	12 *1*	7389.4	59/2$^+$	6599.1	55/2$^+$	Q	R_{ang}=0.92 *6* (2011Ha25).
792.1 *2*	2.5 *3*	7214.1	57/2$^+$	6422.0	53/2$^+$		
795.7 *2*	2.8 *4*	7438.8	57/2$^-$	6643.1	53/2$^-$	Q	R_{ang}=0.98 *3* (2011Ha25).
796.4 *5*	0.8 *1*	7596.5	57/2$^+$	6800.1	53/2$^+$	Q	R_{ang}=1.05 *6* (2011Ha25, 2009Ha33).
796.7 *2*	4.0 *5*	7716.5	59/2$^-$	6919.7	55/2$^-$		
797.4 *5*	0.9 *2*	7471.9	57/2$^-$	6674.4	53/2$^-$		
799.5 *5*	0.8 *1*	8205.9	59/2$^+$	7406.4	55/2$^+$		
799.8 *2*	32 *3*	6226.5	53/2$^-$	5426.7	49/2$^-$	Q	R_{ang}=0.97 *5* (2011Ha25).
812.2 *5*	0.6 *1*	7405.6	(57/2$^-$)	6593.4	(53/2$^-$)		
812.9 *2*	25 *3*	6637.8	55/2$^-$	5824.9	51/2$^-$	Q	R_{ang}=1.18 *9* (2011Ha25).
816@ *1*	<0.3	7596.5	57/2$^+$	6780.1	53/2$^+$		
822.4 *2*	14 *2*	7786.1	61/2$^+$	6963.7	57/2$^+$	(Q)	R_{ang}=0.88 *6* (2011Ha25).
828.8 *2*	1.2 *1*	7471.9	57/2$^-$	6643.1	53/2$^-$		
832.8 *2*	2.3 *2*	8398.8	61/2$^+$	7566.0	57/2$^+$	(Q)	R_{ang}=0.91 *3* (2011Ha25).
835.4 *2*	4.0 *6*	8128.4	61/2$^-$	7293.0	57/2$^-$		R_{ang}=0.82 *10* (2011Ha25); allows D+Q or Q, but level scheme requires ΔJ=2.
837.5 *2*	22 *2*	7064.0	57/2$^-$	6226.5	53/2$^-$		R_{ang}=0.86 *5* (2011Ha25).
838.5 *2*	2.7 *3*	7654.7	59/2$^+$	6816.2	55/2$^+$		
840.9 *5*	0.7 *1*	8437.4	61/2$^+$	7596.5	57/2$^+$		
842.6 *2*	1.3 *2*	7830.3	(59/2$^-$)	6987.7	(55/2$^-$)		
842.7 *2*	17 *2*	7480.5	59/2$^-$	6637.8	55/2$^-$	Q	R_{ang}=0.92 *5* (2011Ha25).
847.2 *2*	12 *1*	2579.7	25/2$^-$	1732.5	23/2$^-$	D	R_{ang}=0.54 *6* (2011Ha25).
847.9 *2*	2.9 *4*	8564.4	63/2$^-$	7716.5	59/2$^-$		
848.7 *5*	0.7 *1*	9054.6	63/2$^+$	8205.9	59/2$^+$		

Continued on next page (footnotes at end of table)

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

γ(^{167}Ta) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	Comments
852.7 *2*	1.4 *2*	8324.6	61/2$^-$	7471.9	57/2$^-$		
855.6 *2*	1.9 *3*	8294.4	61/2$^-$	7438.8	57/2$^-$	Q	R_{ang}=1.13 *5* (2011Ha25).
869.7 *2*	12 *1*	7933.7	61/2$^-$	7064.0	57/2$^-$	Q	R_{ang}=1.13 *8* (2011Ha25).
871.5 *2*	2.1 *2*	8085.6	61/2$^+$	7214.1	57/2$^+$		
872.6 *5*	<0.3	8278.2	(61/2$^-$)	7405.6	(57/2$^-$)		
874.2 *2*	9.6 *9*	8354.6	63/2$^-$	7480.5	59/2$^-$	Q	R_{ang}=1.06 *9* (2011Ha25).
874.3 *2*	10 *1*	8263.8	63/2$^+$	7389.4	59/2$^+$	Q	R_{ang}=0.96 *12* (2011Ha25).
881.4 *2*	1.7 *2*	9280.2	65/2$^+$	8398.8	61/2$^+$	Q	R_{ang}=0.99 *5* (2011Ha25).
892.4 *2*	2.2 *3*	9020.8	65/2$^-$	8128.4	61/2$^-$		
894.6 *5*	0.4 *1*	9332.0	65/2$^+$	8437.4	61/2$^+$		
898.2 *5*	0.8 *1*	9222.8	65/2$^-$	8324.6	61/2$^-$		
899.6 *2*	8.4 *8*	8685.7	65/2$^+$	7786.1	61/2$^+$	Q	R_{ang}=0.97 *7* (2011Ha25).
899.8 *5*	0.5 *1*	9954.4	67/2$^+$	9054.6	63/2$^+$		
901.8 *2*	1.4 *2*	9466.2	67/2$^-$	8564.4	63/2$^-$		
909.9 *2*	1.2 *1*	8564.6	63/2$^+$	7654.7	59/2$^+$		
910.1 *2*	7.3 *6*	8843.8	65/2$^-$	7933.7	61/2$^-$	Q	R_{ang}=0.99 *8* (2011Ha25).
912.6 *5*	0.8 *4*	9207.0	65/2$^-$	8294.4	61/2$^-$		
912.8 *2*	7.7 *8*	9267.4	67/2$^-$	8354.6	63/2$^-$	Q	R_{ang}=1.02 *10* (2011Ha25).
914.6 *5*	0.9 *1*	8744.9	(63/2$^-$)	7830.3	(59/2$^-$)		
921.1 *5*	0.3 *1*	10143.9	69/2$^-$	9222.8	65/2$^-$		
926.7 *5*	<0.3	9204.9	(65/2$^-$)	8278.2	(61/2$^-$)		
933.8 *5*	1.0 *2*	10214.0	69/2$^+$	9280.2	65/2$^+$		
935.5 *5*	<0.3	10267.5	69/2$^+$	9332.0	65/2$^+$		
945.1 *2*	1.5 *2*	9030.7	65/2$^+$	8085.6	61/2$^+$		
951.9 *5*	<0.3	10158.9	69/2$^-$	9207.0	65/2$^-$		
952.0 *5*	0.3 *1*	10906.4	71/2$^+$	9954.4	67/2$^+$		
952.1 *2*	1.2 *2*	9972.9	69/2$^-$	9020.8	65/2$^-$		
956.1 *2*	6.0 *7*	9219.9	67/2$^+$	8263.8	63/2$^+$	Q	R_{ang}=0.96 *7* (2011Ha25).
956.6 *2*	5.0 *5*	10224.0	71/2$^-$	9267.4	67/2$^-$		
958.2 *5*	0.8 *4*	10424.4	71/2$^-$	9466.2	67/2$^-$		
961.4 *2*	5.8 *6*	9805.2	69/2$^-$	8843.8	65/2$^-$		
962.7 *2*	1.5 *2*	1641.6	17/2$^-$	678.9	15/2$^-$		
968.7 *2*	4.8 *5*	9654.4	69/2$^+$	8685.7	65/2$^+$		
972@ *1*	<0.3	11239.5?	(73/2$^+$)	10267.5	69/2$^+$		
986.6 *5*	0.8 *4*	11200.6	73/2$^+$	10214.0	69/2$^+$		
989.4 *5*	0.8 *1*	10020.1	69/2$^+$	9030.7	65/2$^+$		
1001.5 *2*	2.2 *3*	11225.5	75/2$^-$	10224.0	71/2$^-$		
1004.7 *5*	<0.3	11911.1	75/2$^+$	10906.4	71/2$^+$		
1010.5 *5*	0.4 *2*	11434.9	75/2$^-$	10424.4	71/2$^-$		
1012@ *1*	<0.3	11032.1?	(73/2$^+$)	10020.1	69/2$^+$		
1014.0 *5*	0.4 *2*	10986.9	73/2$^-$	9972.9	69/2$^-$		
1020.5 *2*	1.9 *2*	10825.7	73/2$^-$	9805.2	69/2$^-$		
1027.2 *2*	2.3 *4*	10681.6	73/2$^+$	9654.4	69/2$^+$		
1030.8 *2*	1.8 *4*	10250.7	71/2$^+$	9219.9	67/2$^+$		
1040.0 *5*	0.3 *2*	12240.6	77/2$^+$	11200.6	73/2$^+$		
1045.7 *5*	0.8 *4*	12271.2	79/2$^-$	11225.5	75/2$^-$		
1057.1 *5*	<0.3	12968.2	79/2$^+$	11911.1	75/2$^+$		
1058.1 *5*	<0.3	12493.0	79/2$^-$	11434.9	75/2$^-$		
1075.2 *2*	1.2 *2*	11756.8	77/2$^+$	10681.6	73/2$^+$		
1078.7 *5*	<0.3	12065.6	77/2$^-$	10986.9	73/2$^-$		
1081.4 *2*	0.7 *3*	11907.1	77/2$^-$	10825.7	73/2$^-$		
1086.4 *2*	33 *3*	2579.7	25/2$^-$	1493.4	21/2$^-$	Q	R_{ang}=1.04 *6* (2011Ha25).
1086.6 *5*	0.4 *2*	13357.8	83/2$^-$	12271.2	79/2$^-$		
1095.7 *5*	0.8 *4*	11346.4	75/2$^+$	10250.7	71/2$^+$		
1103@ *1*	<0.3	13343.6?	(81/2$^+$)	12240.6	77/2$^+$		

Continued on next page (footnotes at end of table)

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
1103.4 *5*	<0.3	13596.4	$83/2^-$	12493.0	$79/2^-$	1140.3 *2*	0.4 *2*	13047.4	$81/2^-$	11907.1	$77/2^-$
1115.4 *5*	0.4 *2*	12872.2	$81/2^+$	11756.8	$77/2^+$	1153.7 *5*	<0.3	14025.9	$85/2^+$	12872.2	$81/2^+$
1125.4 *5*	<0.3	14483.2	$87/2^-$	13357.8	$83/2^-$	1182.6 *2*	<0.3	14230.0	$85/2^-$	13047.4	$81/2^-$
1140.1 *5*	0.3 *2*	12486.5	$79/2^+$	11346.4	$75/2^+$						

† From 2011Ha25.
‡ From R_{ang}=Iγ(backward angles)/Iγ(90°) gated on stretched Q transitions. Expected values are 1.0 for stretched Q and 0.6 for stretched D transitions (2011Ha25).
# Multiply placed with intensity suitably divided.
@ Placement of transition in the level scheme is uncertain.

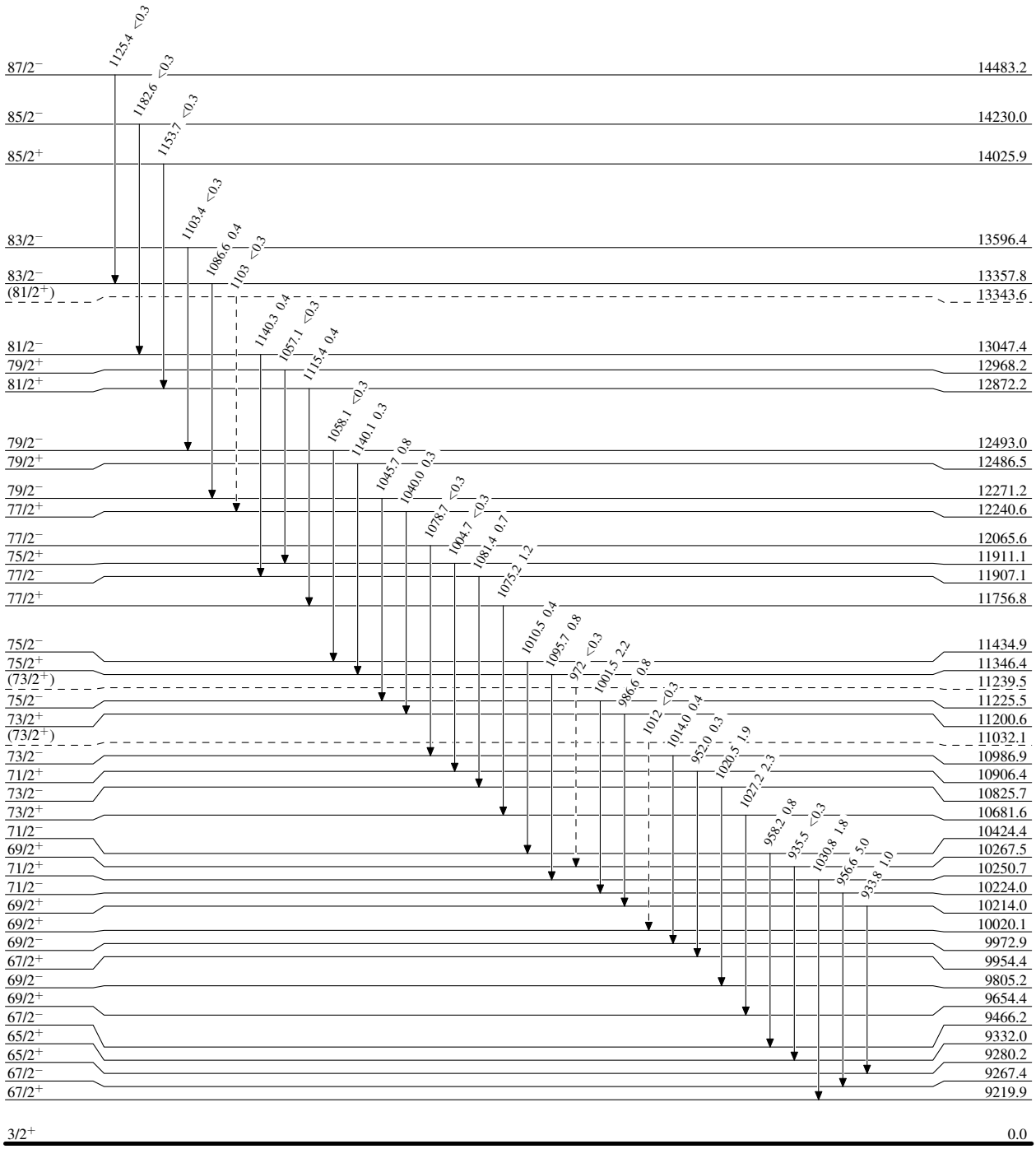
^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



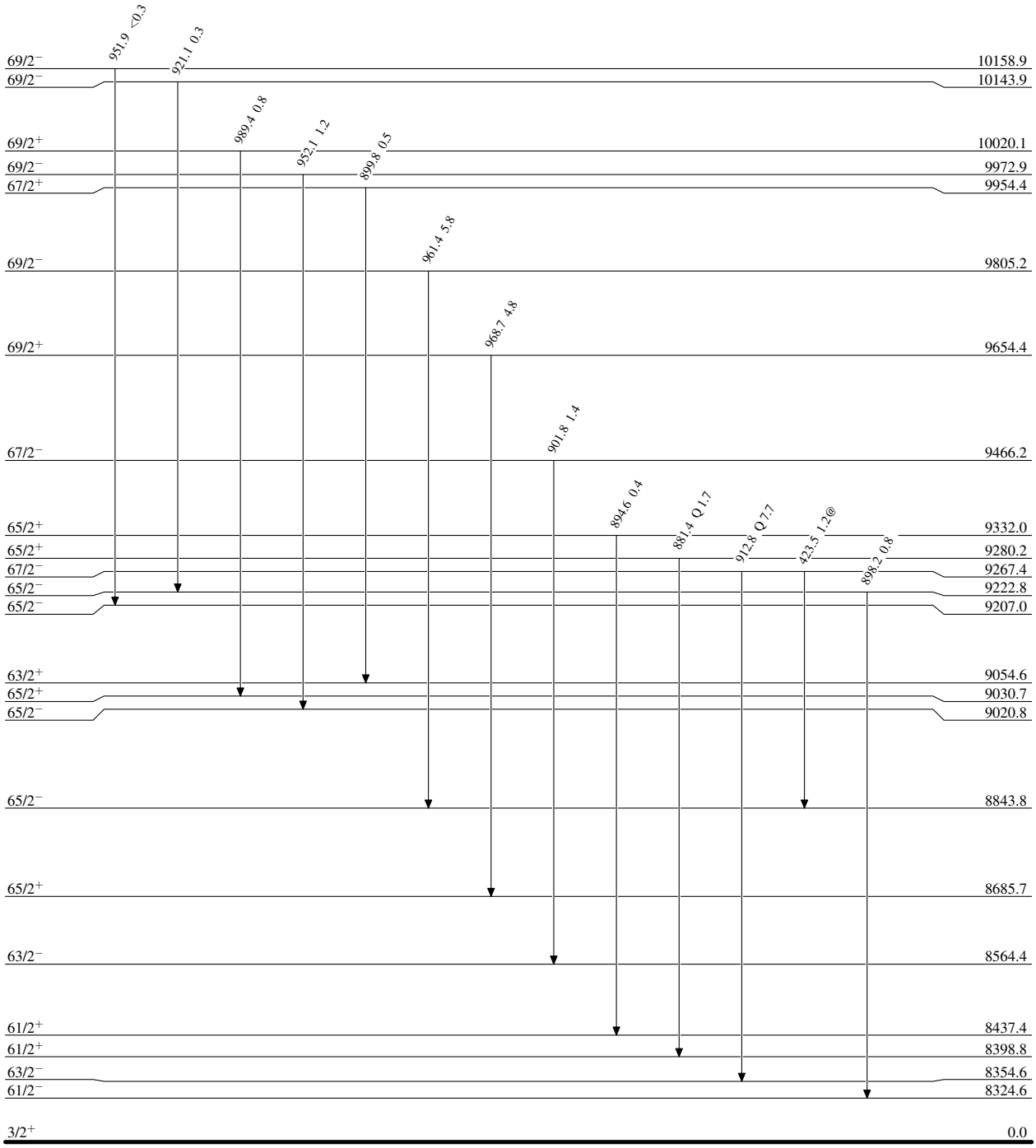
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



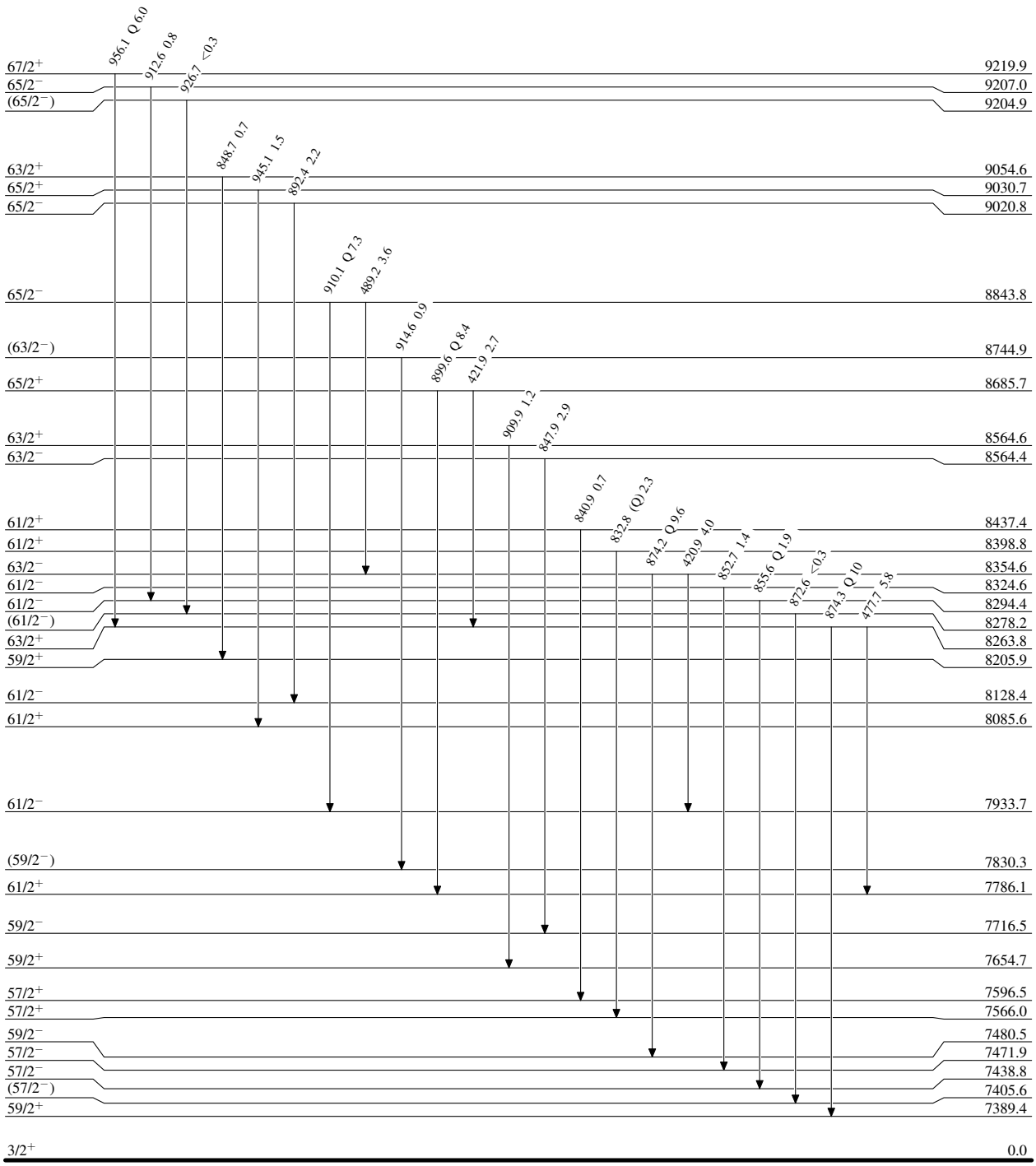
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



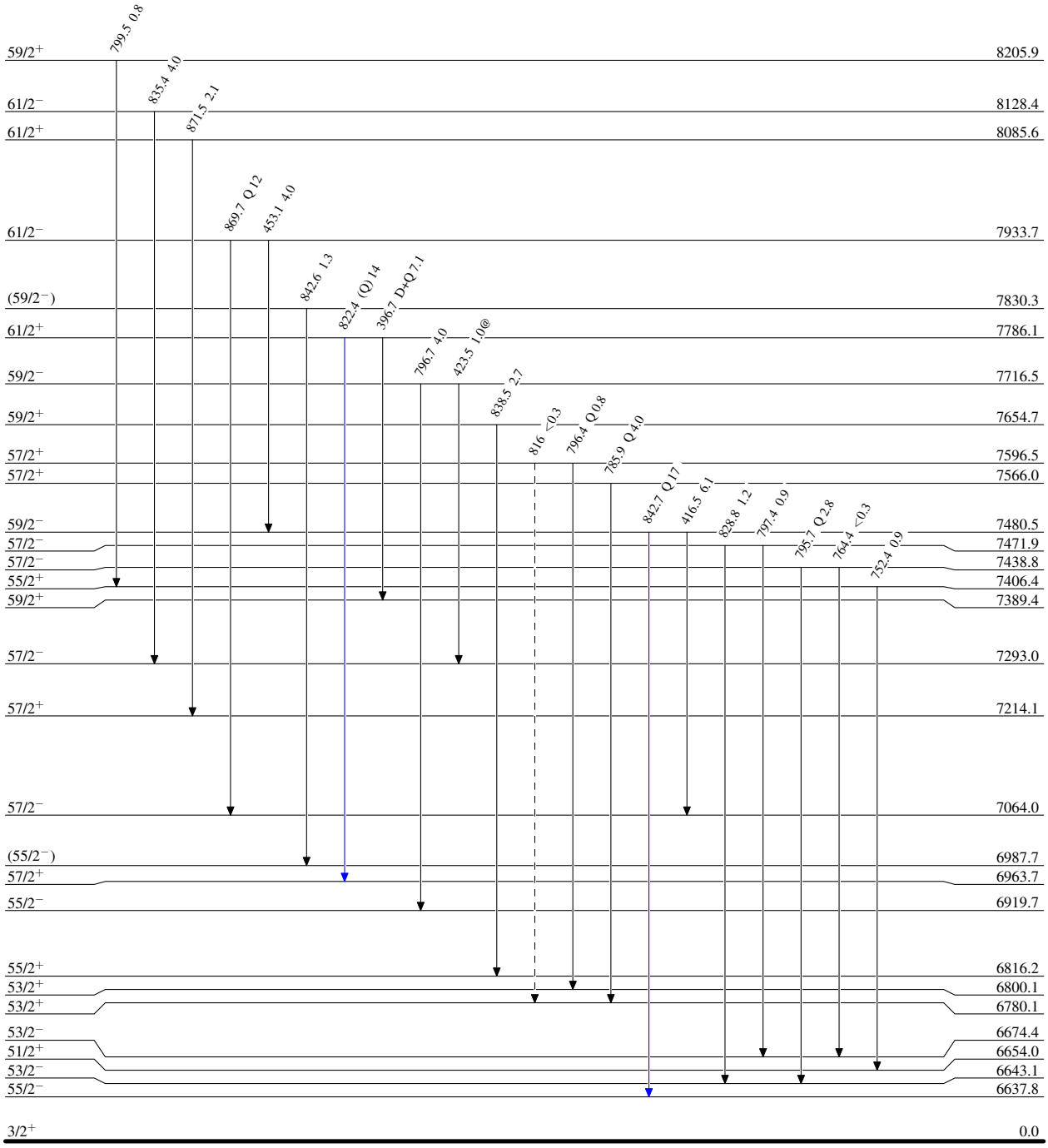
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



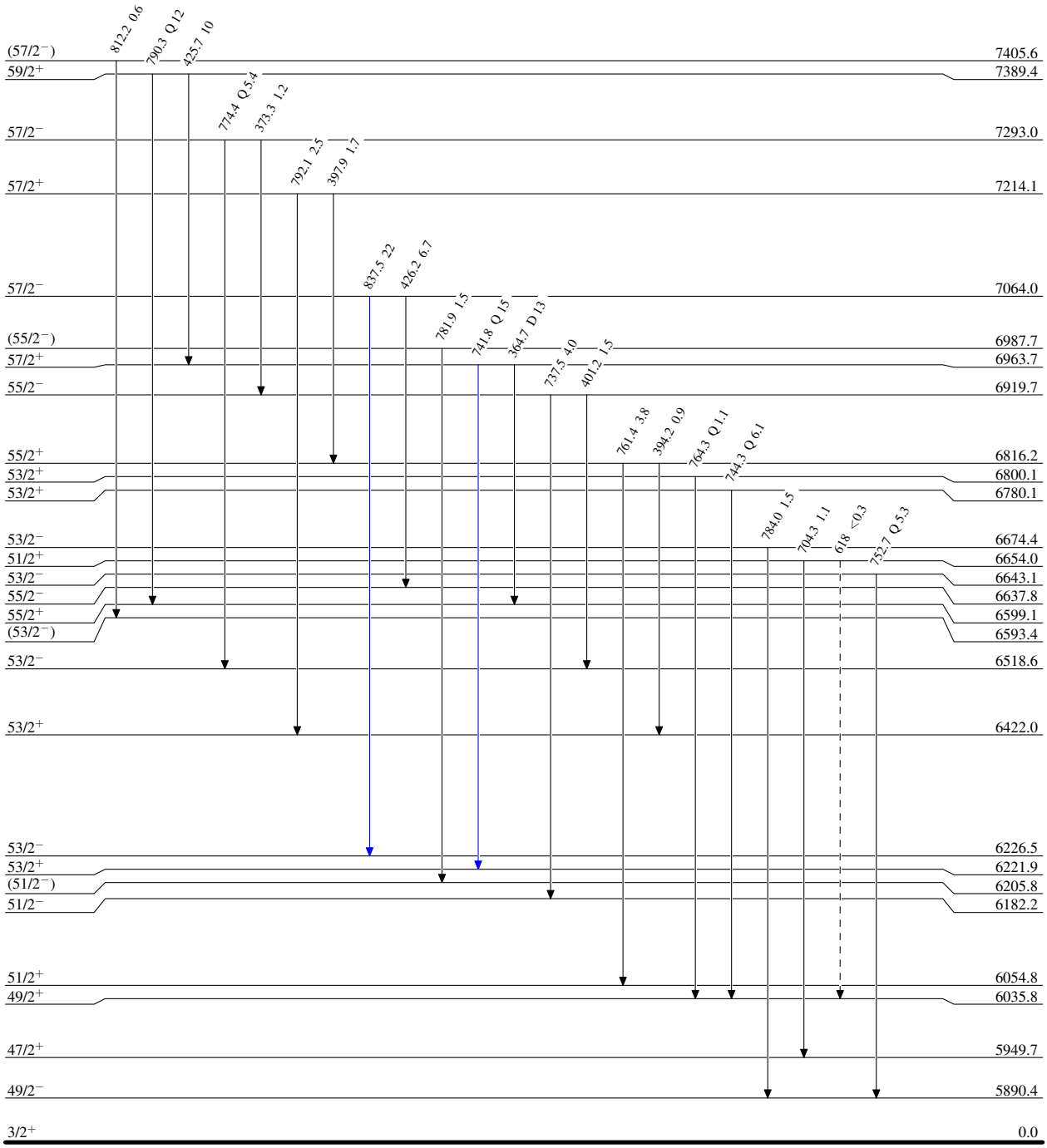
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



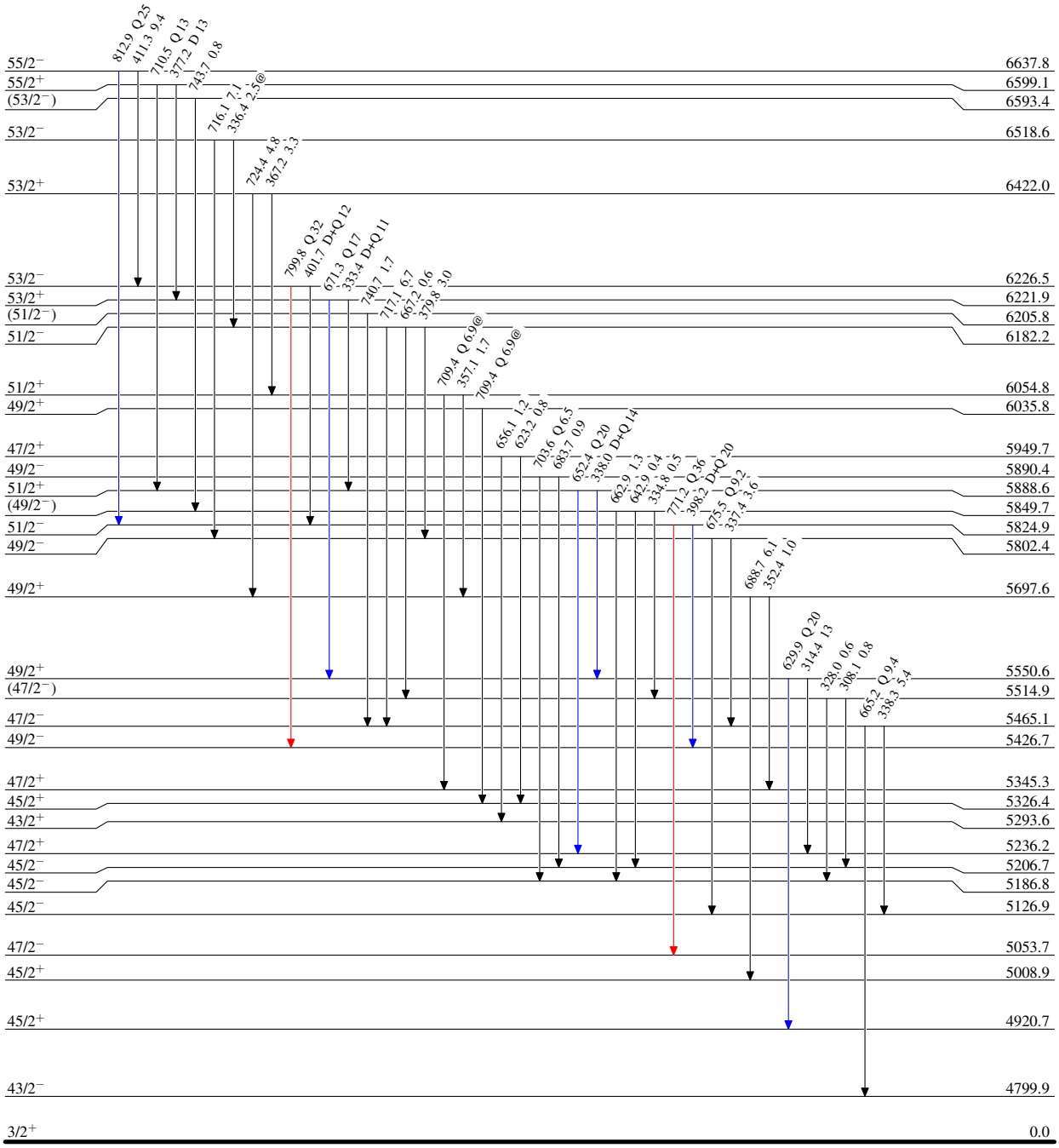
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



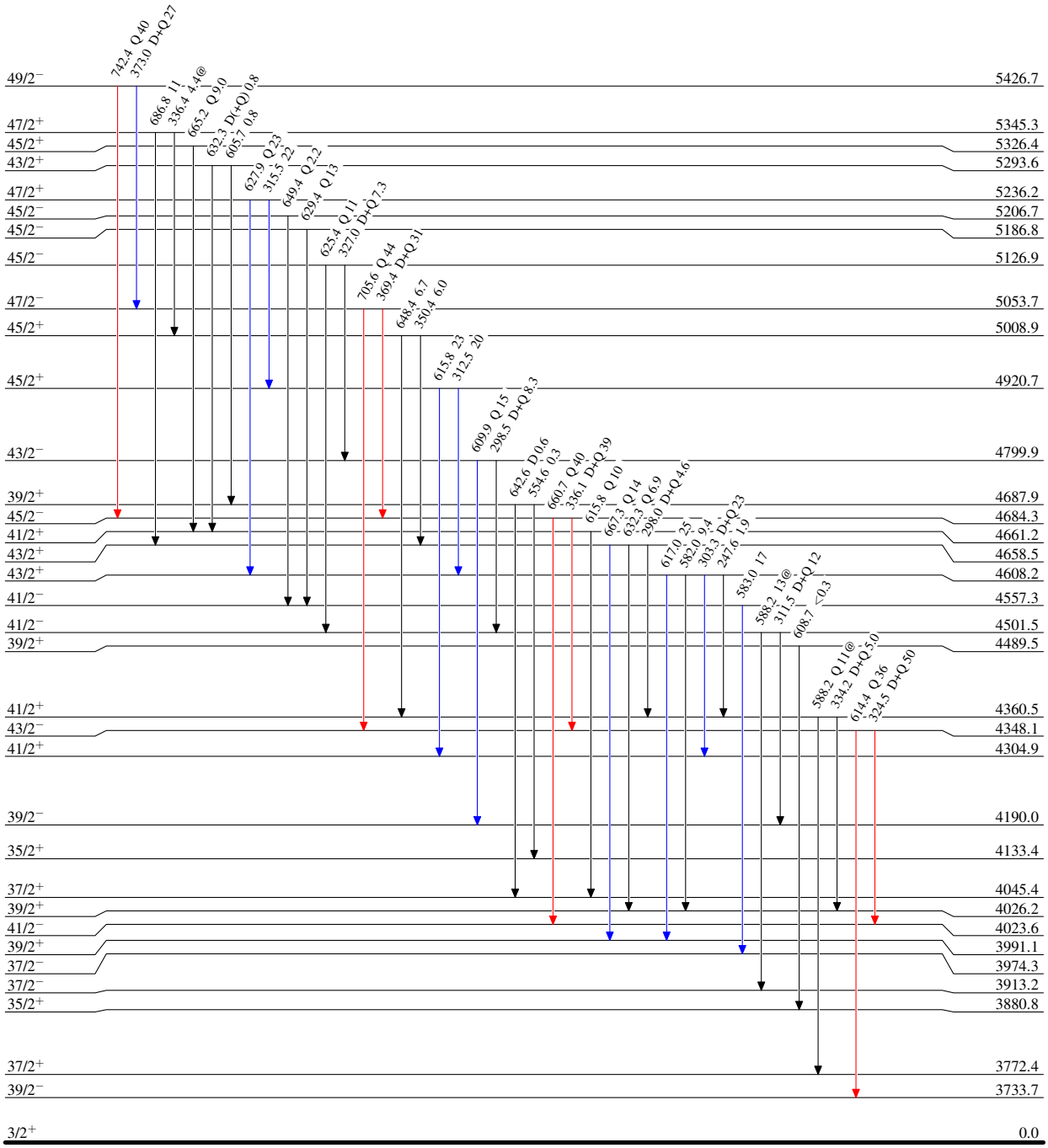
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



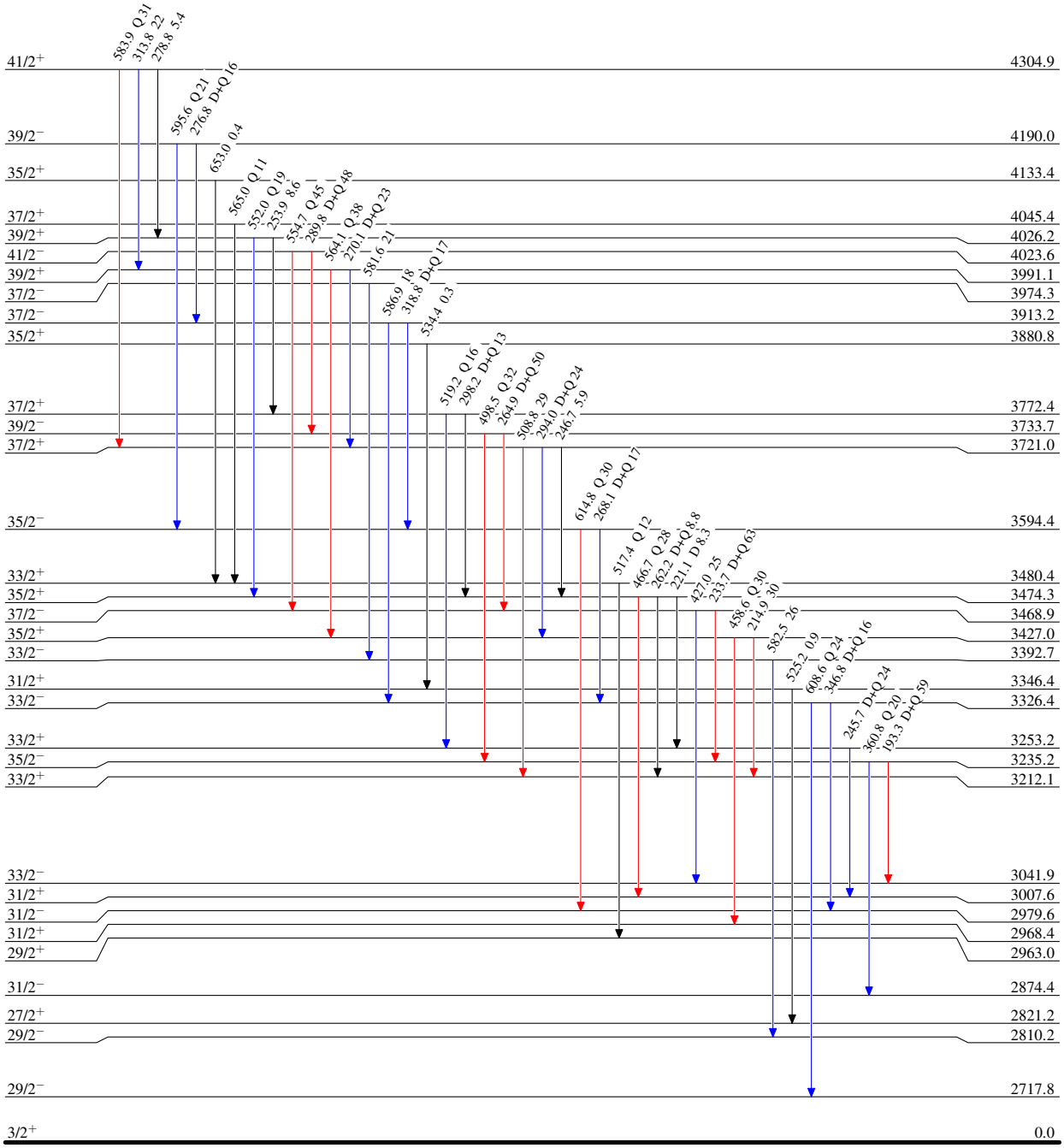
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



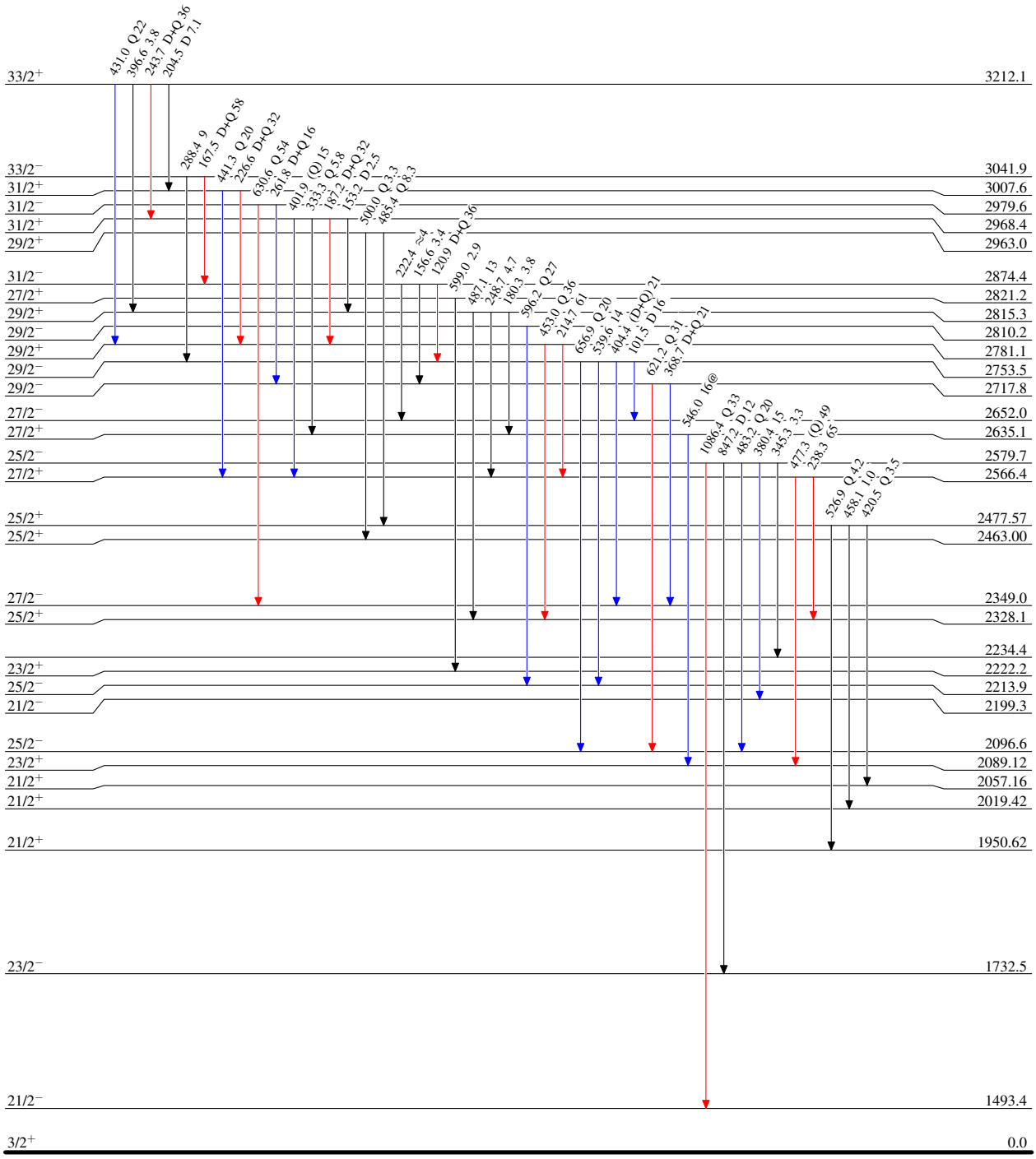
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



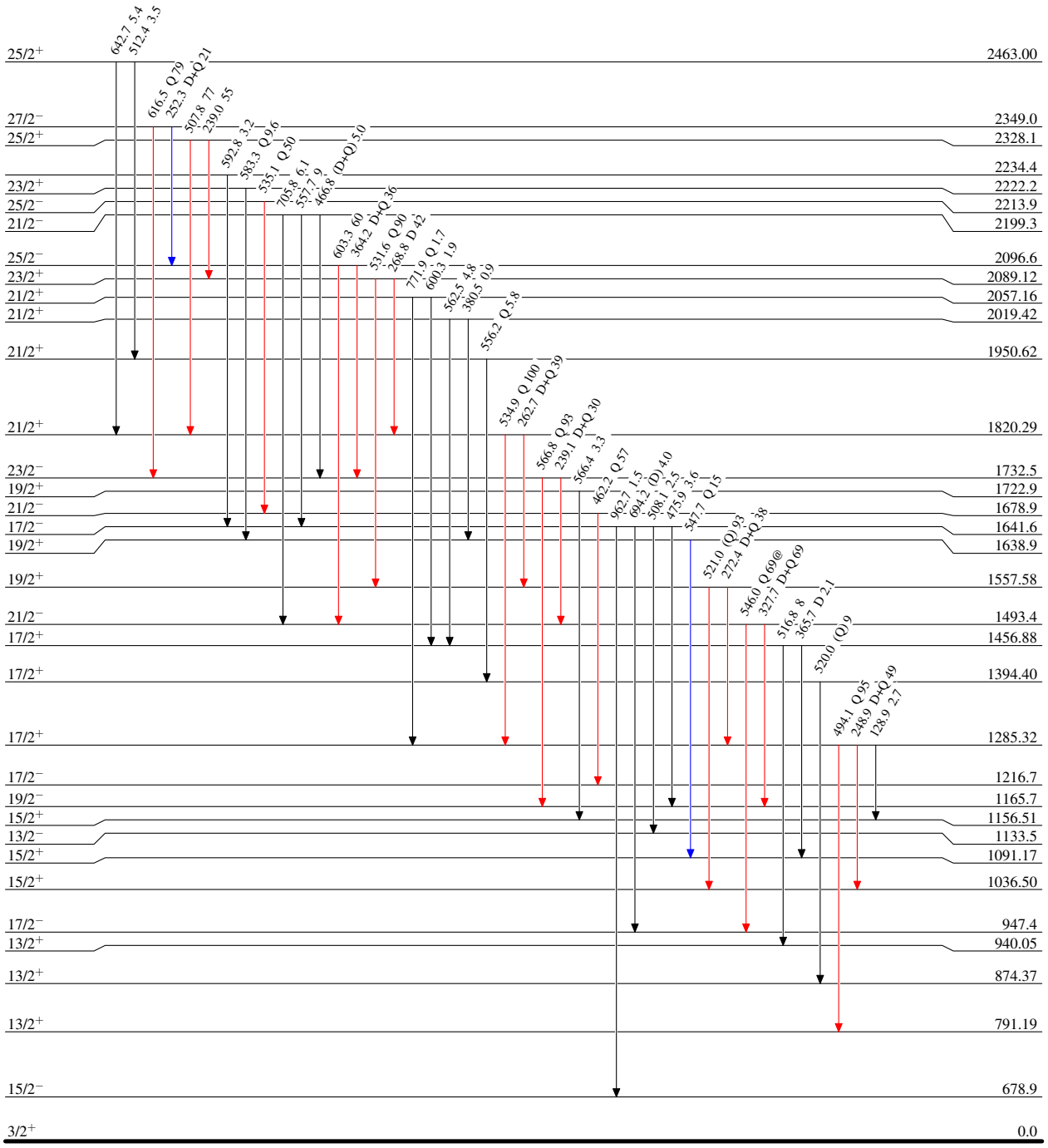
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



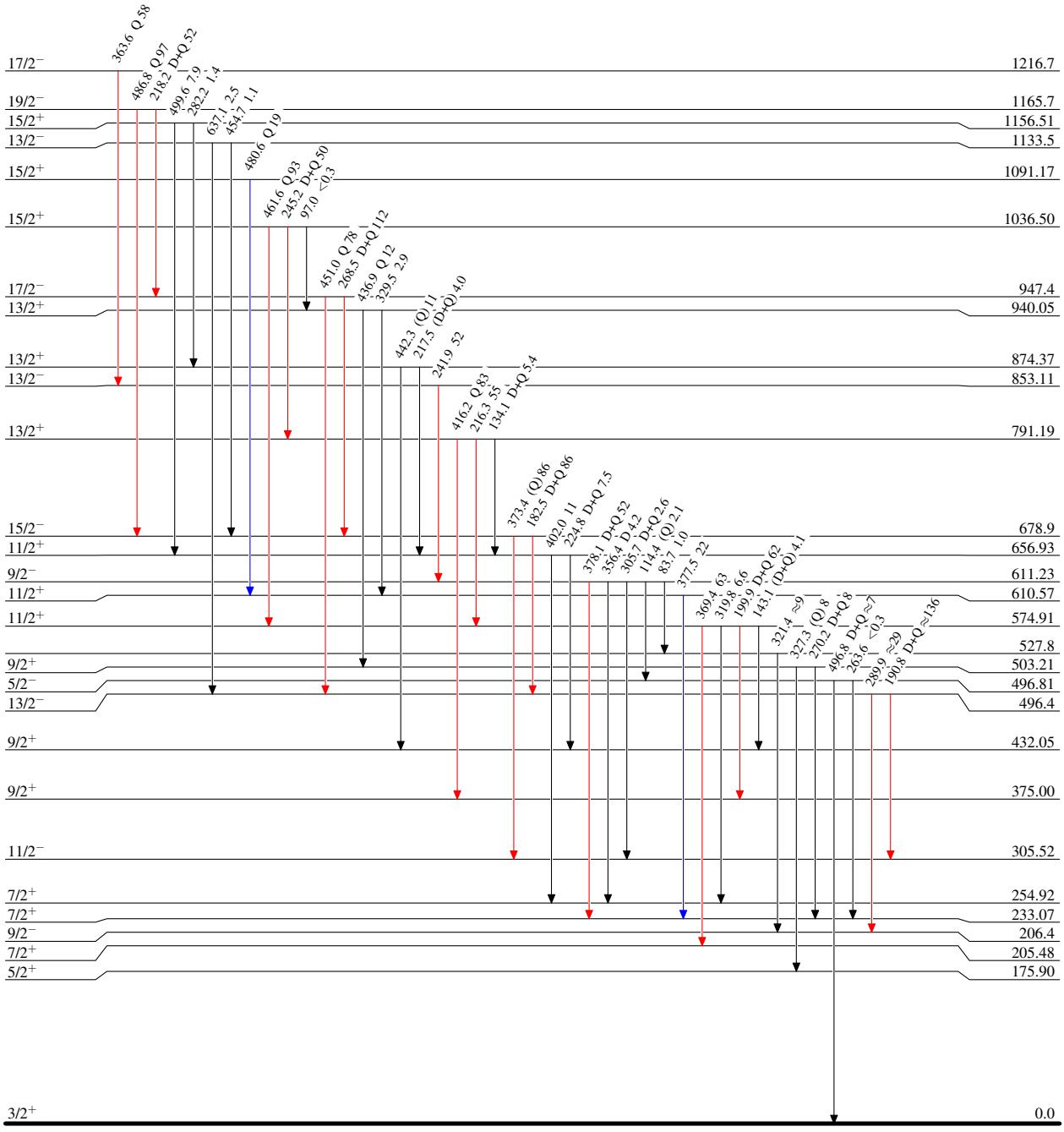
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



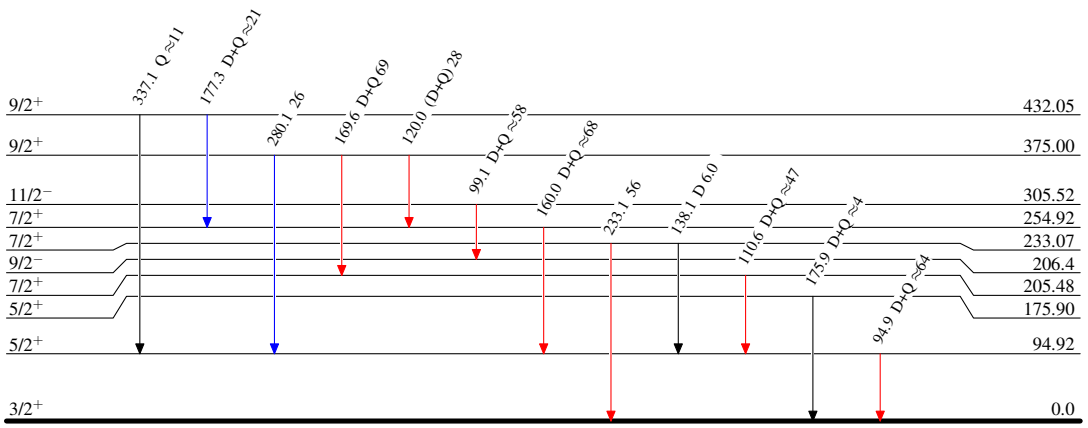
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33

Level Scheme (continued)

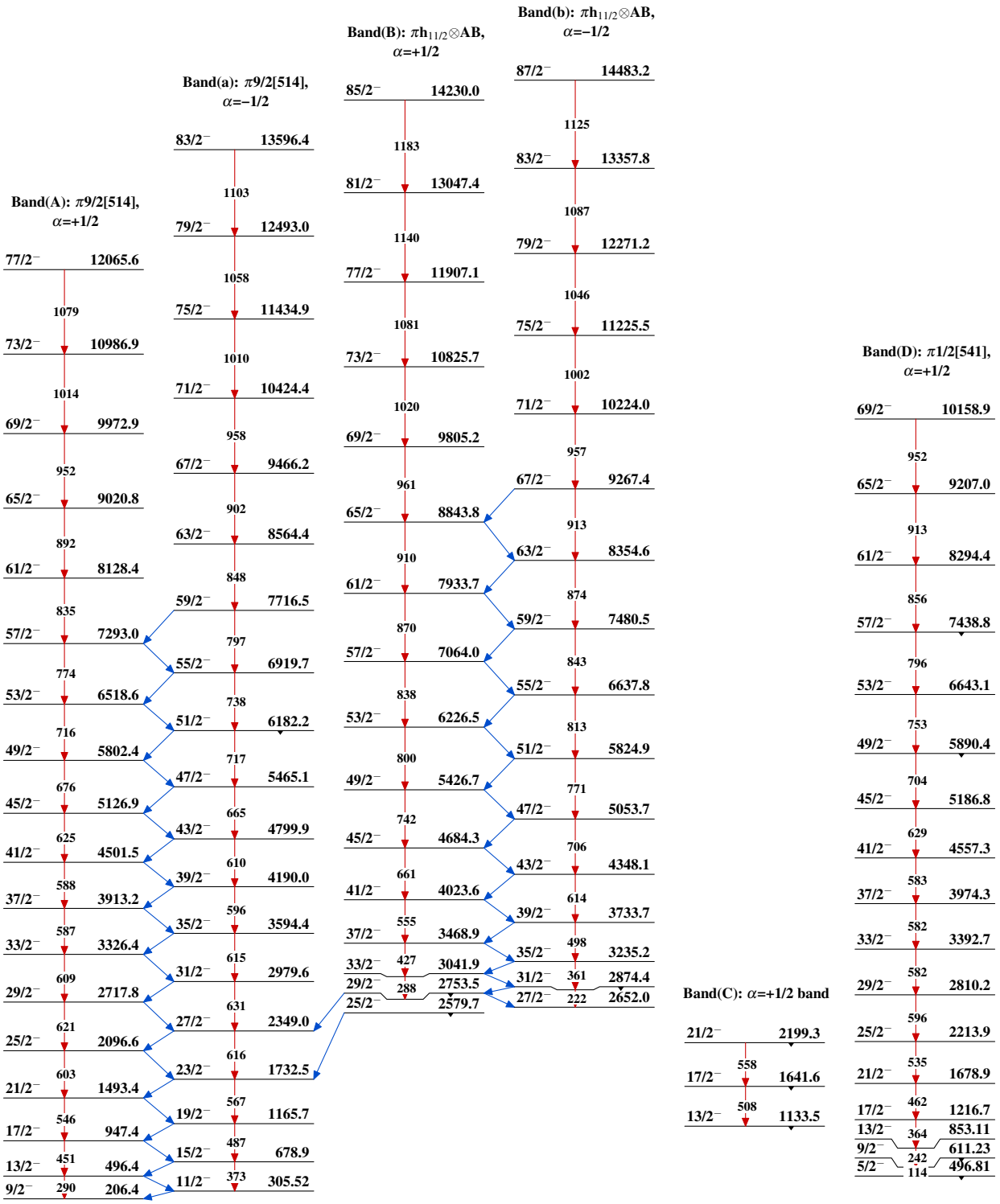
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



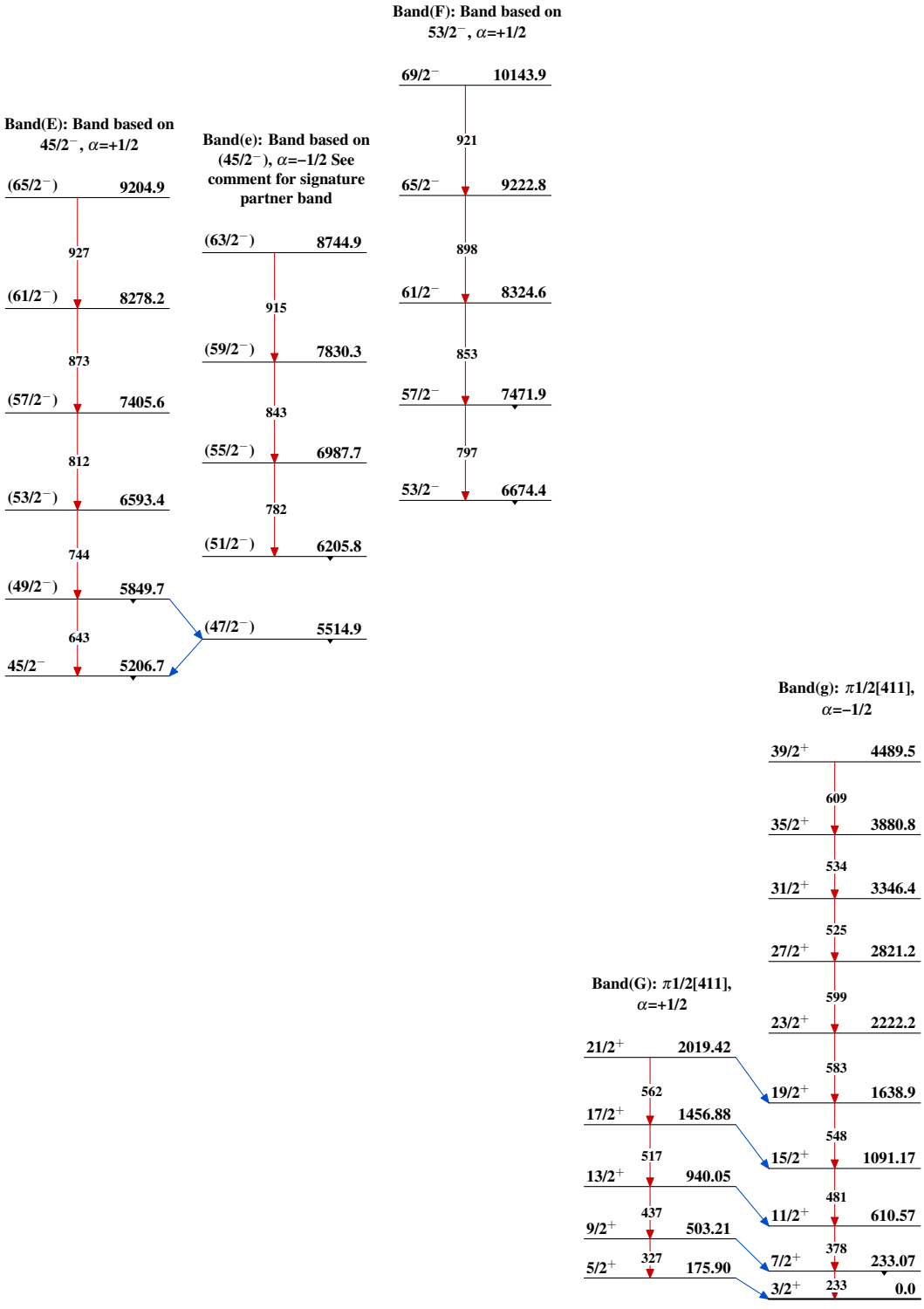
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33



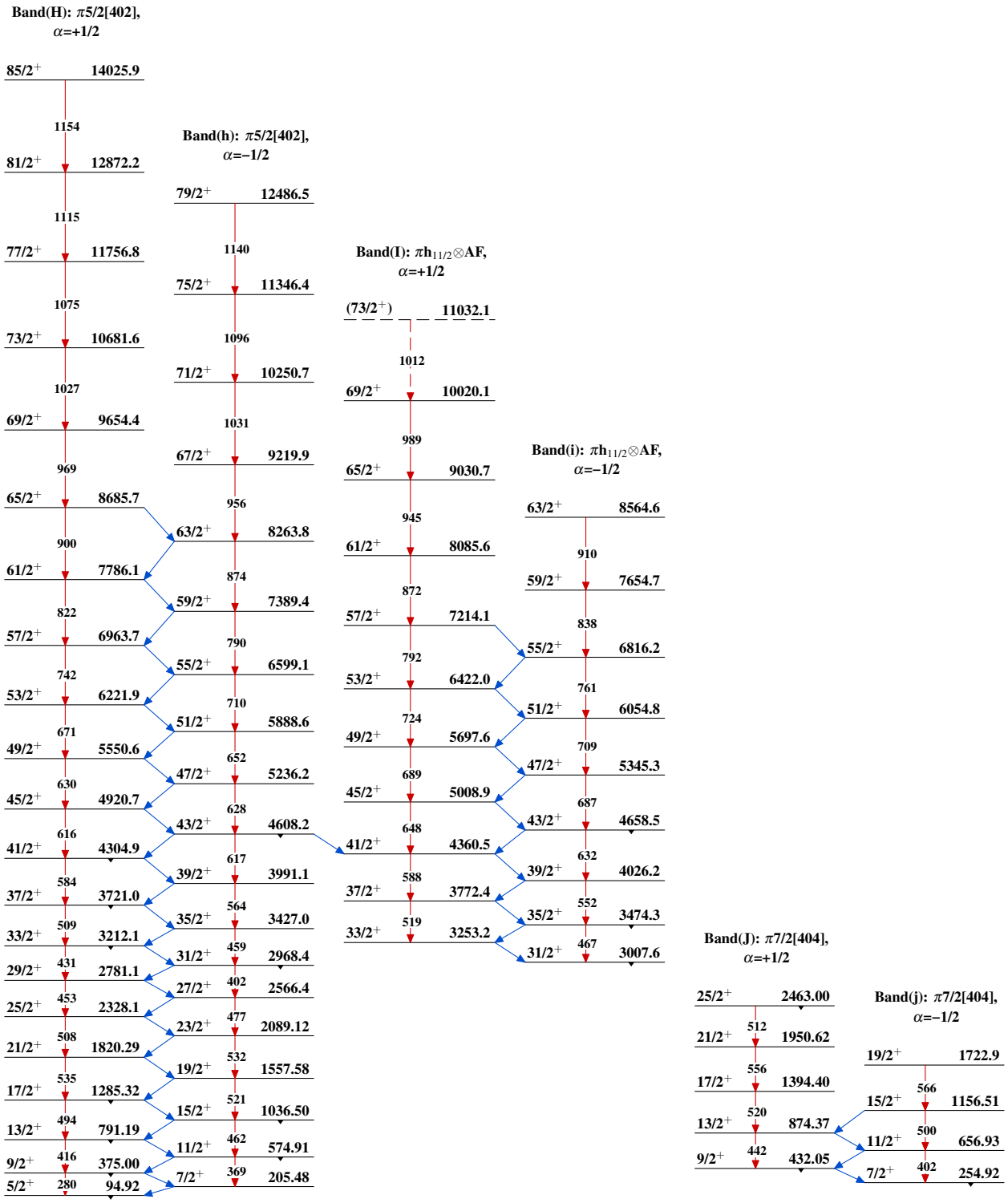
$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)

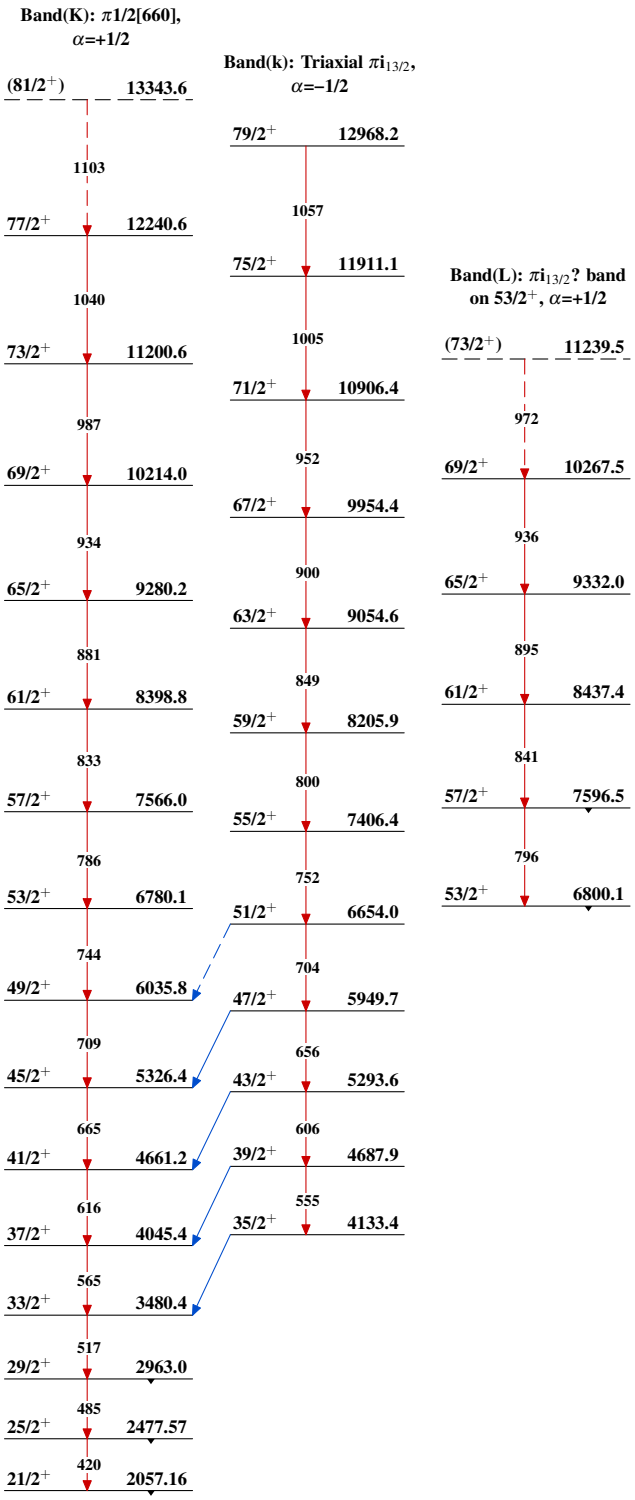


$^{167}_{73}Ta_{94}$

^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)



^{120}Sn(^{51}V,4nγ) 2011Ha25,2009Ha33 (continued)



$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	ENSDF	23-May-2013

1992Th02: E=165 MeV, 29 Compton-suppressed Ge detector array (ESSA30), 98% enriched ^{142}Nd target, θ=37°, 63°, 79°, 101°, 117°, 143°; measured Eγ, Iγ, $\gamma\gamma$ coin, Xγ coin, $\gamma\gamma\gamma$ coin, DCO ratios; cranked shell model calculations.

^{167}Ta Levels

E(level)[†]	J$^\pi$[‡]	Comments
0.0	(3/2$^+$)	Possible configuration=(π 1/2[411]) (1992Th02).
0.0+x[&]	9/2$^-$	E(level): x≈206 from Adopted Levels.
94.4[#] *10*	5/2$^+$	
98.7+x[a] *8*	11/2$^-$	
204.7[@] *13*	7/2$^+$	
214.4 *13*		
232.9 *10*	(7/2$^+$)	
289.7+x[&] *8*	13/2$^-$	
374.4[#] *13*	9/2$^+$	
472.3+x[a] *8*	15/2$^-$	
574.4[@] *14*	11/2$^+$	
611.3[b] *15*	9/2$^-$	
741.2+x[&] *8*	17/2$^-$	
790.9[#] *14*	13/2$^+$	
853.4[b] *15*	13/2$^-$	
959.7+x[a] *9*	19/2$^-$	
1036.3[@] *15*	15/2$^+$	
1217.4[b] *16*	17/2$^-$	
1285.4[#] *16*	17/2$^+$	
1287.7+x[&] *9*	21/2$^-$	
1527.1+x[a] *10*	23/2$^-$	
1557.7[@] *16*	19/2$^+$	
1680.1[b] *19*	21/2$^-$	
1820.7[#] *16*	21/2$^+$	
1891.7+x[&] *10*	25/2$^-$	
2089.9[@] *17*	23/2$^+$	
2144.4+x[a] *10*	27/2$^-$	
2215.6[b] *22*	25/2$^-$	
2329.1[#] *17*	25/2$^+$	
2375.7+x[c] *12*	(25/2$^-$)	
2513.4+x[&] *11*	29/2$^-$	
2549.2+x[c] *12*	(29/2$^-$)	
2567.6[@] *18*	27/2$^+$	
2670.2+x[d] *12*	(31/2$^-$)	
2775.5+x[a] *12*	31/2$^-$	
2782.3[#] *18*	29/2$^+$	
2798.2[b] *24*	29/2$^-$	
2837.7+x[c] *13*	(33/2$^-$)	
2969.9[@] *19*	31/2$^+$	

Continued on next page (footnotes at end of table)

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

^{167}Ta Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
3031.3+x[d] *13*	(35/2⁻)	3530.2+x[d] *14*	(39/2⁻)	4481.6+x[c] *17*	(45/2⁻)	6025.7+x[c] *19*	(53/2⁻)
3122.3+x[&] *13*	33/2⁻	3723.6[#] *21*	37/2⁺	4608[b] *3*	(41/2⁻)	6437.8+x[d] *19*	(55/2⁻)
3213.9[#] *20*	33/2⁺	3820.2+x[c] *15*	(41/2⁻)	4622.0?[@] *22*	(43/2⁺)	6864.5+x[c] *20*	(57/2⁻)
3265.0+x[c] *14*	(37/2⁻)	3977[b] *3*	(37/2⁻)	4851.6+x[d] *17*	(47/2⁻)	7281.2+x?[d] *21*	(59/2⁻)
3381[b] *3*	(33/2⁻)	3992.9?[@] *21*	(39/2⁺)	4925.6?[#] *23*	(45/2⁺)		
3390.9+x[a] *14*	35/2⁻	4145.2+x[d] *16*	(43/2⁻)	5225.0+x[c] *18*	(49/2⁻)		
3429.0[@] *20*	35/2⁺	4308.4?[#] *21*	(41/2⁺)	5623.6+x[d] *18*	(51/2⁻)		

† From least-squares fit to Eγ, assigning an uncertainty of 0.5 keV to transitions for which Iγ≥40, and 1 keV to all other Eγ data. from Adopted Levels, the energy offset x≈206.

‡ Authors′ values, based largely on systematics of transition energies, signature splittings and alignments for the light odd-A Ta and Lu isotopes, and on deduced transition multipolarities.

Band(A): 5/2[402], α=+1/2 band. In-band decay properties, transition energy systematics in nearby odd-A Ta isotopes, and small negative signature splitting favor $d_{5/2}$ orbital assignment over $g_{7/2}$ (1992Th02).

@ Band(a): (π 5/2[402]), α=−1/2 band.

& Band(B): (π 9/2[514]), α=+1/2 band.

a Band(b): (π 9/2[514]), α=−1/2 band.

b Band(C): (π 1/2[541]), α=+1/2 band. Decoupled band, analogous to bands observed in many neighboring odd-A, even-N nuclei; large decoupling parameter shifts unfavored signature levels to energies so high they are not normally observed in (HI,xnγ) studies. note also that energies for J>25/2 band members differ from adopted values because the 631γ-596γ-583γ-583γ cascade reported here has been replaced there by a 629γ-583γ-582γ-583γ-596γ cascade adopted from a later (^{51}V,4nγ) study.

c Band(D): ((π 9/2[514])(ν $i_{13/2}$)^2), α=+1/2 band.

d Band(d): ((π 9/2[514])(ν $i_{13/2}$)^2), α=−1/2 band.

γ(^{167}Ta)

Eγ †	Iγ ‡	Ei(level)	Jiπ	Ef	Jfπ	Mult.#	Comments
94.4[d]		94.4	5/2⁺	0.0	(3/2⁺)		
98.7		98.7+x	11/2⁻	0.0+x	9/2⁻		
110.3	23[@]	204.7	7/2⁺	94.4	5/2⁺		
120.1	7	214.4		94.4	5/2⁺		
121.1	29[@]	2670.2+x	(31/2⁻)	2549.2+x	(29/2⁻)		
157	<3[@]	2670.2+x	(31/2⁻)	2513.4+x	29/2⁻		
160.1	19	374.4	9/2⁺	214.4			
167.5 *5*	65	2837.7+x	(33/2⁻)	2670.2+x	(31/2⁻)		
169.6	31	374.4	9/2⁺	204.7	7/2⁺		
182.6 *5*	66	472.3+x	15/2⁻	289.7+x	13/2⁻		
187.7	12	2969.9	31/2⁺	2782.3	29/2⁺		
191.0 *5*	100	289.7+x	13/2⁻	98.7+x	11/2⁻		
193.5 *5*	70	3031.3+x	(35/2⁻)	2837.7+x	(33/2⁻)		
200.1	31	574.4	11/2⁺	374.4	9/2⁺		
214.8	≈16[a]	2782.3	29/2⁺	2567.6	27/2⁺		
215.2	≈8[a]	3429.0	35/2⁺	3213.9	33/2⁺		
216.4	24	790.9	13/2⁺	574.4	11/2⁺		
218.4 *5*	48	959.7+x	19/2⁻	741.2+x	17/2⁻	(D)	Mult.: DCO ratio=0.72 *24*.
[x]226.4	10						
232.9	32[a]	232.9	(7/2⁺)	0.0	(3/2⁺)		

Continued on next page (footnotes at end of table)

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
233.7 *5*	55	3265.0+x	(37/2$^-$)	3031.3+x	(35/2$^-$)		
238.4	≈19[a]	2567.6	27/2$^+$	2329.1	25/2$^+$		
239.2	≈22[a]	2329.1	25/2$^+$	2089.9	23/2$^+$		
239.4	24	1527.1+x	23/2$^-$	1287.7+x	21/2$^-$		
242.1 *5*	41	853.4	13/2$^-$	611.3	9/2$^-$	Q	Mult.: DCO ratio=1.00 *12*.
243.9	12	3213.9	33/2$^+$	2969.9	31/2$^+$		
245.4	31	1036.3	15/2$^+$	790.9	13/2$^+$		
249.2	25	1285.4	17/2$^+$	1036.3	15/2$^+$	(D)	Mult.: DCO ratio=0.72 *20*.
252.7	14	2144.4+x	27/2$^-$	1891.7+x	25/2$^-$		
262	10	2775.5+x	31/2$^-$	2513.4+x	29/2$^-$		
262.9	24	1820.7	21/2$^+$	1557.7	19/2$^+$	D	Mult.: DCO ratio=0.67 *15*.
265.2 *5*	47	3530.2+x	(39/2$^-$)	3265.0+x	(37/2$^-$)		
268.9 *5*	68[a]	741.2+x	17/2$^-$	472.3+x	15/2$^-$	D	Mult.: DCO ratio=0.64 *14*.
269	≤10[a]	3390.9+x	35/2$^-$	3122.3+x	33/2$^-$		
269.2	≈23[a]	2089.9	23/2$^+$	1820.7	21/2$^+$		
269.4[d]	≈6[a]	3992.9?	(39/2$^+$)	3723.6	37/2$^+$		
272.2	23	1557.7	19/2$^+$	1285.4	17/2$^+$		
279.9	9[a]	374.4	9/2$^+$	94.4	5/2$^+$		I(280γ)/I(170γ)=0.31 *11*.
288.3	≈6	2837.7+x	(33/2$^-$)	2549.2+x	(29/2$^-$)		I(288γ)/I(168γ)=0.24 *7*.
289.7	36[a]	289.7+x	13/2$^-$	0.0+x	9/2$^-$		I(290γ)/I(191γ)=0.42 *14*.
289.9	30[a]	3820.2+x	(41/2$^-$)	3530.2+x	(39/2$^-$)		
294.4	6	3723.6	37/2$^+$	3429.0	35/2$^+$		
303.9[d]	8	4925.6?	(45/2$^+$)	4622.0?	(43/2$^+$)		
313.0[d]	≈6[a]	4622.0?	(43/2$^+$)	4308.4?	(41/2$^+$)		
314.9[d]	12[a]	4308.4?	(41/2$^+$)	3992.9?	(39/2$^+$)		
324.9	21	4145.2+x	(43/2$^-$)	3820.2+x	(41/2$^-$)		
328.0 *5*	51	1287.7+x	21/2$^-$	959.7+x	19/2$^-$	(D)	Mult.: DCO ratio=0.73 *19*.
[x]333.9[b]	5						
336.5	21	4481.6+x	(45/2$^-$)	4145.2+x	(43/2$^-$)		
[x]337.9[b]	4						
347	12	3122.3+x	33/2$^-$	2775.5+x	31/2$^-$		
361.2	26	3031.3+x	(35/2$^-$)	2670.2+x	(31/2$^-$)		I(361γ)/I(194γ)=0.36 *3*.
364.0 *5*	40	1217.4	17/2$^-$	853.4	13/2$^-$	Q	Mult.: DCO ratio=1.02 *18*.
364.6	30	1891.7+x	25/2$^-$	1527.1+x	23/2$^-$		
369	16[a]	2513.4+x	29/2$^-$	2144.4+x	27/2$^-$		
369.7	19[a]	574.4	11/2$^+$	204.7	7/2$^+$		I(370γ)/I(200γ)=1.14 *14*.
369.9	≤12[a]	4851.6+x	(47/2$^-$)	4481.6+x	(45/2$^-$)		
373.5 *5*	71[a]	472.3+x	15/2$^-$	98.7+x	11/2$^-$		I(374γ)/I(183γ)=1.36 *8*.
373.5	11	5225.0+x	(49/2$^-$)	4851.6+x	(47/2$^-$)		
378.4	37	611.3	9/2$^-$	232.9	(7/2$^+$)	D	Mult.: DCO ratio=0.76 *12*.
398.5	7	5623.6+x	(51/2$^-$)	5225.0+x	(49/2$^-$)		
402	7	6025.7+x	(53/2$^-$)	5623.6+x	(51/2$^-$)		
402.2	6	2969.9	31/2$^+$	2567.6	27/2$^+$		I(402γ)/I(188γ)=0.93 *27*.
405	12	2549.2+x	(29/2$^-$)	2144.4+x	27/2$^-$		
412	5	6437.8+x	(55/2$^-$)	6025.7+x	(53/2$^-$)		
416.5	33	790.9	13/2$^+$	374.4	9/2$^+$		I(417γ)/I(216γ)=1.90 *22*.
417[d]	≤7[&]	7281.2+x?	(59/2$^-$)	6864.5+x	(57/2$^-$)		
427	≈4[a]	6864.5+x	(57/2$^-$)	6437.8+x	(55/2$^-$)		
427.2	21	3265.0+x	(37/2$^-$)	2837.7+x	(33/2$^-$)		I(427γ)/I(234γ)=0.56 *8*.
431.6	6	3213.9	33/2$^+$	2782.3	29/2$^+$		I(432γ)/I(244γ)=0.58 *21*.
451.6 *5*	52	741.2+x	17/2$^-$	289.7+x	13/2$^-$		I(452γ)/I(269γ)=0.80 *5*.
453.3	12	2782.3	29/2$^+$	2329.1	25/2$^+$		I(453γ)/I(215γ)=1.1 *4*.
459.2	5	3429.0	35/2$^+$	2969.9	31/2$^+$		

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^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

$\gamma(^{167}Ta)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
461.9	38	1036.3	$15/2^+$	574.4	$11/2^+$		I(462γ)/I(245γ)=1.84 *20*.
462.7	38	1680.1	$21/2^-$	1217.4	$17/2^-$	Q	Mult.: DCO ratio=0.96 *11*.
477.7	≈6	2567.6	$27/2^+$	2089.9	$23/2^+$		I(478γ)/I(238γ)=0.45 *27*.
484	9	2375.7+x	$(25/2^-)$	1891.7+x	$25/2^-$		
487.4 *5*	97	959.7+x	$19/2^-$	472.3+x	$15/2^-$		I(487γ)/I(218γ)=2.99 *25*.
494.5	38	1285.4	$17/2^+$	790.9	$13/2^+$		I(495γ)/I(249γ)=2.16 *21*.
499.0	24	3530.2+x	$(39/2^-)$	3031.3+x	$(35/2^-)$		I(499γ)/I(265γ)=0.68 *8*.
508.4	≈26[a]	2329.1	$25/2^+$	1820.7	$21/2^+$		I(508γ)/I(239γ)=1.6 *13*.
509.6	≈6[a]	3723.6	$37/2^+$	3213.9	$33/2^+$		
521.4 *5*	52	1557.7	$19/2^+$	1036.3	$15/2^+$		I(521γ)/I(272γ)=2.7 *5*.
532.1	32	2089.9	$23/2^+$	1557.7	$19/2^+$		I(532γ)/I(269γ)=1.6 *9*.
535.3 *5*	41	1820.7	$21/2^+$	1285.4	$17/2^+$		I(535γ)/I(263γ)=2.31 *27*.
535.5	32	2215.6	$25/2^-$	1680.1	$21/2^-$	Q	Mult.: DCO ratio=1.06 *13*.
546.5 *5*	61	1287.7+x	$21/2^-$	741.2+x	$17/2^-$		I(547γ)/I(328γ)=1.17 *9*.
555.1	28	3820.2+x	$(41/2^-)$	3265.0+x	$(37/2^-)$		I(555γ)/I(290γ)=0.94 *13*.
564.1[d]	9	3992.9?	$(39/2^+)$	3429.0	$35/2^+$		
567.5 *5*	79	1527.1+x	$23/2^-$	959.7+x	$19/2^-$		I(568γ)/I(239γ)=3.3 *5*.
582.6[c]	38[c]	2798.2	$29/2^-$	2215.6	$25/2^-$		Mult.: DCO ratio=0.87 *17* for 582.6 doublet (1992Th02).
582.6[c]	38[c]	3381	$(33/2^-)$	2798.2	$29/2^-$		Mult.: DCO ratio=0.87 *17* for 582.6 doublet (1992Th02).
584.5[d]	≈9	4308.4?	$(41/2^+)$	3723.6	$37/2^+$		
596.4	16	3977	$(37/2^-)$	3381	$(33/2^-)$		Mult.: DCO ratio=1.5 *6*.
604.0 *5*	44	1891.7+x	$25/2^-$	1287.7+x	$21/2^-$		I(604γ)/I(365γ)=1.09 *17*.
609	25	3122.3+x	$33/2^-$	2513.4+x	$29/2^-$		I(609γ)/I(347γ)=3.0 *6*.
615	≈9	3390.9+x	$35/2^-$	2775.5+x	$31/2^-$		
615.2	<22[&]	4145.2+x	$(43/2^-)$	3530.2+x	$(39/2^-)$		I(615γ)/I(325γ)=1.1 *4*.
617.0[d]	≈12	4925.6?	$(45/2^+)$	4308.4?	$(41/2^+)$		
617.3 *5*	50	2144.4+x	$27/2^-$	1527.1+x	$23/2^-$		I(617γ)/I(253γ)=3.7 *12*.
622	26	2513.4+x	$29/2^-$	1891.7+x	$25/2^-$		I(622γ)/I(369γ)=2.5 *11*.
629.9[d]	<4	4622.0?	$(43/2^+)$	3992.9?	$(39/2^+)$		
630.6	5	4608	$(41/2^-)$	3977	$(37/2^-)$		
631	21	2775.5+x	$31/2^-$	2144.4+x	$27/2^-$		I(631γ)/I(262γ)=3.5 *8*.
[x]643[b] *1*	≈4						
[x]653[b] *1*	<4						
657	20	2549.2+x	$(29/2^-)$	1891.7+x	$25/2^-$		
661.3	24	4481.6+x	$(45/2^-)$	3820.2+x	$(41/2^-)$		I(661γ)/I(337γ)=1.39 *26*.
706.5	24	4851.6+x	$(47/2^-)$	4145.2+x	$(43/2^-)$		I(707γ)/I(370γ)=1.5 *6*.
743.4	16	5225.0+x	$(49/2^-)$	4481.6+x	$(45/2^-)$		I(743γ)/I(374γ)=1.8 *6*.
771.9	12	5623.6+x	$(51/2^-)$	4851.6+x	$(47/2^-)$		I(772γ)/I(399γ)=1.5 *5*.
801	13	6025.7+x	$(53/2^-)$	5225.0+x	$(49/2^-)$		I(801γ)/I(402γ)=2.0 *7*.
814	10	6437.8+x	$(55/2^-)$	5623.6+x	$(51/2^-)$		
839	12	6864.5+x	$(57/2^-)$	6025.7+x	$(53/2^-)$		
843[d]	<13[&]	7281.2+x?	$(59/2^-)$	6437.8+x	$(55/2^-)$		
[x]873 *1*	≈8						
1088	17	2375.7+x	$(25/2^-)$	1287.7+x	$21/2^-$		

[†] From 1992Th02. $\Delta E_\gamma \leq 1$ keV for weak transitions and doublets, ≤0.5 keV for all others (1992Th02); the evaluator assigns 0.5 keV to all single transitions with I$\gamma \geq 40$.

[‡] Relative photon intensity from spectra coincident with principal γ(s) in band, internally normalized to I(191γ)=100; uncertainties range from 5% to 40%. For many levels, 1992Th02 also report Ti(ΔJ=2)/Ti(ΔJ=1) for transitions within bands having the same

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^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)

$\gamma(^{167}Ta)$ (continued)

configuration; the evaluator has converted these to Iγ(ΔJ=2)/Iγ(ΔJ=1) (since the assumed multipolarity is always clear) and quotes those data in comments; consistency between these branching ratios and those from the listed Iγ data is not good. No data have been corrected for time window effects or residual angular correlation effects.

[#] Based on measured DCO ratios (79° (or 101°) and 37° (or 143°)); expected ratios are 1.00 for stretched Q, 0.6 for stretched D (Q transition in gate).

[@] Iγ not reliable for E$\gamma\leq$150 keV due to low efficiency.

[&] Possibly contaminated by unassigned transition of same energy associated with same band.

[a] From coincidence spectra.

[b] Associated with 9/2[514] band above the level crossing.

[c] Multiply placed with undivided intensity.

[d] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

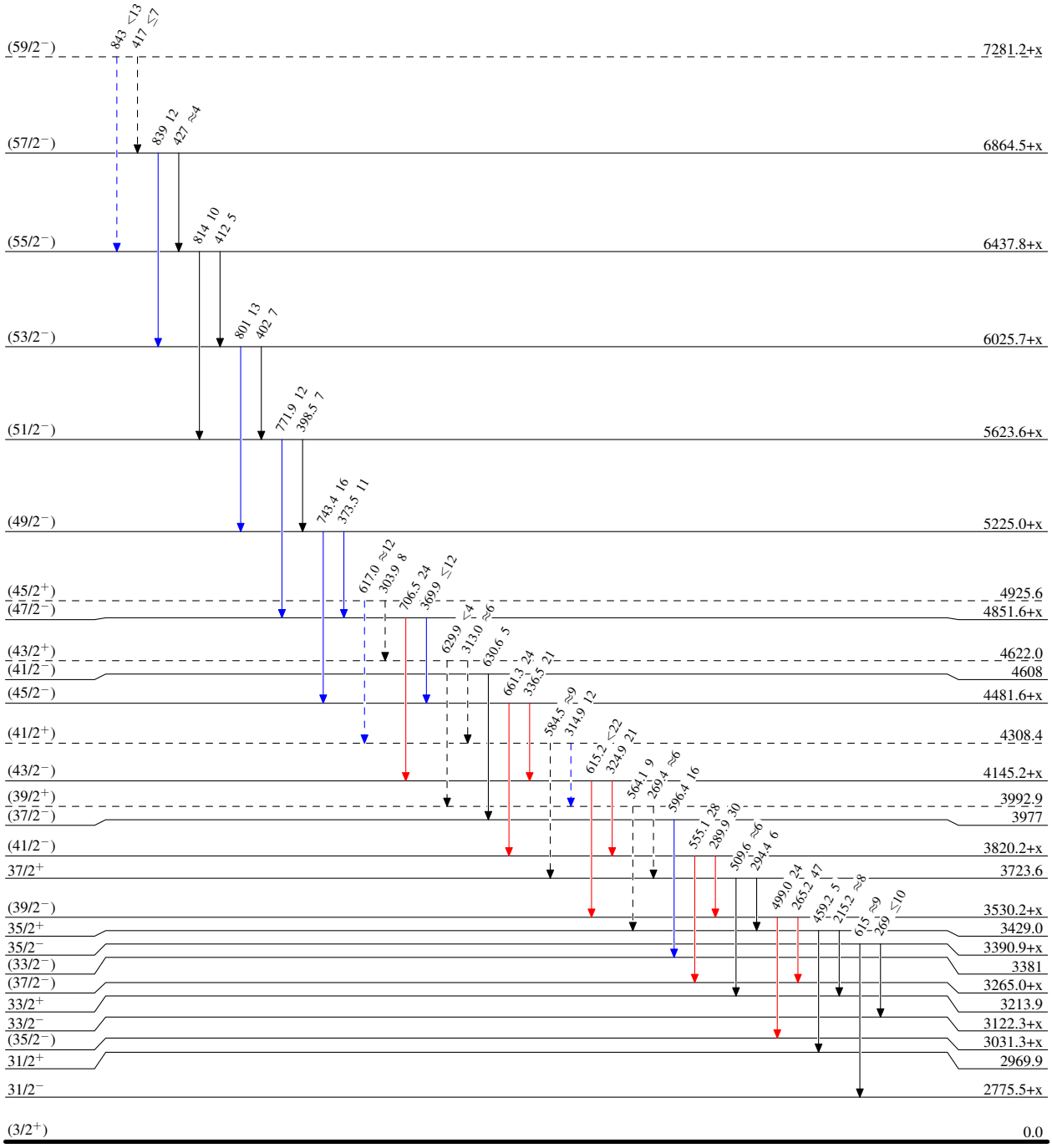
^{142}Nd(^{30}Si,p4nγ) 1992Th02

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



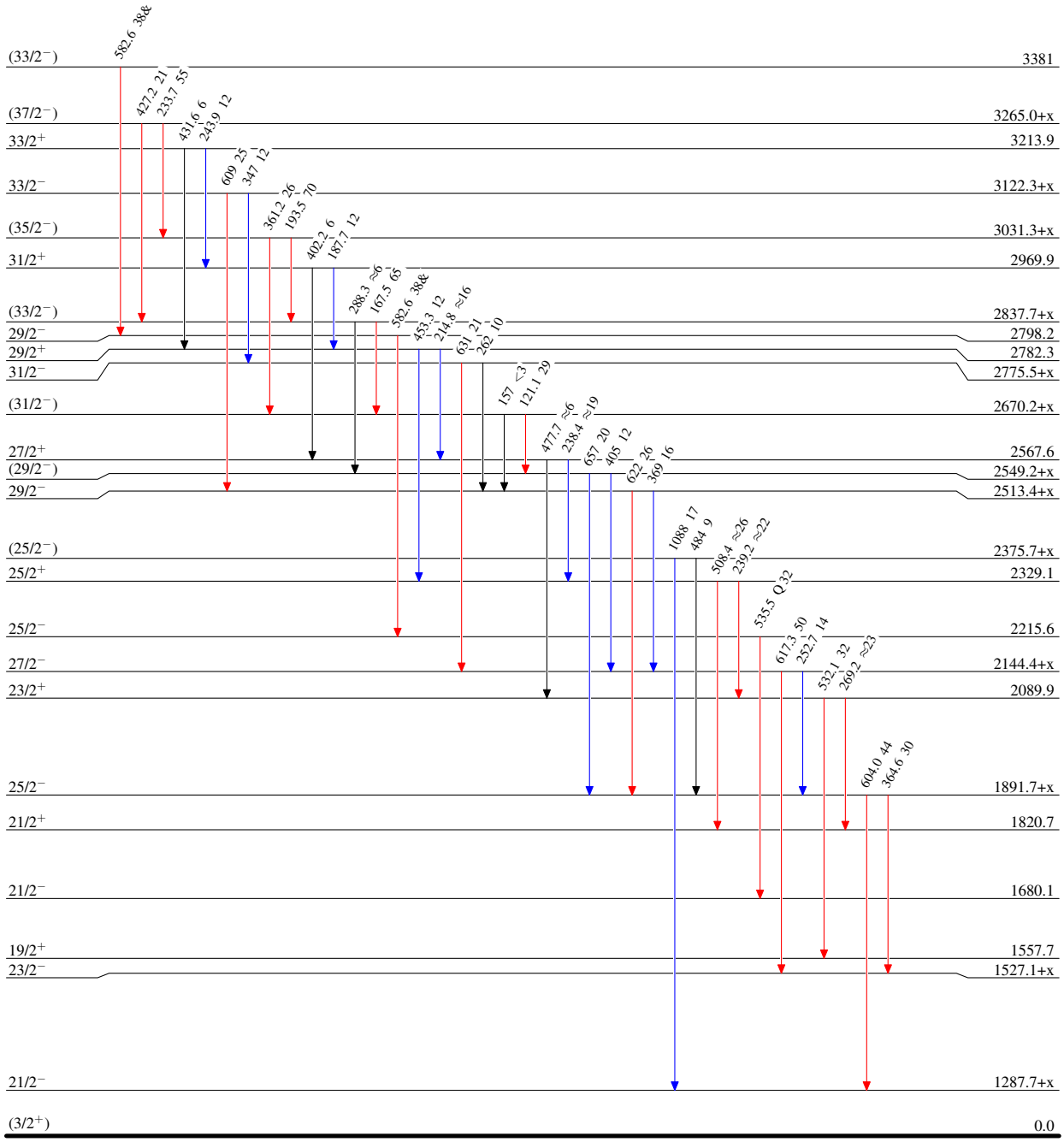
$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



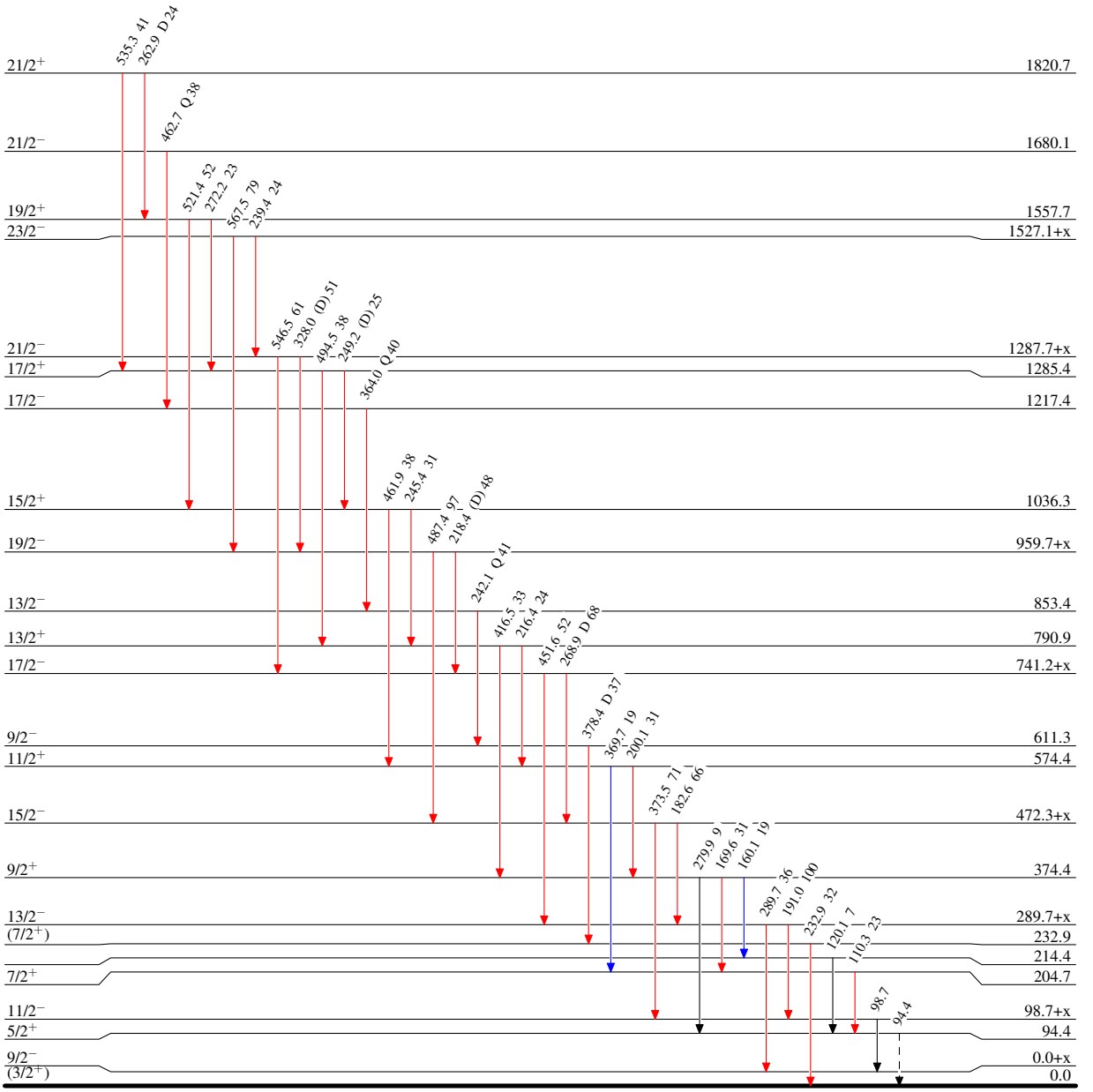
$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02

Level Scheme (continued)

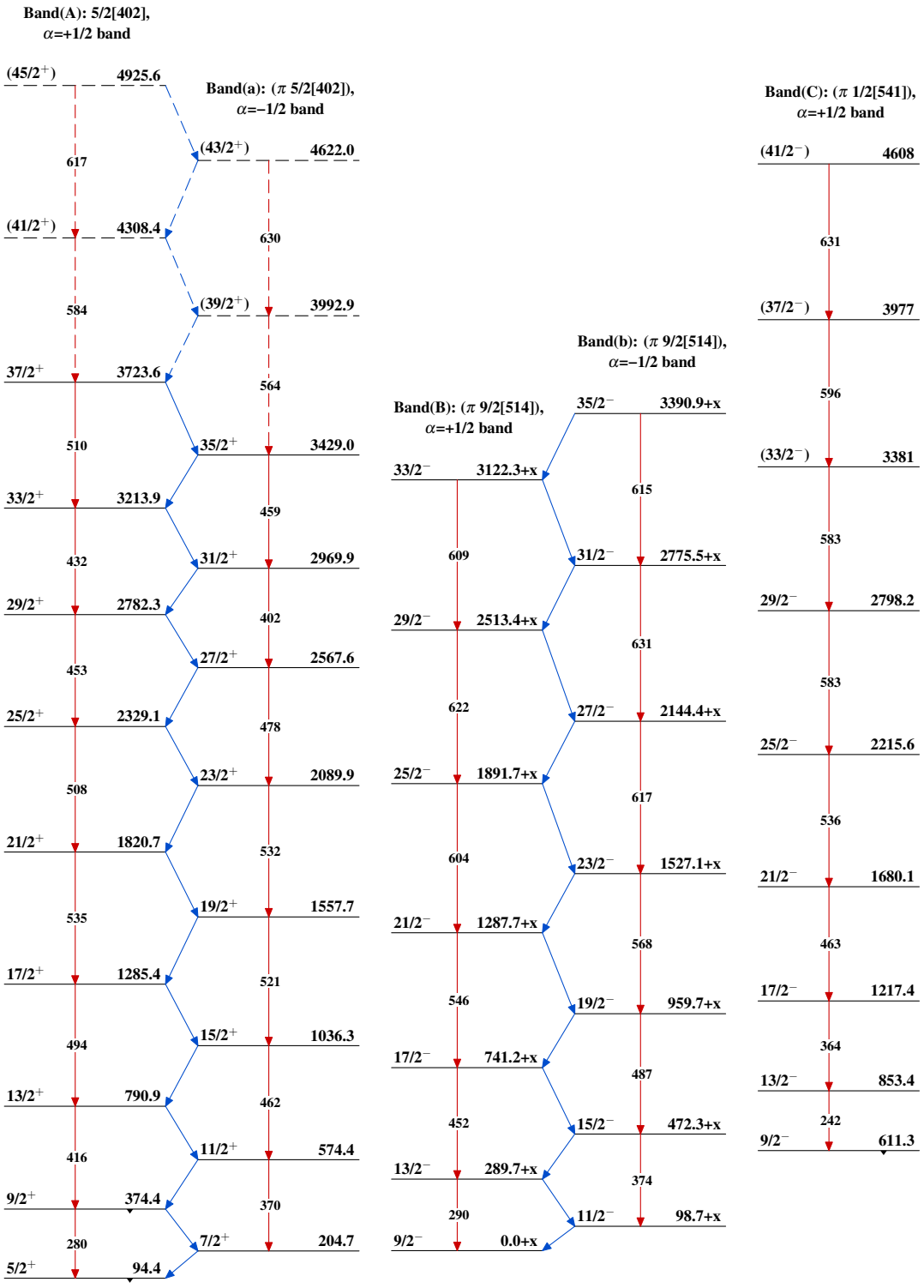
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



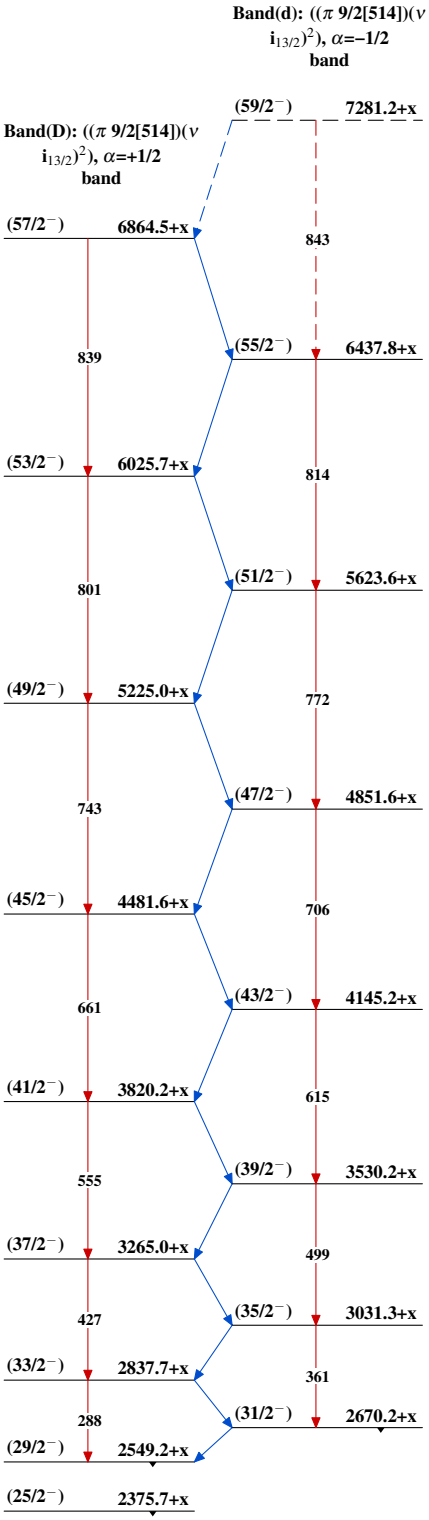
$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02



$^{167}_{73}Ta_{94}$

^{142}Nd(^{30}Si,p4nγ) 1992Th02 (continued)



$^{167}_{73}Ta_{94}$