Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111,1211 (2010)	12-Apr-2010

Q(β^-)=−7.63×10^3 *7*; S(n)=1.083×10^4 *7*; S(p)=6.5×10^2 *4*; Q(α)=4749 *6* 2012Wa38
Note: Current evaluation has used the following Q record $ −7630 70 *10830* 60 660 *40* 4749 *5* 2009AuZZ,2003Au03.
Q(εp)=3010 *80* (2009AuZZ,2003Au03).
Additional information 1.
^{163}W decays by $\varepsilon+\beta^+$ mode (86% *2*) to ^{163}Ta, but nothing is known about the levels populated in this decay.

^{163}Ta Levels

A: ν1/2[660],α=+1/2 from $i_{13/2}$ orbital.
B: ν1/2[660],α=−1/2 from $i_{13/2}$ orbital.
C: ν3/2[651],α=+1/2 from $i_{13/2}$ orbital.
D: ν3/2[651],α=−1/2 from $i_{13/2}$ orbital.
E: ν5/2[523],α=+1/2 from $h_{9/2}$,$f_{7/2}$ orbitals.
F: ν5/2[523],α=−1/2 from $h_{9/2}$,$f_{7/2}$ orbitals.
a: π1/2[411],α=+1/2 from $d_{3/2}$ orbital.
b: π1/2[411],α=−1/2 from $d_{3/2}$ orbital.
c: π7/2[404],α=+1/2 from $g_{7/2}$ orbital.
d: π7/2[404],α=−1/2 from $g_{7/2}$ orbital.
e: π9/2[514],α=−1/2 from $h_{11/2}$ orbital.
f: π9/2[514],α=+1/2 from $h_{11/2}$ orbital.

Cross Reference (XREF) Flags

A ^{167}Re α decay (3.4 s)
B ^{167}Re α decay (5.9 s)
C ^{106}Cd(^{60}Ni,3pγ)

E(level)†	J$^\pi$‡	$T_{1/2}$	XREF	Comments
0.0		10.6 s *18*	B	%ε+%β^+≈99.8; %α≈0.2 $T_{1/2}$: Weighted average of: 10.5 s *18* (1985Li14); 9.4 s *29*; 11.5 s *18* (1986Ru05); and 10 s *2* (1987HaZO). Others: 11 s *2* (1988MeZY, which has common authors with 1986Ru05); 8 s (1989Br19,1987Es08); 11 s *3* (1983Sc18, from 4625α assigned to ^{164}Ta, later (1985Li14) assigned to ^{163}Ta). %α: $T_{1/2}(\alpha)$≈84 min from extrapolation of log $T_{1/2}(\alpha)$ versus log Eα for ^{157}Ta ($T_{1/2}$=5.3 ms *18*,%α=89 *11*,Q(α)=6382) and ^{159}Ta ($T_{1/2}$=0.57 s *18*,%α=80 *5*,Q(α)=5750). J$^\pi$: 1/2$^+$ proposed from systematics (2003Au02).
0+x#	(9/2$^-$)		A C	E(level): level suggested from the energetics of α transitions from the decay of the two activities of ^{167}Re. (See the comments in the two ^{167}Re α decay data sets.) Probably the same level as the yrast bandhead in high-spin data.
44.9+x@ *5*	(11/2$^-$)		C	
333.1+x# *4*	(13/2$^-$)		C	
477.7+x@ *5*	(15/2$^-$)		C	
871.2+x# *5*	(17/2$^-$)		C	
1047.0+x@ *5*	(19/2$^-$)		C	
1312.7+x& *5*	(15/2$^+$)		C	
1522.4+x# *5*	(21/2$^-$)		C	

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Adopted Levels, Gammas (continued)

^{163}Ta Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	E(level)[†]	J$^{\pi}$[‡]	XREF	E(level)[†]	J$^{\pi}$[‡]	XREF
1547.5+x[a] 5	(17/2$^+$)	C	2952.4+x[#] 6	(29/2$^-$)	C	4628.7+x[@] 7	(43/2$^-$)	C
1717.5+x[@] 5	(23/2$^-$)	C	3045.5+x[b] 6	(33/2$^+$)	C	4647.5+x[c] 7	(43/2$^+$)	C
1725.9+x[&] 5	(19/2$^+$)	C	3094.3+x[@] 6	(31/2$^-$)	C	4954.1+x[#] 7	(45/2$^-$)	C
1946.7+x[a] 5	(21/2$^+$)	C	3295.2+x[#] 6	(33/2$^-$)	C	5085.8+x[b] 8	(45/2$^+$)	C
2171.0+x[&] 5	(23/2$^+$)	C	3308.4+x[c] 7	(35/2$^+$)	C	5293.6+x[@] 7	(47/2$^-$)	C
2248.5+x[#] 5	(25/2$^-$)	C	3515.6+x[@] 6	(35/2$^-$)	C	5436.5+x[c] 8	(47/2$^+$)	C
2303.6+x[b] 5	(25/2$^+$)	C	3630.6+x[b] 7	(37/2$^+$)	C	5647.8+x[#] 7	(49/2$^-$)	C
2410.9+x[a] 5	(25/2$^+$)	C	3759.9+x[#] 6	(37/2$^-$)	C	5912.7+x[b] 8	(49/2$^+$)	C
2422.7+x[c] 6	(27/2$^+$)	C	3931.7+x[c] 7	(39/2$^+$)	C	6017.8+x[@] 8	(51/2$^-$)	C
2458.1+x[@] 5	(27/2$^-$)	C	4039.0+x[@] 7	(39/2$^-$)	C	6397.8+x[#] 8	(53/2$^-$)	C
2583.8+x[b] 6	(29/2$^+$)	C	4319.2+x[b] 7	(41/2$^+$)	C	6799.7+x[@] 8	(55/2$^-$)	C
2798.9+x[c] 6	(31/2$^+$)	C	4322.5+x[#] 7	(41/2$^-$)	C	7213.4+x[#] 8	(57/2$^-$)	C

[†] From least-squares fit to Eγ's.
[‡] From the ^{106}Cd(^{60}Ni,3pγ) dataset, see the comments there.
[#] Band(A): Band f to fAB,α=+1/2. Strongly−coupled band built on π9/2[514] Nilsson orbital. This band starts as a 1-qp band but is crossed by a 3-qp band fAB at $J^{\pi}\approx$31/2$^-$ and $\hbar\omega\approx$0.28 MeV. Calculated β_2=0.177, γ=−15° for low-spin states and β_2=0.170, γ=0° for high-spin states above the backbend.
[@] Band(a): Band e to eAB, α=−1/2. Strongly-coupled band built on π9/2[514] Nilsson orbital. This band starts as a 1-qp band but is crossed by a 3-qp band fAB at $J^{\pi}\approx$31/2$^-$ and $\hbar\omega\approx$0.28 MeV See also comments for α=+1/2 partner.
[&] Band(B): Possible π9/2[514]⊗3$^-$,α=−1/2. Strongly coupled-band, possible 3$^-$ octupole vibrational band built on π9/2[514], as supported by the relatively large alignment of the band and the relatively low excitation energy of the bandhead. Further pure dipole (possible E1) transition to the yrast band also supports the octupole character of the band.
[a] Band(b): Possible π9/2[514]⊗3$^-$,α=+1/2. See comments for α=−1/2 partner.
[b] Band(C): Band fAE, α=+1/2.
[c] Band(c): Band eAE, α=−1/2.

γ(^{163}Ta)

E$_i$(level)	J$_i^{\pi}$	E$_{\gamma}$	I$_{\gamma}$	E$_f$	J$_f^{\pi}$	Mult.[†]
44.9+x	(11/2$^-$)	(45)		0+x	(9/2$^-$)	
333.1+x	(13/2$^-$)	288.1 3	100.0 13	44.9+x	(11/2$^-$)	Q
		333.1 4	10.0 6	0+x	(9/2$^-$)	
477.7+x	(15/2$^-$)	144.2 3	38.6 8	333.1+x	(13/2$^-$)	D+Q
		432.9 4	100.0 15	44.9+x	(11/2$^-$)	Q
871.2+x	(17/2$^-$)	393.4 2	100.0 19	477.7+x	(15/2$^-$)	D+Q
		538.2 3	76.9 19	333.1+x	(13/2$^-$)	
1047.0+x	(19/2$^-$)	175.9 4	11.6 5	871.2+x	(17/2$^-$)	D+Q
		569.2 2	100.0 14	477.7+x	(15/2$^-$)	Q
1312.7+x	(15/2$^+$)	979.9 4	100	333.1+x	(13/2$^-$)	
1522.4+x	(21/2$^-$)	475.3 2	70.7 23	1047.0+x	(19/2$^-$)	D+Q
		651.2 2	100 3	871.2+x	(17/2$^-$)	Q
1547.5+x	(17/2$^+$)	235.1 5	20 8	1312.7+x	(15/2$^+$)	
		1069.7 3	100 8	477.7+x	(15/2$^-$)	D
1717.5+x	(23/2$^-$)	195.1 2	8.2 9	1522.4+x	(21/2$^-$)	
		670.5 4	100.0 11	1047.0+x	(19/2$^-$)	Q
1725.9+x	(19/2$^+$)	178.5 4	13.1 21	1547.5+x	(17/2$^+$)	
		413.3 3	9.8 21	1312.7+x	(15/2$^+$)	
		854.8 4	100 3	871.2+x	(17/2$^-$)	D

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Adopted Levels, Gammas (continued)

$\gamma(^{163}Ta)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]
1946.7+x	(21/2$^+$)	221.1 *3*	37.5 *13*	1725.9+x	(19/2$^+$)	
		399.2 *4*	11 *3*	1547.5+x	(17/2$^+$)	
		899.6 *3*	100 *3*	1047.0+x	(19/2$^-$)	D
2171.0+x	(23/2$^+$)	224.6 *4*	100 *3*	1946.7+x	(21/2$^+$)	D+Q[‡]
		445.2 *3*	65 *3*	1725.9+x	(19/2$^+$)	Q
		648.6 *3*	87 *3*	1522.4+x	(21/2$^-$)	D
2248.5+x	(25/2$^-$)	531.0 *2*	71 *6*	1717.5+x	(23/2$^-$)	
		726.3 *3*	100 *4*	1522.4+x	(21/2$^-$)	
2303.6+x	(25/2$^+$)	131.9 *3*	100.0 *25*	2171.0+x	(23/2$^+$)	D+Q
		357.3 *6*	8.9 *13*	1946.7+x	(21/2$^+$)	
2410.9+x	(25/2$^+$)	240.1 *3*	100 *8*	2171.0+x	(23/2$^+$)	
		464.1 *2*	22 *5*	1946.7+x	(21/2$^+$)	
2422.7+x	(27/2$^+$)	118.6 *3*	100 *3*	2303.6+x	(25/2$^+$)	D+Q
		252.1 *3*	9.1 *11*	2171.0+x	(23/2$^+$)	
2458.1+x	(27/2$^-$)	209.8 *2*	9.9 *11*	2248.5+x	(25/2$^-$)	
		740.1 *3*	100.0 *23*	1717.5+x	(23/2$^-$)	Q
2583.8+x	(29/2$^+$)	161.1 *4*	100 *3*	2422.7+x	(27/2$^+$)	D+Q[‡]
		280.3 *5*	16.4 *21*	2303.6+x	(25/2$^+$)	
2798.9+x	(31/2$^+$)	215.2 *4*	100 *3*	2583.8+x	(29/2$^+$)	D+Q
		376.3 *4*	10.3 *13*	2422.7+x	(27/2$^+$)	
2952.4+x	(29/2$^-$)	494.3 *2*	100 *3*	2458.1+x	(27/2$^-$)	
		703.9 *4*	97 *4*	2248.5+x	(25/2$^-$)	
3045.5+x	(33/2$^+$)	246.6 *3*	100 *3*	2798.9+x	(31/2$^+$)	
		461.6 *4*	35 *3*	2583.8+x	(29/2$^+$)	
3094.3+x	(31/2$^-$)	141.6 *4*	33.9 *10*	2952.4+x	(29/2$^-$)	
		636.5 *4*	100 *3*	2458.1+x	(27/2$^-$)	Q
3295.2+x	(33/2$^-$)	201.0 *3*	100 *3*	3094.3+x	(31/2$^-$)	D+Q
		342.6 *7*	3.3 *23*	2952.4+x	(29/2$^-$)	
3308.4+x	(35/2$^+$)	262.9 *4*	100.0 *21*	3045.5+x	(33/2$^+$)	
		509.4 *3*	56 *4*	2798.9+x	(31/2$^+$)	
3515.6+x	(35/2$^-$)	220.4 *2*	100 *3*	3295.2+x	(33/2$^-$)	D+Q
		421.3 *3*	18.9 *23*	3094.3+x	(31/2$^-$)	
3630.6+x	(37/2$^+$)	322.3 *3*	100 *4*	3308.4+x	(35/2$^+$)	
		585.1 *4*	55 *4*	3045.5+x	(33/2$^+$)	
3759.9+x	(37/2$^-$)	244.3 *3*	100.0 *25*	3515.6+x	(35/2$^-$)	D+Q
		464.7 *2*	24.3 *18*	3295.2+x	(33/2$^-$)	
3931.7+x	(39/2$^+$)	301.1 *4*	95 *5*	3630.6+x	(37/2$^+$)	
		623.3 *3*	100 *5*	3308.4+x	(35/2$^+$)	
4039.0+x	(39/2$^-$)	279.1 *2*	100 *4*	3759.9+x	(37/2$^-$)	
		523.3 *4*	40.4 *14*	3515.6+x	(35/2$^-$)	
4319.2+x	(41/2$^+$)	387.7 *4*	100 *8*	3931.7+x	(39/2$^+$)	
		688.5 *4*	89 *7*	3630.6+x	(37/2$^+$)	
4322.5+x	(41/2$^-$)	283.4 *2*	100 *4*	4039.0+x	(39/2$^-$)	
		562.8 *3*	54.6 *25*	3759.9+x	(37/2$^-$)	
4628.7+x	(43/2$^-$)	306.3 *3*	100 *5*	4322.5+x	(41/2$^-$)	
		589.6 *3*	45 *3*	4039.0+x	(39/2$^-$)	
4647.5+x	(43/2$^+$)	328.4 *3*	54 *4*	4319.2+x	(41/2$^+$)	
		715.7 *4*	100 *6*	3931.7+x	(39/2$^+$)	
4954.1+x	(45/2$^-$)	325.0 *3*	100 *7*	4628.7+x	(43/2$^-$)	
		631.7 *4*	75 *3*	4322.5+x	(41/2$^-$)	
5085.8+x	(45/2$^+$)	438.2 *3*	100 *16*	4647.5+x	(43/2$^+$)	
		766.5 *4*	100 *13*	4319.2+x	(41/2$^+$)	
5293.6+x	(47/2$^-$)	339.3 *4*	80 *10*	4954.1+x	(45/2$^-$)	
		665.1 *3*	100 *10*	4628.7+x	(43/2$^-$)	
5436.5+x	(47/2$^+$)	350.7 *5*	25 *8*	5085.8+x	(45/2$^+$)	

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Adopted Levels, Gammas (continued)

$\gamma(^{163}Ta)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π
5436.5+x	(47/2$^+$)	789.1 *3*	100 *10*	4647.5+x	(43/2$^+$)
5647.8+x	(49/2$^-$)	355.2 *5*	100 *12*	5293.6+x	(47/2$^-$)
		693.6 *3*	60 *7*	4954.1+x	(45/2$^-$)
5912.7+x	(49/2$^+$)	476.4 *3*	50 *17*	5436.5+x	(47/2$^+$)
		826.6 *5*	100 *17*	5085.8+x	(45/2$^+$)
6017.8+x	(51/2$^-$)	370.0 *2*	92 *12*	5647.8+x	(49/2$^-$)
		723.9 *4*	100 *10*	5293.6+x	(47/2$^-$)
6397.8+x	(53/2$^-$)	379.8 *3*	100 *21*	6017.8+x	(51/2$^-$)
		750.3 *4*	83 *13*	5647.8+x	(49/2$^-$)
6799.7+x	(55/2$^-$)	402.3 *4*	<83	6397.8+x	(53/2$^-$)
		781.8 *5*	100 *25*	6017.8+x	(51/2$^-$)
7213.4+x	(57/2$^-$)	414.1 *5*	100 *27*	6799.7+x	(55/2$^-$)
		815.3 *4*	<67	6397.8+x	(53/2$^-$)

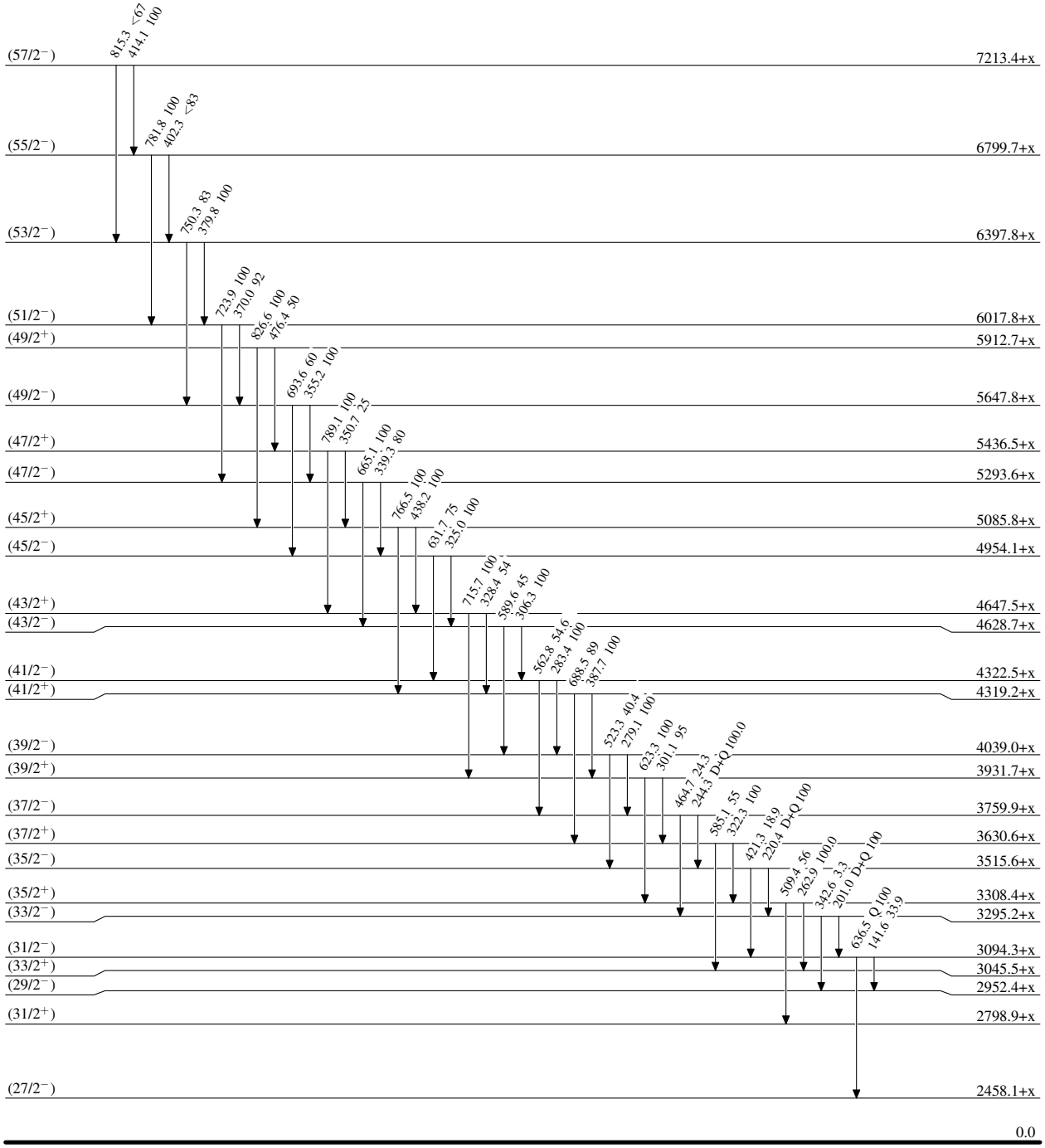
† From $\gamma\gamma(\theta)$(DCO), mult=Q corresponds to ΔJ=2, quadrupole (most likely E2), mult=D+Q to ΔJ=1, dipole or dipole+quadrupole, the former most likely E1 and the latter M1+E2.

‡ DCO ratio of ≈1 suggests a significant dipole and quadrupole admixture, thus the transition is most likely M1+E2.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{163}_{73}Ta_{90}$

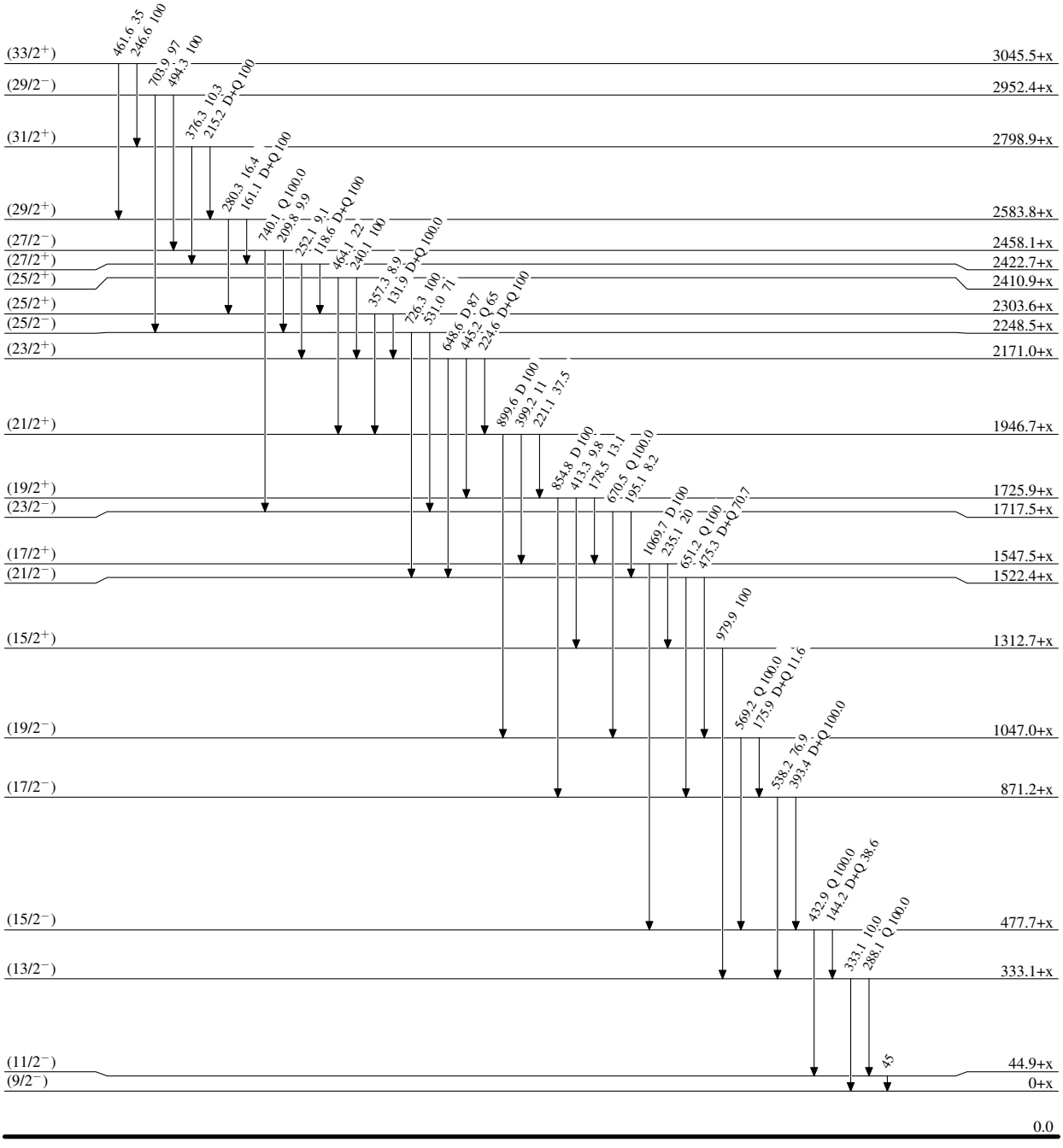
Adopted Levels, Gammas

Legend

Level Scheme (continued)

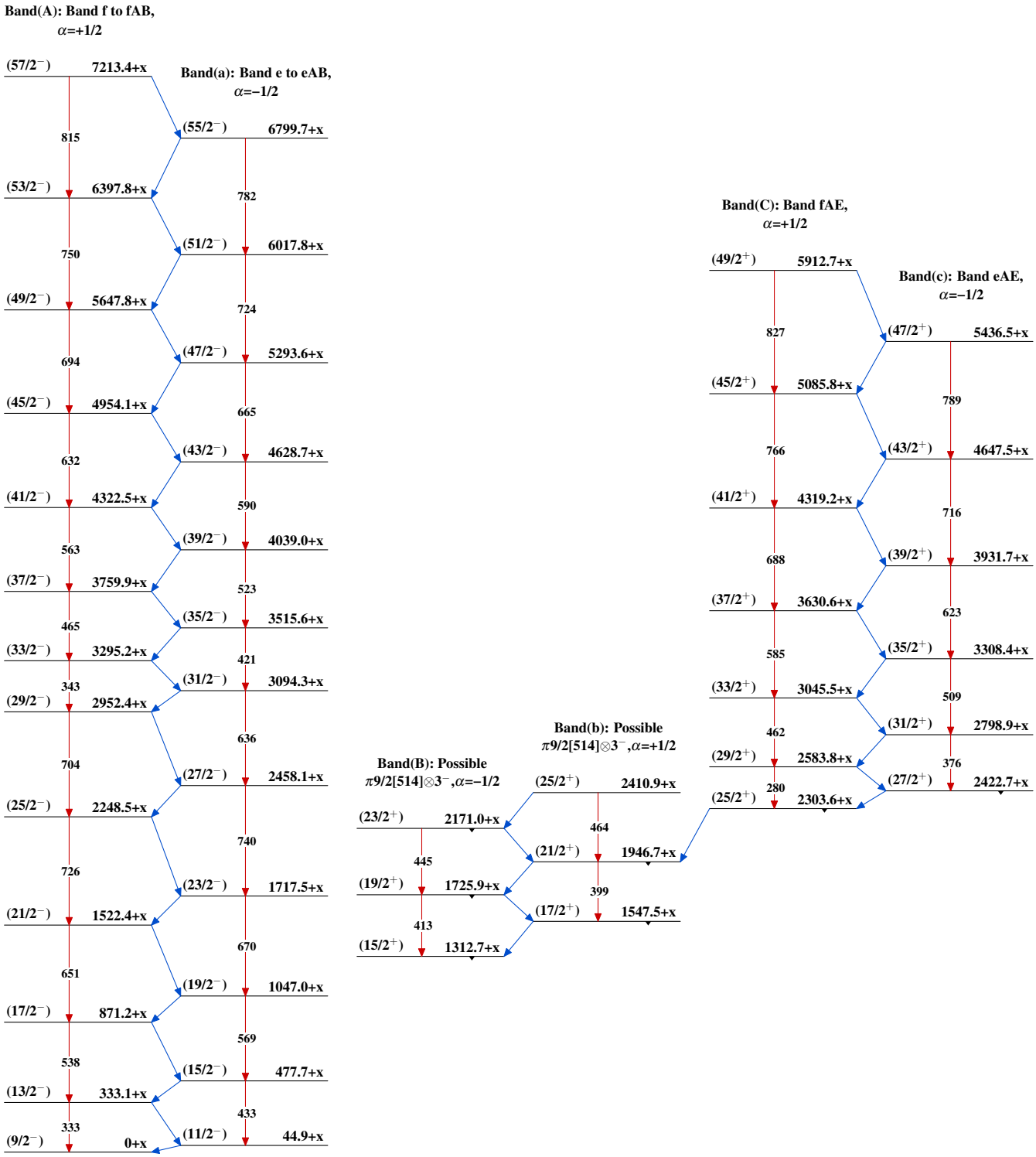
Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{163}_{73}Ta_{90}$

Adopted Levels, Gammas



$^{163}_{73}Ta_{90}$