Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 110,265 (2009)	15-Nov-2008

Q(β^-)=−1062 *15*; S(n)=7.83×10^3 *syst*; S(p)=5211.1 *5*; Q(α)=2382.9 *10* 2012Wa38
Note: Current evaluation has used the following Q record −1063 167930 155211.0 *4* 2379.5 9 2003Au03.

Other reactions:

Fragmentation of 1 GeV/nucleon ^{208}Pb (2001Pf03, 2002Pf01):
Be target, fragment mass analyzer, Ge detector array; observed γ rays following production of known 21/2$^-$ (E=1253) isomer.

^{48}Ca(Xe,X) (2000Po16):
E(^{134}Xe)=535 MeV, E(^{136}Xe)=535, 550 MeV; 80%−90% ^{48}Ca oxide targets, 8π γ-detector array (20 Compton-suppressed Ge detectors + 70−element BGO calorimeter); observed (out of beam) the 232γ and 475γ from 21/2$^-$, E=1253 isomer; searched for, but did not find, evidence for additional isomers.

^{179}Ta Levels

Cross Reference (XREF) Flags

A	^{176}Yb(^{7}Li,4nγ) E=38 MeV	E	^{181}Ta(p,t)
B	^{179}Hf(d,2nγ), (p,nγ)	F	^{178}Hf(p,p′) IAR
C	^{179}W ε decay (37.05 min)	G	^{176}Lu(^{136}Xe,Xγ),
D	^{179}W ε decay (6.40 min)	H	^{178}Hf(^{3}He,d), ^{178}Hf(α,t)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0[a]	7/2$^+$	1.82 y *3*	ABCDE GH	%ε=100 μ=+2.289 *9* (1996Wa02); Q=+3.37 *4* (1996Wa02) μ, Q: from LASER rf double resonance spectroscopy; relative to ^{181}Ta standard. T$_{1/2}$: weighted average of 1.820 y *4* (664.9 d *14*, 1974NaYW) and 1.610 y *27* (588 d *10*; 1974Ch53, decay followed for 2 y). Others: 1950Wi67 (600 d), 1963Ra14 (consistent with 600 d). J$^\pi$: L(p,t)=0 on 7/2$^+$ target. Nilsson orbital assignment based on energy systematics of this orbital in neighboring odd-A Ta isotopes.
30.7[b] *1*	9/2$^-$	1.42 μs *8*	ABC GH	J$^\pi$: E1 30.7γ to 7/2$^+$ g.s.; allowed, unhindered ε decay (log *ft*=4.6) from ^{179}W g.s. indicates transition between states with same asymptotic quantum numbers, typically (ν 7/2[514]) and (π 9/2[514]) in this mass region. Nilsson orbital assignment supported by energy systematics of this orbital in ^{177}Ta, ^{181}Ta and ^{183}Ta. T$_{1/2}$: from ^{179}W ε decay (37.05 min).
133.79[a] *11*	(9/2$^+$)		ABC E GH	J$^\pi$: intraband 134γ to 7/2$^+$ g.s. L(p,t)=(2) for 7/2$^+$ target.
180.79[b] *14*	(11/2$^-$)		AB GH	J$^\pi$: intraband D(+Q) 150γ to 9/2$^-$ 31 level.
238.56[cd] *9*	5/2$^+$	65 ns *10*	AB D GH	T$_{1/2}$: from $\gamma\gamma$(t) in (^{7}Li,4nγ) E=45 MeV. Other: 95 ns *5* from (d,2nγ) (1974Ma26); 1997Ko13 suggest that the 239γ pulsed-beam time spectrum used for this measurement may have been complicated due to feeding of the 239 level from states with different lifetimes. J$^\pi$: M1+E2 238.6γ to 7/2$^+$ g.s.; L(^{3}He,d)=2. Nilsson orbital assignment based on energy systematics of this orbital in neighboring odd-A tantalum isotopes and on comparison of deduced [g$_K$-g$_R$] for band with Nilsson model prediction.
294.65[a] *14*	(11/2$^+$)		AB E G	J$^\pi$: intraband D(+Q) 161γ to (9/2$^+$); intraband 295γ to 7/2$^+$ g.s. L=(4) in (p,t) on 7/2$^+$ target.
343.95[cd] *13*	(7/2$^+$)		AB G	J$^\pi$: D+Q intraband 105γ to 5/2$^+$ 239; D+Q 284γ from 5/2$^-$ 628;
356.19[b] *15*	(13/2$^-$)		AB G	J$^\pi$: D+Q intraband 175γ to 11/2$^-$ 181; intraband 325γ to 9/2$^-$ 31.
477.18[cd] *21*	(9/2$^+$)		AB G	J$^\pi$: intraband gammas to (7/2$^+$) 344 and to 5/2$^+$ 239 level.

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Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
481.27[a] 15	(13/2+)		AB E G	Jπ: intraband 187γ to (11/2+) 295; intraband Q 347γ to (9/2+) 134.
520.23[f] 18	(1/2)+	0.28 μs 8	AB D GH	Jπ: M1,E2 281.6γ to 5/2+ 239; bandhead energy and experimental decoupling constant (a=−0.86) consistent with that expected from Nilsson model for 1/2[411] orbital. $T_{1/2}$: unweighted average of 350 ns 20 from (d,2nγ) and 200 ns 60 from (^{7}Li,4nγ) E=45 MeV; reason for discrepancy is unknown.
527.51[f] 15	(3/2)+		AB D GH	Jπ: E1 101γ from 5/2− 628; L(^{3}He,d)=(2); band assignment.
555.58[b] 17	(15/2−)		AB G	Jπ: D+Q intraband 199γ to (13/2−) 356; Q intraband 375γ to (11/2−) 181.
627.98[e] 15	5/2−	80 ns 7	AB GH	Jπ: L(^{3}He,d)=3 and cross section fingerprint in (α,t), (^{3}He,d). Configuration assignment supported by energy and by decoupling parameter expected from Nilsson model cf. experimental a=+6.9 (the same orbital is observed in ^{177}Ta). $T_{1/2}$: weighted average of 80 ns 10 from (d,2nγ) and 80 ns 10 from (^{7}Li,4nγ) E=45 MeV.
636.69[cd] 23	(11/2+)		AB G	Jπ: intraband γ to (9/2+) and to (7/2+).
673[e] 1	9/2−		AB GH	XREF: A(628+X)B(628+X)G(628+X)H(673). E(level): from (α,t). Jπ: L=5 and cross section fingerprint in (^{3}He,d), (α,t).
673.01[f] 23	(5/2+)		AB	Jπ: intraband γ to (3/2)+ and to (1/2)+.
≈680[@e]	1/2−		H	Jπ: L=1 and cross section fingerprint in (^{3}He,d), (α,t).
691.85[a] 18	15/2+		AB E G	Jπ: continuation of band based on Jπ=7/2+ g.s.
695.98[f] 21	(7/2+)		AB GH	Jπ: intraband γ to (3/2)+; band assignment.
741.4 6	1/2,3/2		D	Jπ: γ to (3/2+) 528; log ft=6.4 from 1/2− in ε decay.
750.2 4	(1/2,3/2)		D	Jπ: 223 γ to (3/2)+ 528, 230γ to (1/2)+ 520; logft1ut<8.5 from 1/2−. Suggested to Be J=1/2 member of the 1/2[541] band; however, an unobserved 1/2 to 5/2 transition with Eγ=122.2 keV would Be implied cf. 31 and 18 keV in ^{177}Ta and ^{175}Ta, respectively. The adopted assignment of the 680 level as the 1/2− 1/2[541] state implies ≈52 keV for this transition energy, and this seems more consistent with systematics.
757[#] 5			E	
777.69[b] 18	(17/2−)		AB G	Jπ: D+Q intraband 222γ to (15/2−) 556; intraband 421γ to (13/2−).
820.95[cd] 25	(13/2+)		AB E G	Jπ: intraband gammas to (11/2+) and to (9/2+).
825.1[e] 10	(13/2−)		AB G	Jπ: intraband (Q) 153γ to 9/2− 673; band assignment.
855[@e] 1	3/2−		H	Jπ: L(^{3}He,d)=1 and cross section fingerprint in (α,t), (^{3}He,d).
875[#] 5			E	
891[@] 2	3/2,5/2,7/2		H	Jπ: L(^{3}He,d)=2 or 3.
924.64[a] 20	(17/2+)		AB E G	Jπ: intraband γ to (15/2+) and to (13/2+).
937.9[f] 3	(9/2+)		AB	Jπ: intraband γ to (7/2+) and to (5/2+).
987.6[f] 3	(11/2+)		AB G	Jπ: intraband γ to (9/2+); band assignment.
994[@] 1	3/2,5/2,7/2		H	Jπ: L(^{3}He,d)=2 or 3.
1017[#] 5			E	
1020.19[b] 20	(19/2−)		AB G	Jπ: intraband D+Q 242γ to (17/2+); Q intraband 465γ to (15/2+).
1028.6[cd] 3	(15/2+)		AB E G	XREF: E(1033). Jπ: intraband D+Q 208γ to (13/2+); intraband 392γ to (11/2+).
1064[@] 10	1/2+		H	Jπ: L(^{3}He,d)=0.
1088.8[e] 10	(17/2−)		AB G	Jπ: intraband 264γ to (13/2−); band assignment.
1105[#] 10			E	
1126 7	3/2,5/2,7/2		E H	Jπ: L(^{3}He,d)=2 or 3.

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Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
1177[@] *10*	3/2,5/2,7/2		H	E(level): average of 1129 *10* in (p,t) and 1122 *10* in (^{3}He,d). Jπ: L(^{3}He,d)=2 or 3.
1177.06[a] *22*	(19/2$^+$)		AB E G	Jπ: intraband 252γ to (17/2$^+$); Q intraband 485γ to (15/2$^+$).
1206[#] *10*			E	
1231[@] *10*			H	
1252.60[l] *23*	(21/2$^-$)	322 ns *16*	AB G	$T_{1/2}$: weighted average of 325 ns *25* from (^{7}Li,4nγ) E=38 MeV and 320 ns *20* from (^{7}Li,4nγ) E=45 MeV. Other: 250 ns *70* (2002Pf01). Jπ: 232γ is M1(+E2) to (19/2$^-$) 1020; band assignment. Low hindrances per degree of K-forbiddenness of deexciting γ rays indicate that there is mixing with other configurations.
1256.1[cd] *3*	(17/2$^+$)		AB G	Jπ: intraband D+Q 228γ to (15/2$^+$); Q intraband 435γ to (13/2$^+$).
1281.8[b] *3*	(21/2$^-$)		AB G	Jπ: intraband D+Q 261γ to (19/2$^-$); Q intraband 504γ to (17/2$^-$).
1298[#] *10*	7/2$^+$[&]		E	
1317.2[g] *4*	(25/2$^+$)	9.0 ms *2*	AB G	%IT=100 $T_{1/2}$: from (^{7}Li,4nγ) E=38 MeV. Other values: 8.6 ms *10* from (d,2nγ) and 11 ms *2* from (^{7}Li,4nγ) E=45 MeV. Jπ: M2 64.7γ to (21/2$^-$) 1253; band assignment.
1328.0[k] *4*	(23/2$^-$)	1.6 μs *4*	A G	$T_{1/2}$: from (^{7}Li,4nγ) E=38 MeV. Jπ: 75.3γ M1(+E2) to (21/2$^-$) 1253; band assignment. Additional information 1. Bandhead for K^π=(23/2$^-$) band.
1335[@] *10*	3/2$^+$,5/2$^+$		H	Jπ: L(^{3}He,d)=2.
1351[#] *10*	($^+$)		E	Jπ: L(p,t)=(2) on 7/2$^+$ target.
1389.0[f] *4*	(15/2$^+$)		AB G	
1396[@] *10*			H	
1420[@] *10*	3/2$^-$[c]		H	Jπ: L(^{3}He,d)=1 and cross section fingerprint in (α,t), (^{3}He,d).
1423[#] *10*	($^+$)		E	Jπ: L(p,t)=(2) on 7/2$^+$ target.
1446.9[a] *3*	(21/2$^+$)		A E G	Jπ: intraband 270γ to (19/2$^+$); Q intraband 522γ to (17/2$^+$).
1458.4[e] *10*	(21/2$^-$)		AB G	Jπ: intraband 370γ to (17/2$^-$); band assignment.
1464[@] *10*	1/2$^+$		H	Jπ: L(^{3}He,d)=0.
1475[#] *10*	7/2$^+$[&]		E	
1496[@] *10*	1/2$^-$[c]		H	Jπ: L(^{3}He,d)=1 and cross section fingerprint in (α,t), (^{3}He,d).
1503.4[cd] *4*	(19/2$^+$)		A G	Jπ: intraband γ to (17/2$^+$) and to (15/2$^+$).
1524[@] *10*	7/2$^-$[c]		H	Jπ: L(^{3}He,d)=3 and cross section fingerprint in (α,t), (^{3}He,d).
1527[#] *10*	7/2$^+$[&]		E	
1542.5[l] *3*	(23/2$^-$)		A G	Jπ: intraband γ to (21/2$^-$) 1253; band assignment.
1555[@] *10*	5/2$^-$,7/2$^-$		H	Jπ: L(^{3}He,d)=3.
1557.9[b] *3*	(23/2$^-$)		A G	Jπ: intraband D+Q 276γ to (21/2$^-$); Q intraband 538γ to (19/2$^-$).
1561[#] *5*			E	
1576[#] *10*			E	
1591.0[g] *4*	(27/2$^+$)		A G	Jπ: intraband 274γ to (25/2$^+$); band assignment.
1602.4[k] *4*	(25/2$^-$)		A G	Jπ: intraband 274γ to (23/2$^-$); band assignment.
1610[#] *10*			E	
1628.8[m] *3*	(19/2$^+$,21/2$^-$)	≤1 ns	A G	$T_{1/2}$: based on lack of significant shift in time centroid for time-difference spectrum involving 304.7γ and 376.1γ in (^{7}Li,4nγ) E=45 MeV. Jπ: D(+Q) 376γ to (21/2)$^-$ 1252; no γ to (23/2)$^-$ disfavors 21/2$^+$ and 19/2$^-$; low population of band disfavors J=23/2 (1997Ko13).

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Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
1635[#] *10*			E	
1665[@] *10*			H	
1705[#] *10*			E	
1730.4[a] *5*	(23/2$^+$)		A G	J^{π}: intraband γ to (21/2$^+$) and to (19/2$^+$).
1738.0 *9*	(19/2,21/2)		G	J^{π}: 485γ to (21/2$^-$) 1253.
1739[#] *10*	7/2$^+$[&]		E	
1765.7[cd] *6*	(21/2$^+$)		A G	J^{π}: intraband γ to (19/2$^+$) and to (17/2$^+$).
1778[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
1813[#] *10*			E	
1833.1[m] *7*	(21/2$^+$,23/2$^-$)		G	J^{π}: intraband γ to (19/2$^+$,21/2$^-$); band assignment.
1848.0[b] *4*	(25/2$^-$)		A G	J^{π}: intraband γ to (23/2$^-$) and to (21/2$^-$).
1848.6[l] *4*	(25/2$^-$)		A G	J^{π}: intraband γ to (23/2$^-$) and to (21/2$^-$).
1857[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
1874[@] *10*			H	
1878[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
1880.5[f] *9*	(19/2$^+$)		G	J^{π}: intraband γ to (15/2$^+$); band assignment.
1884.8[g] *4*	(29/2$^+$)		A G	J^{π}: intraband γ to (27/2$^+$) and to (25/2$^+$).
1899.8[k] *4*	(27/2$^-$)		A G	J^{π}: intraband γ to (25/2$^-$) and to (23/2$^-$).
1905[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
1925.2[e] *12*	(25/2$^-$)		A G	J^{π}: intraband γ to (21/2$^-$); band assignment.
1938[@] *10*			H	
1958[#] *10*	7/2$^+$[&]		E	
1995[@] *10*			H	
2026.4[a] *4*	(25/2$^+$)		A G	J^{π}: intraband γ to (23/2$^+$) and Q 580γ to (21/2$^+$).
2043.8[cd] *7*	(23/2$^+$)		G	J^{π}: intraband γ to (21/2$^+$) and Q 540γ to (19/2$^+$).
2058.8[m] *7*	(23/2$^+$,25/2$^-$)		G	J^{π}: intraband γ to (21/2$^+$,23/2$^-$) and to (19/2$^+$,21/2$^-$).
2093[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
2123[#] *10*			E	
2132 *9*			E H	E(level): weighted average of 2142 *11* in (^{3}He,d) and 2123 *10* in (p,t).
2145.2[b] *4*	(27/2$^-$)		A G	J^{π}: intraband γ to (25/2$^-$) and to (23/2$^-$).
2162.4[l] *6*	(27/2$^-$)		A G	J^{π}: intraband γ to (25/2$^-$) and to (23/2$^-$).
2198.3[g] *4*	(31/2$^+$)		A G	J^{π}: intraband γ to (29/2$^+$) and to (27/2$^+$).
2212[#] *10*	($^+$)		E	J^{π}: L(p,t)=(2) on 7/2$^+$ target.
2219.3[k] *4*	(29/2$^-$)		A G	J^{π}: intraband γ to (27/2$^-$); Q intraband 617γ to (25/2$^-$).
2272[@] *10*			H	
2305.1[m] *9*	(25/2$^+$,27/2$^-$)		G	J^{π}: intraband γ to (23/2$^+$,25/2$^-$) and to (21/2$^+$,23/2$^-$).
2330.0[a] *7*	(27/2$^+$)		A G	J^{π}: intraband γ to (25/2$^+$) and to (23/2$^+$).
2331.5[cd] *8*	(25/2$^+$)		G	J^{π}: intraband γ to (23/2$^+$) and to (21/2$^+$).
2450.3[b] *6*	(29/2$^-$)		A G	J^{π}: intraband γ to (27/2$^-$) and to (25/2$^-$).
2477.7[e] *13*	(29/2$^-$)		A G	J^{π}: intraband γ to (25/2$^-$); band assignment.
2513.5[l] *7*	(29/2$^-$)		G	J^{π}: intraband γ to (27/2$^-$) and intraband Q γ to (25/2$^-$).
2530.7[g] *4*	(33/2$^+$)		A G	J^{π}: intraband γ to (31/2$^+$) and intraband Q γ to (29/2$^+$).
2561.1[k] *6*	(31/2$^-$)		A G	J^{π}: intraband γ to (29/2$^-$) and to (27/2$^-$).
2631.7[cd] *9*	(27/2$^+$)		G	J^{π}: intraband γ to (25/2$^+$) and to (23/2$^+$).
2639.5[h] *5*	(37/2$^+$)	54.1 ms *17*	A G	%IT=100 XREF: A(2640.7). $T_{1/2}$: weighted average of 52 ms *3* from (^{7}Li,4nγ) E=38 MeV and 55

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Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				ms *2* from (^{7}Li,4nγ) E=45 MeV. Jπ: E2 108.8γ to (33/2+). Five-quasiparticle configuration assumed in order to explain the high value of K at such low energy. The hindrance factor per degree of K-forbiddenness is 24 for 108.8γ compared with 33 for a similar transition in the core nucleus ^{178}Hf (1982Ba21).
2641.3[a] *9*	(29/2+)		A G	XREF: A(2641.7). Jπ: intraband γ to (27/2+) and to (25/2+).
2654.1 *9*	(31/2)		G	Jπ: γ to (29/2+).
2757.0[b] *8*	(31/2−)		G	Jπ: intraband γ to (29/2−) and to (27/2−).
2792.8[j] *4*	(33/2−)	17 ns *3*	A G	Jπ: M1 232γ to (31/2−) 2561; γ to (29/2−); weak γ to (33/2+) and to (31/2+); likely configurations in this energy region. $T_{1/2}$: weighted average of 22 ns *5* from (^{7}Li,4nγ) E=38 MeV and 15 ns *3* from (^{7}Li,4nγ) E=45 MeV.
2863.7[l] *8*	(31/2)−		G	Jπ: intraband γ to (29/2−) and to (27/2−).
2881.7[g] *7*	(35/2+)		G	Jπ: intraband γ to (33/2+) and to (31/2+).
2921.4?[k] *7*	(33/2−)		G	Jπ: intraband γ to (31/2−) and to (29/2−).
2928.8[j] *5*	(35/2−)		A G	Jπ: intraband M1+E2 136γ to (33/2−) 2793; band assignment.
2936.4[cd] *10*	(29/2+)		G	Jπ: intraband γ to (27/2+) and to (25/2+).
2955.3[a] *11*	(31/2+)		A G	Jπ: intraband γ to (27/2+); band assignment.
3049.9[h] *6*	(39/2+)		G	Jπ: intraband D+Q 410γ to (37/2+) 2640; band assignment.
3071.7[b] *10*	(33/2−)		G	Jπ: intraband γ to (31/2−) and to (29/2−).
3101.0[e] *16*	(33/2−)		A G	Jπ: intraband γ to (29/2−); band assignment.
3163.2[j] *5*	(37/2−)		A G	Jπ: intraband M1+E2 234γ to (35/2−) 2929; intraband 370γ to (33/2−) 2793.
3185.2 *9*	(35/2)		G	Jπ: ΔJ=1 392γ to (33/2−) 2793.
3227.4?[l] *9*	(33/2−)		G	Jπ: possible intraband γ to (31/2−) and to (29/2−).
3251.0[g] *7*	(37/2+)		G	Jπ: intraband γ to (35/2+) and to (33/2+).
3252.1[cd] *12*	(31/2+)		G	Jπ: intraband γ to (27/2+); band assignment.
3266.8[a] *12*	(33/2+)		G	Jπ: intraband γ to (29/2+); band assignment.
3394.6?[b] *8*	(35/2−)		G	Jπ: possible intraband γ to (33/2−) and to (31/2−).
3443.9[j] *7*	(39/2−)		G	Jπ: intraband γ to (37/2−) and to (35/2−).
3481.2[h] *6*	(41/2+)		G	Jπ: intraband γ to (39/2+) and to (37/2+).
3637.7[g] *9*	(39/2+)		G	Jπ: intraband γ to (37/2+) and to (35/2+).
3737.7?[b] *13*	(37/2−)		G	Jπ: possible intraband γ to (33/2−); band assignment.
3758.2[j] *8*	(41/2−)		G	Jπ: intraband γ to (39/2−) and to (37/2−).
3780.2[e] *18*	(37/2−)		G	Jπ: intraband γ to (33/2−); band assignment.
3932.3[h] *6*	(43/2+)		G	Jπ: intraband γ to (41/2+) and to (39/2+).
4041.3[g] *11*	(41/2+)		G	Jπ: intraband γ to (39/2+) and to (37/2+).
4101.5[j] *9*	(43/2−)		G	Jπ: intraband γ to (41/2−) and to (39/2−).
4402.9[h] *7*	(45/2+)		G	Jπ: intraband γ to (43/2+) and to (41/2+).
4471.7[j] *11*	(45/2−)		G	Jπ: intraband γ to (41/2−); band assignment.
4508.8[e] *20*	(41/2−)		G	Jπ: intraband γ to (37/2−); band assignment.
4865.2[j] *12*	(47/2−)		G	Jπ: intraband γ to (43/2−); band assignment.
4891.9[h] *7*	(47/2+)		G	Jπ: intraband γ to (45/2+) and to (43/2+).
5269.3?[e] *21*	(45/2−)		G	Jπ: possible intraband γ to (41/2−); band assignment.
5391.8[i] *8*	(49/2+)	53 ns *+3−7*	G	Jπ: γ branching to 47/2+ and 45/2+ levels argues against J=47/2; *Jπ*=49/2− very unlikely because 989γ would then have to Be a ΔK=6, M2 transition, inconsistent with measured $T_{1/2}$. $T_{1/2}$: from fit to background-subtracted time spectra from (^{7}Li,4nγ) E=45

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Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
				MeV produced by gating on cascade transitions in K^π=37/2+ band. Unexpectedly short $T_{1/2}$ attributed to mixing with nearby 49/2+ state.
5397.9?[h] *10*	(49/2+)		G	Jπ: intraband γ to (47/2+) and to (45/2+).
5745.1 *9*	(51/2−)		G	Jπ: possible seven-quasiparticle state with configuration (π 5/2[402])+(π 7/2[404])+(π 9/2[514])+(ν 7/2 [633])+(ν 7/2[514])+ (ν 7/2[503])+(ν 9/2[624]) (2004Ko58).
5919.1[i] *9*	(51/2+)		G	Jπ: γ to (49/2+) band head probably a ΔJ=1 transition based on Eγ.
5953.7 *10*	(53/2+)		G	Jπ: possible seven-quasiparticle state with configuration (π 7/2[523])+(π 7/2[404])+(π 9/2[514])+(ν 7/2 [633])+(ν 7/2[514])+ (ν 7/2[503])+(ν 9/2[624]) (2004Ko58); favored over a 53/2− configuration predicted at comparable energy due to similarity between the former configuration and that of the state to which the 5953 level deexcites (no lifetime evident for 5953 level).
16807 *11*	(3/2)−	65 keV	F	E(level): from ^{178}Hf(p,p′) IAR. Jπ: L=1 in ^{178}Hf(p,p′); probable analog of the 3/2− ^{179}Hf(421 level). Γ_p/Γ=0.028 from (p,p′) IAR. $T_{1/2}$: from (p,p′) IAR.
17238	(7/2−)		F	E(level): from ^{178}Hf(p,p′) IAR. Jπ: Possible analog of the 7/2− ^{179}Hf(849 level).

† From least-squares fit to adopted Eγ, except as noted.

‡ For E>3000, assignments given without comment are based on band structure, on γ-ray multipolarities and decay patterns, and/or on collective-band systematics in neighboring isotopes. Values of [g_K-g_R] deduced from in-band branching ratios support many of the configuration assignments.

\# From (p,t). ΔE≤5 keV for E≤1000 and ΔE≤10 keV for E>1000 in (p,t); evaluator assigns ΔE=5 and 10 keV, respectively, to the levels in these energy ranges.

@ From (^{3}He,d), (α,t); measured relative to E(238.6 level). Calibration uncertainties of ≤1 keV for E≤1000 and 10 keV for E>1000 have been combined in quadrature with the statistical uncertainties (1 to 5 keV).

& $J^\pi=K^\pi$=7/2+, from angular momentum conservation for L=0 (p,t) transfers on ^{181}Ta($J^\pi=K^\pi$=7/2+) target.

a Band(A): 7/2[404] band (1997Ko13). g.s. band. Rotational parameters: A=15.0, B=−11.4. [g_K-g_R]=0.48 *3* (1997Ko13) for J≤19/2, implying g_K slightly larger than Nilsson-model value for ν 7/2[404] orbital; this is consistent with expectation of some mixing with the 5/2[402] orbital (1997Ko13).

b Band(B): 9/2[514] band (1997Ko13). Rotational parameters: A=13.8, B=−6.8. [g_K-g_R]=0.94 *3* (1997Ko13) for J≤21/2, implying g_K close to Nilsson-model value for ν 9/2[514] orbital.

c Band(C): 1/2[530] band (2006Bu19). (α,t) and (^{3}He,d) cross sections for the J=1/2, 3/2 and 7/2 members match the expected fingerprint for the 1/2[530] configuration.

d Band(C): 5/2[402] band (1997Ko13). Rotational parameters: A=15.2, B=−15.4. [g_K-g_R]=1.34 *4* (1997Ko13) for J≤17/2, implying g_K close to Nilsson-model value for ν 5/2[402] orbital.

e Band(D): 1/2[541] α=+1/2 band (1997Ko13). Rotational parameters: A=14.0, B=−7.2, a=+6.9, B_{2K}=−97 from fit to 9/2 through 33/2 members (parameters sensitive to levels chosen). The transition connecting J=9/2 and 5/2 (lowest energy band member) has yet to Be observed; from (α,t) level energy difference, its energy is 44.0 *14*. (α,t) and (^{3}He,d) cross sections for the J=1/2, 3/2, 5/2 and 9/2 members match the expected fingerprint for this configuration. The suggestion in 1969Ko18 that the 742 level (rather than the 628 level adopted here) could Be the J=5/2 band member is not adopted.

f Band(E): 1/2[411] band (1997Ko13). Rotational parameters: A=16.2, B=−18, a=−0.86, B_{2K}=+122.

g Band(F): K^π=(25/2+) 3-quasiparticle band (1997Ko13). Possible configuration: ((π 9/2[514])+(ν 7/2[514])+(ν 9/2[624])). [g_K-g_R]=0.23 *2* (1997Ko13).

h Band(G): K^π=(37/2+) 5-quasiparticle band (1997Ko13). Possible configuration: ((π 5/2[402])+(π 7/2[404])+(π 9/2[514])+(ν 7/2[514])+(ν 9/2[624])) . [g_K-g_R]=0.39 *4* (1997Ko13).

i Band(H): K^π=(49/2+) 7-quasiparticle band (2004Ko58). Probable configuration: (π 5/2[402])+(π 7/2[404])+(π 9/2[514])+(ν 5/2 [512])+(ν 7/2[514])+ (ν 7/2[503])+(ν 9/2[624]).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{179}Ta Levels (continued)

[j] Band(I): K^{π}=(33/2$^-$) 5-quasiparticle band (1997Ko13). Possible configuration: ((π 7/2[404])+(π 1/2[541])+(π 9/2[514])+(ν 7/2[514])+(ν 9/2[624])) . [g_K-g_R]=0.006 *2* (1997Ko13) for δ>0.

[k] Band(J): K^{π}=(23/2$^-$) 3-quasiparticle band (1997Ko13). Possible configuration: ((π 7/2[404])+(ν 7/2[514])+(ν 9/2[624])). [g_K-g_R]=0.09 *3* (1997Ko13) for δ>0.

[l] Band(K): K^{π}=(21/2)$^-$ 3-quasiparticle band (1997Ko13). Possible configuration: ((π 5/2[402])+(π 7/2[404])+(π 9/2[514])). Assignment supported by small alignment, bandhead energy and deduced [g_K-g_R]=0.36 *1* (1997Ko13).

[m] Band(L): 3-quasiparticle band (1997Ko13). Possible configurations are: K^{π}=19/2$^+$, ((π 9/2[514])+(ν 1/2[521])+(ν 9/2[624])); K^{π}=21/2$^-$, ((π 5/2[402])+(ν 1/2[521])+(ν 9/2[624])). Similar g_K values are predicted for both configurations and each includes a single $i_{13/2}$ quasineutron, consistent with observed alignment of 2 $\hbar$. [g_K-g_R]=0.30 *7* (1997Ko13) if K=19/2.

$\gamma(^{179}Ta)$

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	α[f]	Comments
30.7	9/2⁻	30.7 *1*	100	0.0	7/2⁺	E1	4.6 *9*	B(E1)(W.u.)=9.3×10⁻⁷ *16* Eγ: from ^{179}W ε decay (37.05 min). The mean of 6 determinations by 1963Va28 is 30.69 *4*, but authors do not indicate systematic uncertainty. Other Eγ: 30.7 *3* in (d,2nγ), 30.5 *5* in ε decay (37.05 min), 30.7 *8* in (^{7}Li,4nγ) E=45 MeV. Mult.: anomalous E1 transition, from ^{179}W ε decay (37.05 min). α(E1 theory)=1.73 *3*.
133.79	(9/2⁺)	133.79 *12*	100	0.0	7/2⁺	[M1(+E2)]	1.6 *4*	Eγ: weighted average from ε decay (37.05 min), (d,2nγ) and both (^{7}Li,4nγ) studies.
180.79	(11/2⁻)	150.13 *11*	100	30.7	9/2⁻	(M1(+E2))	1.1 *3*	
238.56	5/2⁺	238.56[b] *9*	100	0.0	7/2⁺	M1+E2	0.27 *11*	Mult.: D+Q transition from γ(θ) in (^{7}Li,4nγ) E=38 MeV; M1,E2 from ce data in ^{179}W ε decay (6.40 min).
294.65	(11/2⁺)	160.88[b] *17*	100 *17*	133.79	(9/2⁺)	(M1(+E2))	0.88 *25*	Mult.: D(+Q) from γ(θ) in (^{7}Li,4nγ) E=38 MeV for intraband γ.
		294.65[b] *21*	42 *8*	0.0	7/2⁺			Other Iγ: 33 *10* in (^{7}Li,4nγ) E=38 MeV, 50 *15* in (d,2nγ), 60 *18* in (p,2nγ) relative to I(161γ)=100 *30*.
343.95	(7/2⁺)	105.39[b] *9*	100	238.56	5/2⁺	(M1+E2)	3.4 *4*	
356.19	(13/2⁻)	175.44 *12*	100	180.79	(11/2⁻)	(M1(+E2))	0.67 *21*	Eγ: weighted average from (d,2nγ) and (^{7}Li,4nγ) E=45 MeV. Other I(175γ):I(326γ)=100 *30*:7.9 *24* from (d,2nγ).
		325.39[c] *17*	16 *1*	30.7	9/2⁻			
477.18	(9/2⁺)	133.17[b] *21*	100	343.95	(7/2⁺)	[M1(+E2)]	1.6 *4*	
		238.3 *8*	17 *4*	238.56	5/2⁺			
481.27	(13/2⁺)	186.63[b] *16*	69 *11*	294.65	(11/2⁺)			
		347.46[b] *15*	100	133.79	(9/2⁺)	(E2)	0.0534	
520.23	(1/2)⁺	281.69[b] *16*	100	238.56	5/2⁺	(E2)[&]	0.0992	B(E2)(W.u.)=0.017 *5*
527.51	(3/2)⁺	(7.28 *22*)		520.23	(1/2)⁺			Eγ: from level energy difference; transition not observed. I(γ+ce)(7.3):I(γ+ce)(289)=63 *31*:15 *3* from ^{179}W ε decay (6.40 min).
		289.01[b] *16*	100 *20*	238.56	5/2⁺	[M1,E2]	0.16 *7*	
555.58	(15/2⁻)	199.36[b] *13*	100	356.19	(13/2⁻)	(M1+E2)	0.46 *16*	Mult.: from γ(θ) in (^{7}Li,4nγ) E=38 MeV for intraband γ.
		374.79[b] *15*	24 *2*	180.79	(11/2⁻)	(E2)	0.0431	
627.98	5/2⁻	100.50[b] *9*	100 *16*	527.51	(3/2)⁺	E1	0.362	B(E1)(W.u.)=1.02×10⁻⁶ *22* Mult.: from ce data in ^{179}W ε decay (37.05 min).
		283.99[b] *21*	48 *8*	343.95	(7/2⁺)	(E1)	0.0253	B(E1)(W.u.)=2.2×10⁻⁸ *5* Mult.: D+Q from γ(θ) in (^{7}Li,4nγ) E=38 MeV; Δπ=yes from level scheme. Other Iγ: 77 *23* in (^{7}Li,4nγ) E=38 MeV, 41 *12* in (d,2nγ), 61 *18* in (p,2nγ) relative to I(101γ)=100 *30*.
		389.32[b] *21*	72 *12*	238.56	5/2⁺	[E1]	0.01195	B(E1)(W.u.)=1.3×10⁻⁸ *3*

γ(^{179}Ta) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	α[f]	Comments
								Other Iγ: 100 *30* in (d,2nγ) and (p,nγ); 112 *34* in (^{7}Li,4nγ) E=38 MeV relative to I(101γ)=100 *30*.
636.69	(11/2$^+$)	159.48[b] *16*	100	477.18	(9/2$^+$)			
		292.9[d] *3*	50 *9*	343.95	(7/2$^+$)			
673	9/2$^-$	(44.0 *14*)		627.98	5/2$^-$	[E2]	143 *25*	E_γ: from level energy difference in (α,t); γ unobserved. Eγ consistent with an estimate of E=45 *10*, based on transition energy systematics (28 keV in ^{181}Ta, 60 keV in ^{177}Ta, 72 keV in ^{175}Ta, 83 keV in ^{173}Ta). γ will Be very highly converted and may Be obscured by strong Ta Kα x ray at 57 keV.
673.01	(5/2$^+$)	145.66[a] *26*	100 *30*	527.51	(3/2)$^+$			I_γ: from (d,2nγ).
		152.8[d] *3*	34 *10*	520.23	(1/2)$^+$			I_γ: from (d,2nγ).
691.85	15/2$^+$	210.68[b] *21*	54 *6*	481.27	(13/2$^+$)			Other Iγ: 36 *11* in (^{7}Li,4nγ) E=38 MeV, 39 *12* in (p,nγ).
		397.21[b] *16*	100	294.65	(11/2$^+$)			
695.98	(7/2$^+$)	168.40[b] *16*	100	527.51	(3/2)$^+$			
741.4	1/2,3/2	213.9 *5*	100	527.51	(3/2)$^+$	[D,E2]	0.28 *24*	E_γ,I_γ: from ^{179}W ε decay (6.40 min).
750.2	(1/2,3/2)	222.5 *5*	100 *31*	527.51	(3/2)$^+$	[D,E2]	0.25 *21*	E_γ,I_γ: from ^{179}W ε decay (6.40 min).
		230.1 *5*	35 *19*	520.23	(1/2)$^+$	[D,E2]	0.23 *19*	E_γ,I_γ: from ^{179}W ε decay (6.40 min).
777.69	(17/2$^-$)	222.03[b] *15*	100	555.58	(15/2$^-$)	(M1+E2)[@]	0.33 *13*	
		421.54[b] *15*	50 *3*	356.19	(13/2$^-$)			Other I(422γ):I(222γ)=31 *6*:100 *17*, weighted average from (^{7}Li,4nγ) E=38 MeV, (d,2nγ) and (p,2nγ).
820.95	(13/2$^+$)	184.2[d] *2*	100	636.69	(11/2$^+$)			
		343.73[b] *21*	52 *4*	477.18	(9/2$^+$)			Other I(344γ):I(184γ)=28 *8*:100 *30* in (d,2nγ).
825.1	(13/2$^-$)	153.15 *15*	100	673	9/2$^-$	(E2)	0.749	E_γ: weighted average from (d,2nγ) and (^{7}Li,4nγ) E=45 MeV. Mult.: γ(θ) in (^{7}Li,4nγ) E=38 MeV consistent with Q for doublet dominated by this intraband transition.
924.64	(17/2$^+$)	232.6 *8*	29 *7*	691.85	15/2$^+$			
		443.31[b] *16*	100	481.27	(13/2$^+$)			
937.9	(9/2$^+$)	241.7[d] *3*	100 *30*	695.98	(7/2$^+$)			I_γ: from (d,2nγ).
		265.2[d] *3*	26 *8*	673.01	(5/2$^+$)			I_γ: from (d,2nγ).
987.6	(11/2$^+$)	291.58[b] *21*	100	695.98	(7/2$^+$)			
1020.19	(19/2$^-$)	242.40[b] *15*	100	777.69	(17/2$^-$)	(M1+E2)	0.26 *11*	
		464.66[b] *15*	52 *2*	555.58	(15/2$^-$)	(E2)	0.0243	
1028.6	(15/2$^+$)	207.55[b] *21*	100	820.95	(13/2$^+$)	(M1+E2)	0.41 *15*	Mult.: from γ(θ) in (^{7}Li,4nγ) E=38 MeV.
		391.98[b] *21*	61 *10*	636.69	(11/2$^+$)			
1088.8	(17/2$^-$)	263.70[b] *15*	100	825.1	(13/2$^-$)			
1177.06	(19/2$^+$)	252.38[b] *21*	20 *4*	924.64	(17/2$^+$)			Other I(252γ):I(485γ)=44 *9*:100 *21*, average from (d,2nγ) and (p,2nγ).

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$\gamma(^{179}Ta)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ	α[f]	Comments
1177.06	(19/2$^+$)	485.33[b] *21*	100	691.85	15/2$^+$	(E2)		0.0217	
1252.60	(21/2$^-$)	232.4 *2*	100 *8*	1020.19	(19/2$^-$)	M1(+E2)[@]		0.29 *12*	B(M1)(W.u.)=2.5×10^{-6} *5*; B(E2)(W.u.)<0.024 Mult.: from α(exp) in (^{7}Li,4nγ) E=38 MeV.
		474.92 *18*	83 *8*	777.69	(17/2$^-$)	[E2]		0.0229	B(E2)(W.u.)=0.00047 *7* E_γ: weighted average from (d,2nγ) and (^{7}Li,4nγ) E=45 MeV. Other I(475γ):I(232γ)=100 *30*:83 *25* in (d,2nγ).
1256.1	(17/2$^+$)	227.6[d] *3*	100	1028.6	(15/2$^+$)	(M1+E2)		0.31 *12*	
		435.11[b] *21*	82 *13*	820.95	(13/2$^+$)	(E2)		0.0288	Other I(435γ):I(228γ)=48 *14*:100 *30* in (d,2nγ).
1281.8	(21/2$^-$)	261.3[d] *3*	100	1020.19	(19/2$^-$)	(M1+E2)		0.21 *9*	
		504.3[e] *3*	70 *10*	777.69	(17/2$^-$)	(E2)		0.0197	
1317.2	(25/2$^+$)	64.7[e] *3*	100	1252.60	(21/2$^-$)	M2[@]		76.0 *19*	B(M2)(W.u.)=0.00124 *5*
1328.0	(23/2$^-$)	75.3[e] *3*	100	1252.60	(21/2$^-$)	M1(+E2)	0.33 *+19−33*	10.0 *3*	B(M1)(W.u.)=2.6×10^{-6} *8*; B(E2)(W.u.)<0.046 Mult.: from α(L)exp in (^{7}Li,4nγ). Other mult: not E1 from α(exp) in (^{7}Li,4nγ) E=45 MeV. δ: from (^{7}Li,4nγ) E=38 MeV.
1389.0	(15/2$^+$)	401.46[b] *21*	100	987.6	(11/2$^+$)				
1446.9	(21/2$^+$)	270.0[e] *3*	32 *7*	1177.06	(19/2$^+$)				
		522.1[e] *3*	100	924.64	(17/2$^+$)	(E2)		0.0181	
1458.4	(21/2$^-$)	369.51[b] *20*	100	1088.8	(17/2$^-$)	(E2)[@]		0.0449	
1503.4	(19/2$^+$)	247.2[e] *3*	90 *16*	1256.1	(17/2$^+$)				
		475.0[c] *3*	100	1028.6	(15/2$^+$)				
1542.5	(23/2$^-$)	289.9 *2*	100	1252.60	(21/2$^-$)				
1557.9	(23/2$^-$)	276.1[e] *3*	100	1281.8	(21/2$^-$)	(M1+E2)[@]		0.18 *8*	
		537.8[e] *3*	73 *11*	1020.19	(19/2$^-$)	(E2)		0.01683	
1591.0	(27/2$^+$)	273.8 *2*	100	1317.2	(25/2$^+$)				
1602.4	(25/2$^-$)	274.35[c] *17*	100	1328.0	(23/2$^-$)				
1628.8	(19/2$^+$,21/2$^-$)	376.22[c] *18*	100	1252.60	(21/2$^-$)	D(+Q)			
1730.4	(23/2$^+$)	283.2 *8*	91 *25*	1446.9	(21/2$^+$)				
		553.2 *8*	100	1177.06	(19/2$^+$)				
1738.0	(19/2,21/2)	485.4 *8*	100	1252.60	(21/2$^-$)				
1765.7	(21/2$^+$)	262.5 *8*	67 *18*	1503.4	(19/2$^+$)				
		509.3 *8*	100	1256.1	(17/2$^+$)				
1833.1	(21/2$^+$,23/2$^-$)	204.7 *8*	100	1628.8	(19/2$^+$,21/2$^-$)				
1848.0	(25/2$^-$)	289.8 *8*	100	1557.9	(23/2$^-$)				
		566.2[e] *3*	70 *16*	1281.8	(21/2$^-$)				

$^{179}_{73}Ta_{106}$-10

Adopted Levels, Gammas (continued)

γ(^{179}Ta) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	α[f]	Comments
1848.6	(25/2⁻)	306.2 *2*	100	1542.5	(23/2⁻)			
		595.9 *8*	20 *6*	1252.60	(21/2⁻)			
1880.5	(19/2⁺)	491.5 *8*	100	1389.0	(15/2⁺)			
1884.8	(29/2⁺)	293.73[c] *17*	100	1591.0	(27/2⁺)			
		567.52[c] *18*	32 *5*	1317.2	(25/2⁺)			Other I(568γ):I(294γ)=63 *19*:100 *30* in (^{7}Li,4nγ) E=38 MeV.
1899.8	(27/2⁻)	297.1 *8*	93 *18*	1602.4	(25/2⁻)			
		572.0[c] *3*	100	1328.0	(23/2⁻)	(E2)	0.01451	
1925.2	(25/2⁻)	466.8[e] *3*	100	1458.4	(21/2⁻)			
2026.4	(25/2⁺)	295.9 *8*	31 *6*	1730.4	(23/2⁺)			
		579.6[c] *3*	100 *13*	1446.9	(21/2⁺)	(E2)	0.01406	
2043.8	(23/2⁺)	278.0 *8*	67 *13*	1765.7	(21/2⁺)			
		540.4 *8*	100	1503.4	(19/2⁺)	(E2)	0.01664	
2058.8	(23/2⁺,25/2⁻)	225.9 *8*	100	1833.1	(21/2⁺,23/2⁻)			
		429.6 *8*	13 *8*	1628.8	(19/2⁺,21/2⁻)			
2145.2	(27/2⁻)	296.9 *8*	100	1848.0	(25/2⁻)			
		587.4[c] *3*	84 *18*	1557.9	(23/2⁻)			
2162.4	(27/2⁻)	314.0 *8*	100	1848.6	(25/2⁻)			
		619.9 *8*	65 *14*	1542.5	(23/2⁻)			
2198.3	(31/2⁺)	313.5 *2*	100 *10*	1884.8	(29/2⁺)			
		607.6 *3*	70 *6*	1591.0	(27/2⁺)			E_γ: from (^{7}Li,4nγ) E=38 MeV.
2219.3	(29/2⁻)	319.7[e] *3*	53 *8*	1899.8	(27/2⁻)			Other Iγ: 37 *6* from (^{7}Li,4nγ) E=45 MeV.
		616.8 *2*	100	1602.4	(25/2⁻)	(E2)	0.01215	Other Eγ: 617.6 *3* in (^{7}Li,4nγ) E=38 MeV.
2305.1	(25/2⁺,27/2⁻)	246.1 *8*	100	2058.8	(23/2⁺,25/2⁻)			
		472.2 *8*	65 *28*	1833.1	(21/2⁺,23/2⁻)			
2330.0	(27/2⁺)	303.9 *8*	17 *6*	2026.4	(25/2⁺)			
		599.2 *8*	100	1730.4	(23/2⁺)			
2331.5	(25/2⁺)	287.5 *8*	70 *10*	2043.8	(23/2⁺)			
		565.9 *8*	100 *20*	1765.7	(21/2⁺)			
2450.3	(29/2⁻)	305.3 *8*	71 *20*	2145.2	(27/2⁻)			
		602.1 *8*	100	1848.0	(25/2⁻)			
2477.7	(29/2⁻)	552.5 *8*	100	1925.2	(25/2⁻)			
2513.5	(29/2⁻)	350.8 *8*	100	2162.4	(27/2⁻)			
		664.6 *8*	65 *21*	1848.6	(25/2⁻)	(E2)	0.01024	
2530.7	(33/2⁺)	332.53[c] *17*	98 *24*	2198.3	(31/2⁺)			
		645.8[c] *3*	100	1884.8	(29/2⁺)	(E2)	0.01093	
2561.1	(31/2⁻)	342.1 *8*	57 *14*	2219.3	(29/2⁻)			
		661.2 *8*	100 *21*	1899.8	(27/2⁻)			
2631.7	(27/2⁺)	300.0 *8*	63 *23*	2331.5	(25/2⁺)			
		588.1 *8*	100	2043.8	(23/2⁺)			
2639.5	(37/2⁺)	108.8 *3*	100	2530.7	(33/2⁺)	E2	2.67 *5*	B(E2)(W.u.)=3.12×10^{-6} *12* Mult.: from α(exp) in (^{7}Li,4nγ) E=38 MeV.

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$\gamma(^{179}Ta)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	α[f]	Comments
2641.3	(29/2$^+$)	311.5[g] *8*	≤10	2330.0	(27/2$^+$)			
		614.9 *8*	100 *20*	2026.4	(25/2$^+$)			
2654.1	(31/2)	769.3 *8*	100	1884.8	(29/2$^+$)			
2757.0	(31/2$^-$)	306.7 *8*	88 *13*	2450.3	(29/2$^-$)			
		611.7 *8*	100 *25*	2145.2	(27/2$^-$)			
2792.8	(33/2$^-$)	232.0 *8*	18 *5*	2561.1	(31/2$^-$)	M1	0.407 *7*	B(M1)(W.u.)=1.5×10^{-5} *5* B(M1)(W.u.) given here assumes negligible branching for 262γ, 595γ. Mult.: from α(exp) in (^{7}Li,4nγ) E=45 MeV.
		262.2[e] *3*		2530.7	(33/2$^+$)			Absent in (^{7}Li,4nγ) E=45 MeV.
		573.45[c] *23*	100 *9*	2219.3	(29/2$^-$)	[E2]	0.01442	B(E2)(W.u.)=0.0071 *16* B(E2)(W.u.) given here assumes negligible branching for 262γ, 595γ.
		595[eg]		2198.3	(31/2$^+$)			Absent in (^{7}Li,4nγ) E=45 MeV.
2863.7	(31/2)$^-$	349.3 *8*	100 *30*	2513.5	(29/2$^-$)			
		701.9 *8*	60 *20*	2162.4	(27/2$^-$)			
2881.7	(35/2$^+$)	351.3 *8*	67 *22*	2530.7	(33/2$^+$)			
		683.5 *8*	100 *22*	2198.3	(31/2$^+$)			
2921.4?	(33/2$^-$)	360.5[g] *8*	100 *25*	2561.1	(31/2$^-$)			
		702.0[g] *8*	≤25	2219.3	(29/2$^-$)			
2928.8	(35/2$^-$)	135.9[e] *3*	100	2792.8	(33/2$^-$)	M1+E2	1.5 *4*	Mult.: M1(+E2) from α(exp), D+Q from γ(θ) in (^{7}Li,4nγ) E=45 MeV.
2936.4	(29/2$^+$)	304.7 *8*	36 *13*	2631.7	(27/2$^+$)			
		604.9 *8*	100	2331.5	(25/2$^+$)			
2955.3	(31/2$^+$)	625.3 *8*	100	2330.0	(27/2$^+$)			
3049.9	(39/2$^+$)	410.4 *2*	100	2639.5	(37/2$^+$)	(M1+E2)	0.06 *3*	
3071.7	(33/2$^-$)	314.3 *8*	100 *14*	2757.0	(31/2$^-$)			In (^{7}Li,4nγ) E=38 MeV, this transition was placed from the 31/2 member of the 9/2[514] band because the 307γ from that level was not resolved from the 305γ immediately below it in the band′s ΔJ=1 γ cascade.
		622.2[g] *8*	43 *29*	2450.3	(29/2$^-$)			
3101.0	(33/2$^-$)	623.3 *8*	100	2477.7	(29/2$^-$)			
3163.2	(37/2$^-$)	234.35[c] *17*	100	2928.8	(35/2$^-$)	M1+E2	0.29 *11*	Mult.: from α(exp) and γ(θ) in (^{7}Li,4nγ) E=45 MeV.
		370.4[c] *3*	24 *8*	2792.8	(33/2$^-$)			
3185.2	(35/2)	392.4 *8*	100	2792.8	(33/2$^-$)			ΔJ=1 transition from authors′ interpretation of γ(θ) in (^{7}Li,4nγ) E=45 MeV.
3227.4?	(33/2$^-$)	363.6[g] *8*	≤100	2863.7	(31/2)$^-$			
		714.0[g] *8*	≤25	2513.5	(29/2$^-$)			
3251.0	(37/2$^+$)	369.5 *8*	83 *33*	2881.7	(35/2$^+$)			
		720.0 *8*	100 *33*	2530.7	(33/2$^+$)			
3252.1	(31/2$^+$)	620.4 *8*	100	2631.7	(27/2$^+$)			
3266.8	(33/2$^+$)	625.5 *8*	100	2641.3	(29/2$^+$)			
3394.6?	(35/2$^-$)	322.5[g] *8*	≤25	3071.7	(33/2$^-$)			
		637.7[cg] *3*	100 *50*	2757.0	(31/2$^-$)	(E2)	0.01125	E_γ: presumed to Be the same transition as the Eγ=639.0 *3* line reported in

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γ(^{179}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[f]	Comments
								(^{7}Li,4nγ) E=38 MeV, but placed feeding the 29/2 (rather than the 31/2) member of the 9/2[514] band.
3443.9	(39/2$^-$)	280.9 *8*	88 *19*	3163.2	(37/2$^-$)			
		515.1 *8*	100	2928.8	(35/2$^-$)	(E2)	0.0187	
3481.2	(41/2$^+$)	431.2 *2*	100	3049.9	(39/2$^+$)			
		841.6 *5*	17 *6*	2639.5	(37/2$^+$)			
3637.7	(39/2$^+$)	386.6 *8*	60 *20*	3251.0	(37/2$^+$)			
		756.1 *8*	100 *40*	2881.7	(35/2$^+$)			
3737.7?	(37/2$^-$)	666.0[g] *8*	100	3071.7	(33/2$^-$)			
3758.2	(41/2$^-$)	314.6 *8*	59 *21*	3443.9	(39/2$^-$)			
		594.9 *8*	100	3163.2	(37/2$^-$)			
3780.2	(37/2$^-$)	679.2 *8*	100	3101.0	(33/2$^-$)			
3932.3	(43/2$^+$)	451.1 *2*	100	3481.2	(41/2$^+$)			
		882.9 *5*	17 *6*	3049.9	(39/2$^+$)			
4041.3	(41/2$^+$)	403.7[g] *8*	≤33	3637.7	(39/2$^+$)			
		790.3 *8*	100 *33*	3251.0	(37/2$^+$)			
4101.5	(43/2$^-$)	343.4 *8*	100 *20*	3758.2	(41/2$^-$)			
		657.5 *8*	90 *20*	3443.9	(39/2$^-$)	(E2)	0.01049	
4402.9	(45/2$^+$)	470.6 *5*	100	3932.3	(43/2$^+$)			
		921.5 *5*	25 *7*	3481.2	(41/2$^+$)			I_γ: from 1997Ko13 in (^{7}Li,4nγ) E=45 MeV.
4471.7	(45/2$^-$)	713.5 *8*	100	3758.2	(41/2$^-$)			
4508.8	(41/2$^-$)	728.6 *8*	100	3780.2	(37/2$^-$)			E_γ: 728.6 *3* in (^{7}Li,4nγ) E=38 MeV for line which was partly associated with the 1/2[541] band; see comment on 2610+x level in that dataset.
4865.2	(47/2$^-$)	763.7 *8*	100	4101.5	(43/2$^-$)			
4891.9	(47/2$^+$)	488.9 *5*	100	4402.9	(45/2$^+$)			
		959.8 *5*	37 *10*	3932.3	(43/2$^+$)			I_γ: from 1997Ko13 in (^{7}Li,4nγ) E=45 MeV.
5269.3?	(45/2$^-$)	760.5[g] *8*	100	4508.8	(41/2$^-$)			
5391.8	(49/2$^+$)	500.0 *5*	100	4891.9	(47/2$^+$)	[M1]	0.0521	B(M1)(W.u.)=2.225×10^{-6} *+300−14*
		988.8 *5*	44 *4*	4402.9	(45/2$^+$)	[E2]	0.00439 *7*	B(E2)(W.u.)=5.6×10^{-5} *+9−7* I_γ: from 2004Ko58 in (^{7}Li,4nγ) E=45 MeV.
5397.9?	(49/2$^+$)	506[g] *1*		4891.9	(47/2$^+$)			
		995[g] *1*		4402.9	(45/2$^+$)			
5745.1	(51/2$^-$)	353.3 *5*	100	5391.8	(49/2$^+$)			
5919.1	(51/2$^+$)	527.3 *5*	100	5391.8	(49/2$^+$)			
5953.7	(53/2$^+$)	208.6 *5*	100	5745.1	(51/2$^-$)	(E1)	0.0546 *9*	Mult.: from intensity balance in (^{7}Li,4nγ) E=45 MeV if order of 353.3γ and 208.6γ shown here is correct.

† From ^{176}Yb(^{7}Li,4nγ) E=45 MeV, except as noted. ΔE_γ is 0.1-0.2 keV for strong, well-resolved transitions, and ≤0.8 keV for all others; the evaluator assigns ΔE=0.2 or 0.8 keV to these data as indicated in the ^{176}Yb(^{7}Li,4nγ) E=45 MeV dataset.

γ(^{179}Ta) (continued)

‡ Photon branching from (^{7}Li,4nγ) E=45 MeV, except as noted. Most data from (^{7}Li,4nγ) E=38 MeV and from (d,2nγ) and (p,2nγ) are consistent with adopted branching within the 30% uncertainty assigned to these data (ΔIγ=8%−30% for Iγ from (^{7}Li,4nγ) E=38 MeV and 5%−30% for Iγ from (d,2nγ) and (p,nγ)); major exceptions are noted.

ΔJ is from $\gamma(\theta)$ in ^{176}Yb(^{7}Li,4nγ) E=45 MeV, except as noted; additionally, $\Delta\pi$=(no) is assigned for intraband transitions.

@ From ^{176}Yb(^{7}Li,4nγ) E=38 MeV, assigning $\Delta\pi$=(no) for intraband transitions.

& From ce data in ^{179}W ε decay (6.40 min).

[a] Weighted average from (d,2nγ) and (^{7}Li,4nγ) E=38 MeV.

[b] Weighted average from (d,2nγ), (^{7}Li,4nγ) E=38 MeV and (^{7}Li,4nγ) E=45 MeV.

[c] Weighted average from (^{7}Li,4nγ) E=38 MeV and (^{7}Li,4nγ) E=45 MeV.

[d] From (d,2nγ). ΔE_{γ}=0.1 to 0.3 for these data; the evaluator assigns ΔE as indicated in the (d,2nγ) dataset.

[e] From (^{7}Li,4nγ) E=38 MeV. ΔE_{γ}=0.1 to 0.3 for these data; the evaluator assigns Δ(Eγ)=0.3 keV to all data.

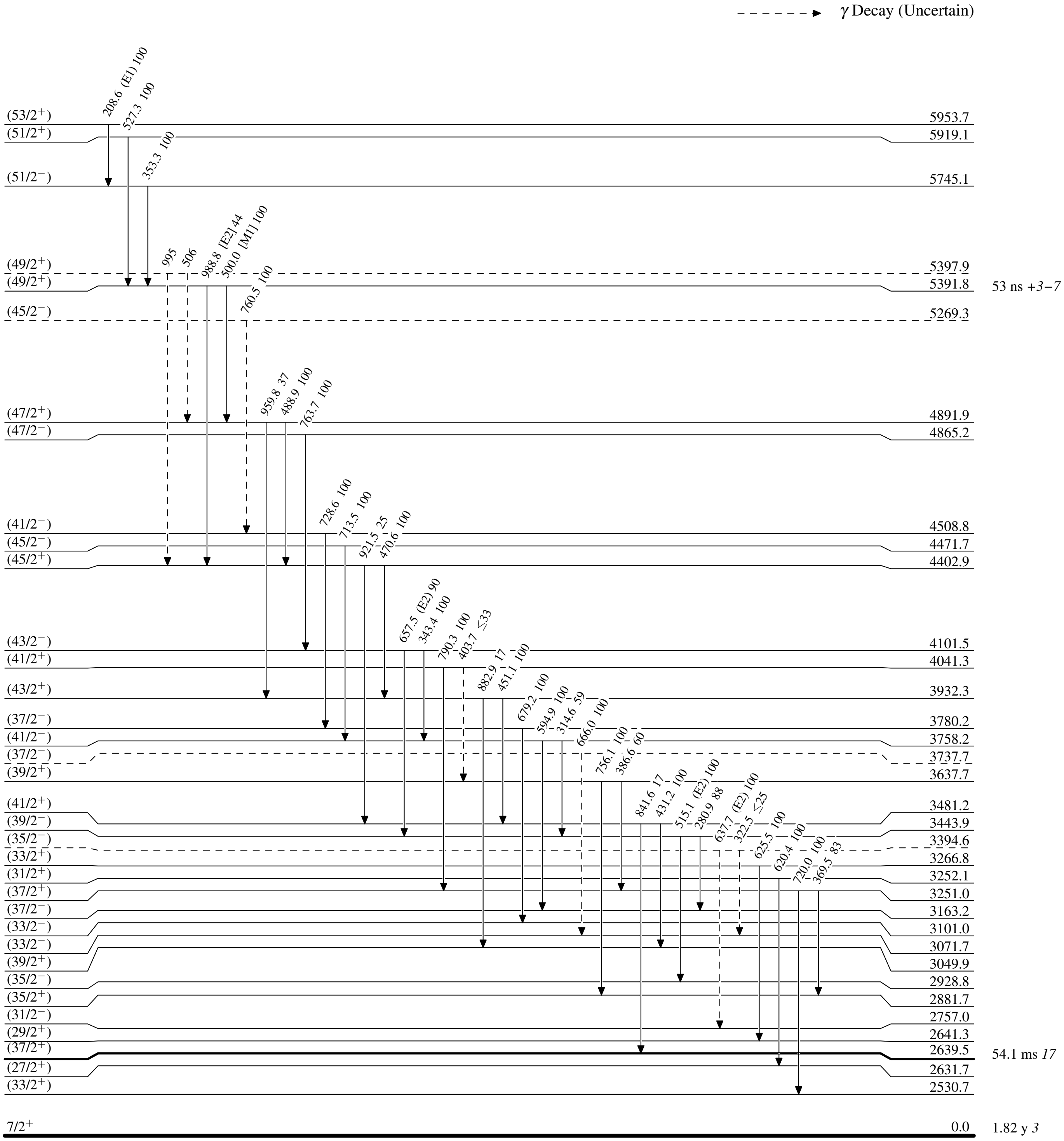
[f] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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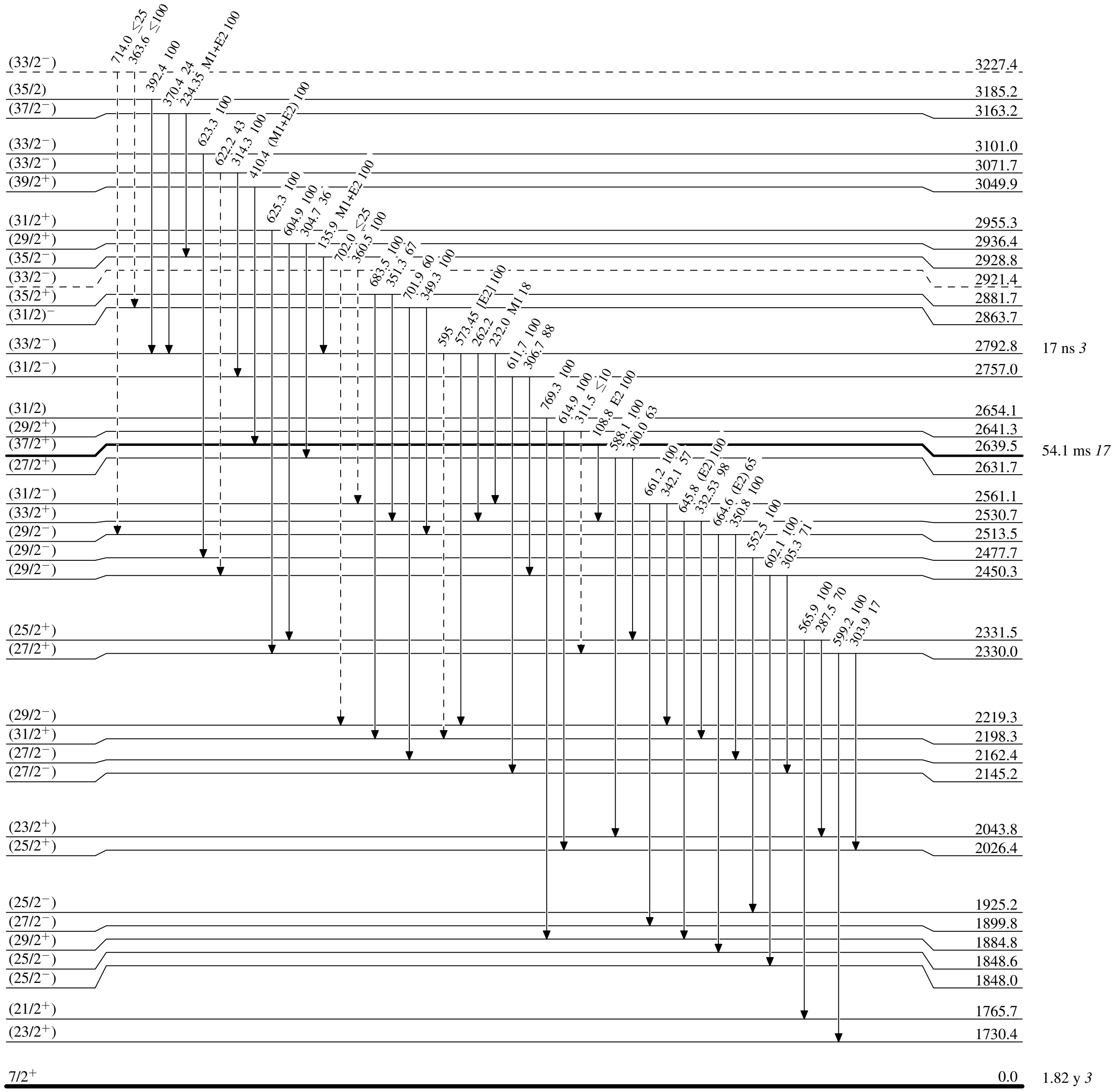
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - ► γ Decay (Uncertain)



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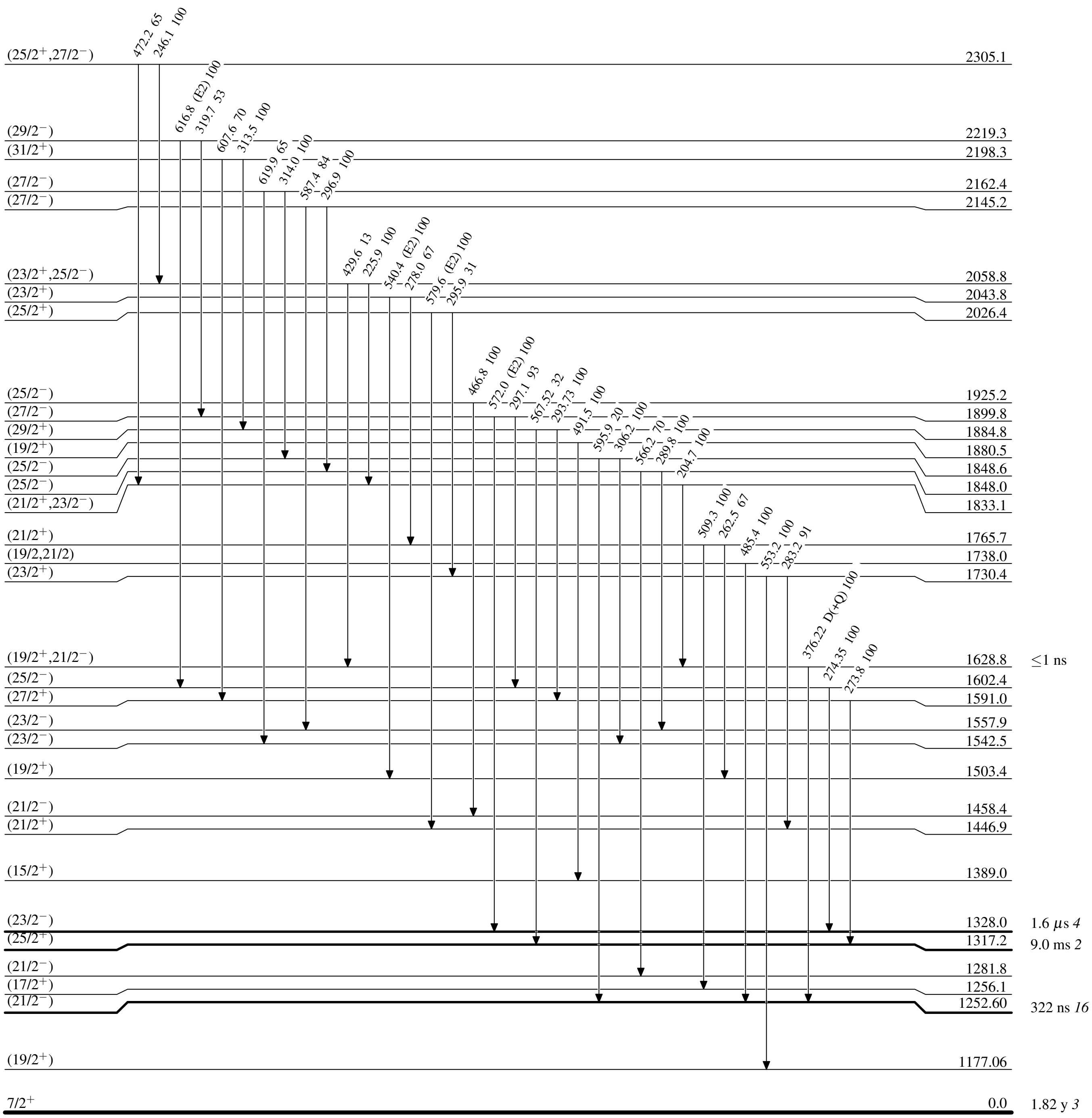
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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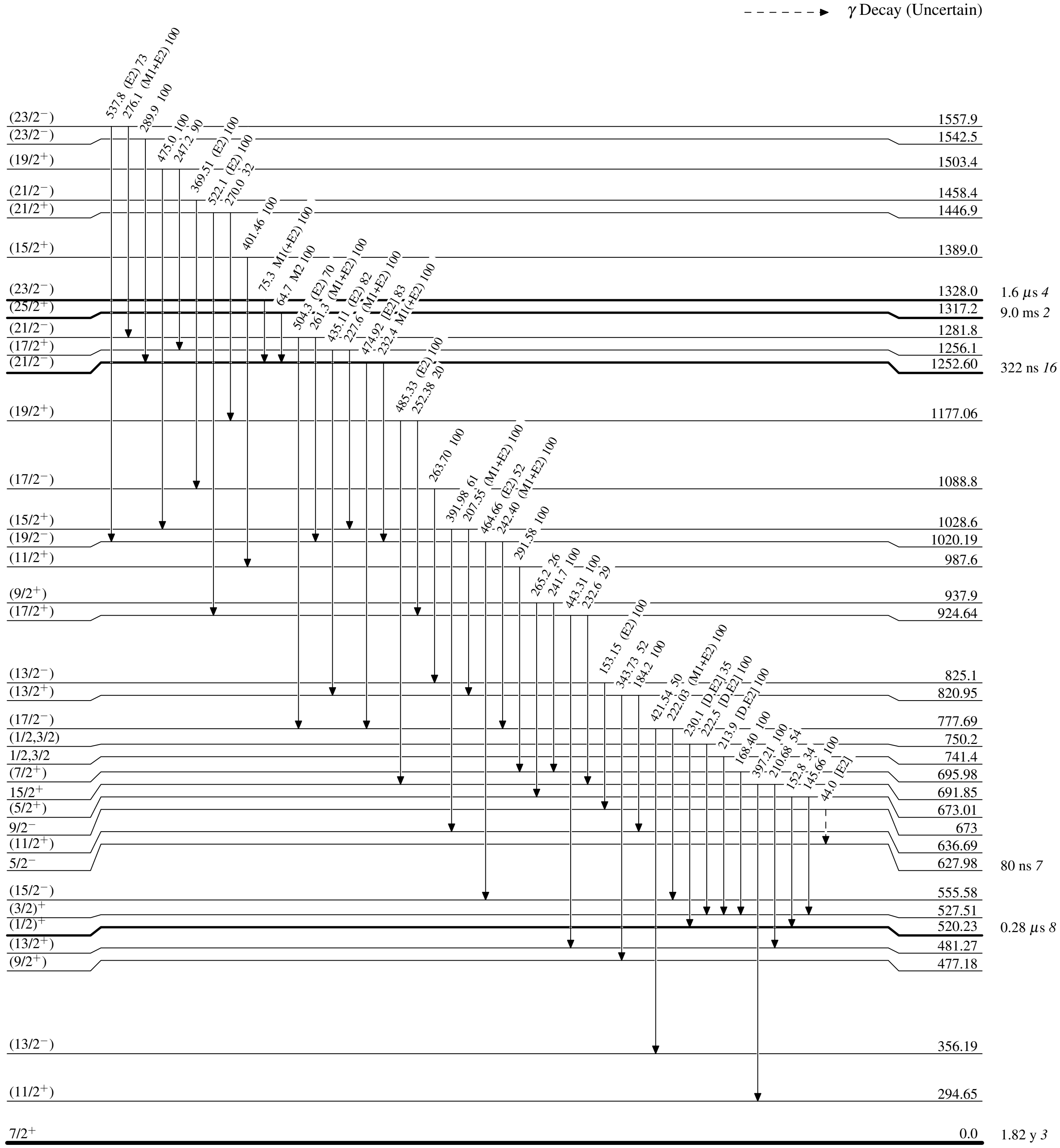
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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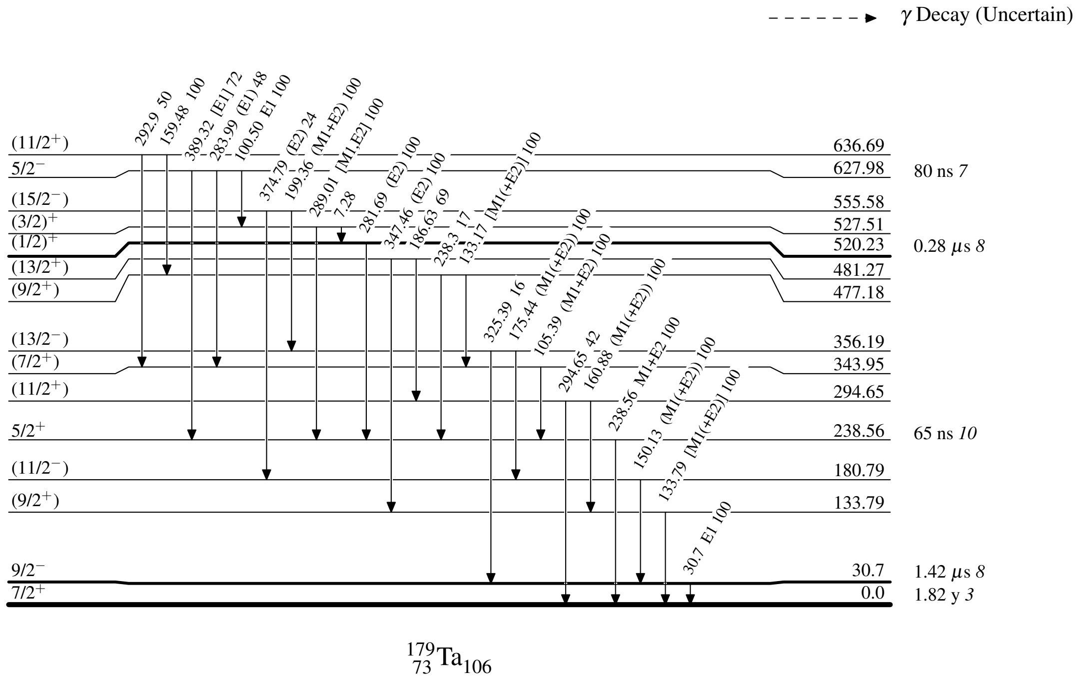
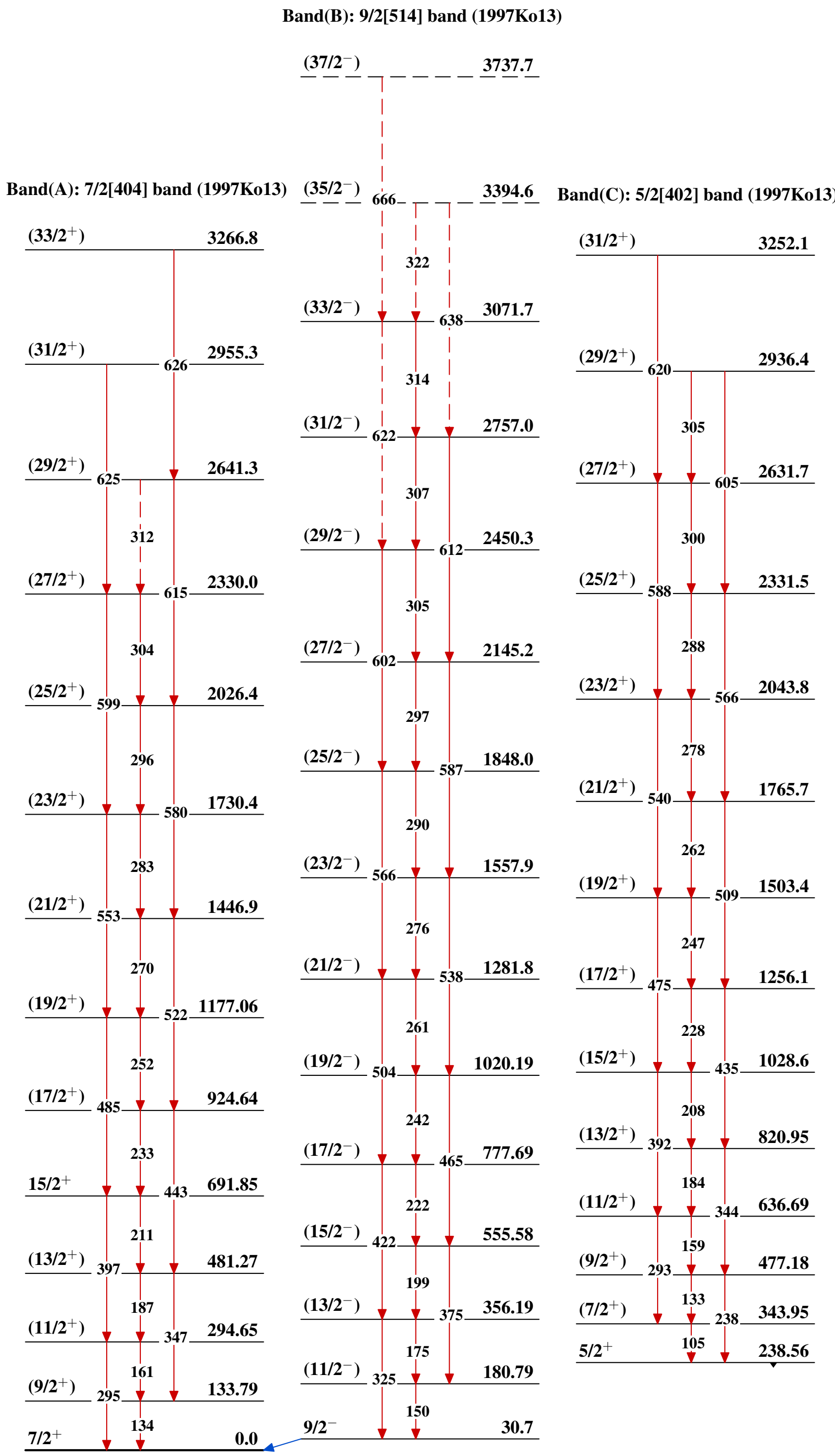
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas



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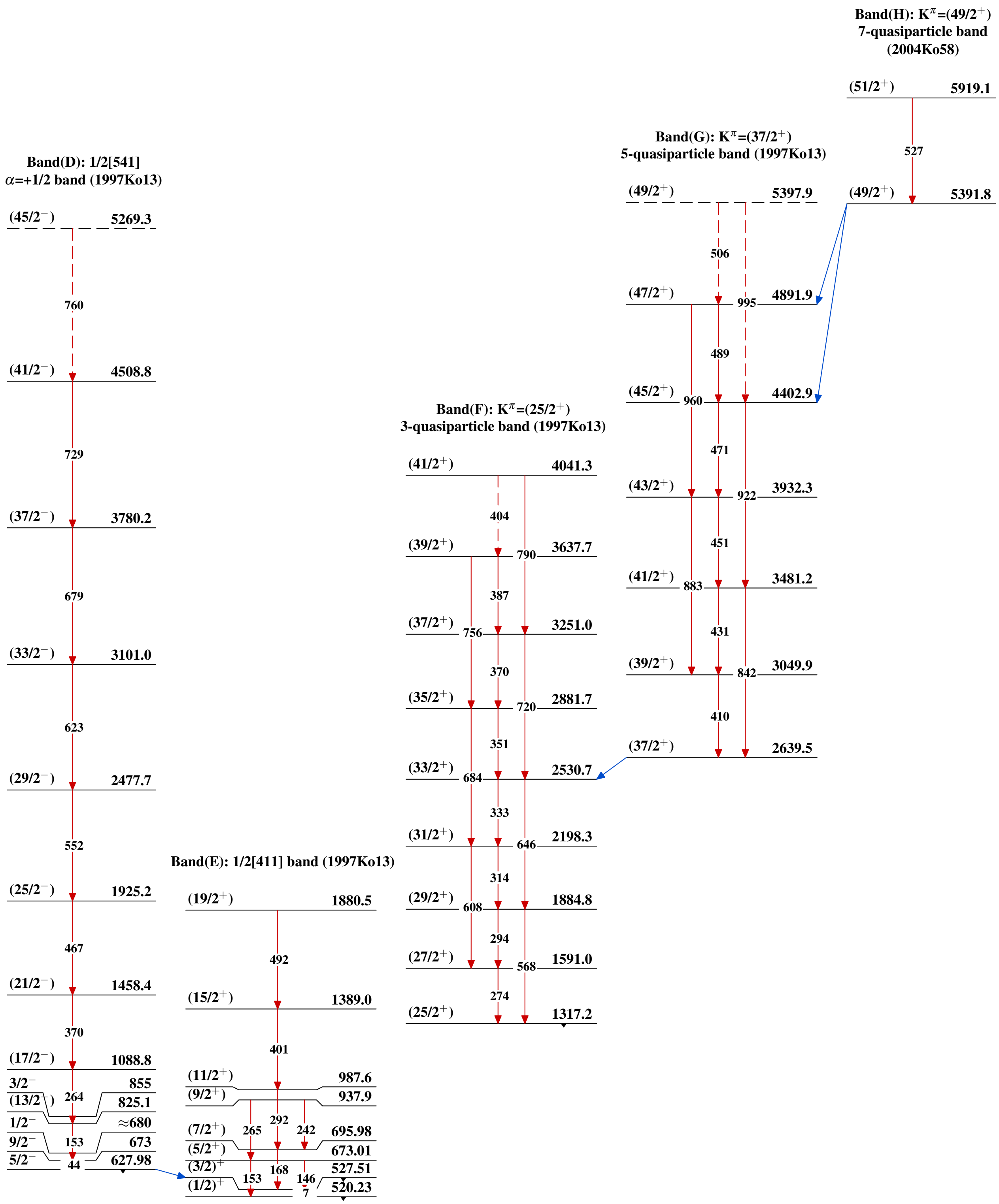
Adopted Levels, Gammas (continued)



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Adopted Levels, Gammas (continued)