Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 130, 21 (2015)	15-Jul-2015

Q(β^-)=1814.5 *17*; S(n)=6062.94 *11*; S(p)=6316.9 *22*; Q(α)=1481.6 *30* 2012Wa38
S(2n)=13639.7 *13*, S(2p)=14330 *70* (2012Wa38).
There are about 690 neutron resonances known in the energy region: E(n)=4.28 to 3996.7 eV. See ^{181}Ta(n,γ):resonances dataset for energies and width parameters.
Additional information 1.
Structure calculations:
2002Co07 (levels, configurations, particle-rotor model); 1989Ja04 (levels, band structures); 1982Si06 (2-quasiparticle band energies); 1972Ga29 (structure of g.s. and isomer of ^{182}Ta); 1971Re13 (Coriolis coupling analysis of bands in ^{182}Ta).
First identifications of ^{182}Ta in (n,γ): Physik Z. Sowjetunion 9, 273 (1936); 1938Oldenberg: Phys. Rev 53, 35; Naturwissenschaften 28, 578 (1940). For later studies of the decay of this isotope, see ^{182}Ta β^- decay dataset.

^{182}Ta Levels

The band assignments are from (n,γ) E=thermal, and from ‘finger-print’ method for π7/2[404]⊗ν1/2[510] and π7/2[404]⊗ν3/2[512] configurations in (d,p) (1971Re13).

Cross Reference (XREF) Flags

A	^{182}Hf β^- decay (8.90×10^6 y)	E	^{181}Ta(n,γ) E=thermal	I	^{181}Ta(n,γ) E=2 keV
B	^{182}Hf β^- decay (61.5 min)	F	^{181}Ta(n,γ) E=0.4-49.2 eV	J	^{181}Ta(d,p)
C	^{182}Ta IT decay (283 ms)	G	^{181}Ta(n,γ) E=0.002-3 keV		
D	^{182}Ta IT decay (15.84 min)	H	^{181}Ta(n,γ) E=4.28, 10.36 eV		

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0[&]	3$^-$	114.74[@] d *12*	ABCDEFGHIJ	%β^-=100 μ=(+)3.02 *3* (1980Al27,2014StZZ) Q=+2.6 *3* (1991Fa12,2013StZZ,2014StZZ) J$^\pi$: 3$^-$,4$^-$ from (n,γ) E=0.002-3 keV and E=2 keV; log *ft*=8.35 to 2$^-$ level in ^{182}W rules out 4$^-$. μ: NMR on oriented nuclei (1980Al27). Other: (+)3.02 *6* (1980De22). Q: NQR on oriented nuclei (1991Fa12,1983Fa18).
16.273[h] *4*	5$^+$[#]	283 ms *3*	BCDE GHI	%IT=100 T$_{1/2}$: from IT decay (1968Cl06).
97.8304[&] *16*	4$^-$		AB EFGHIJ	J$^\pi$: M1 γ to 3$^-$, M1 γ from 5$^-$.
114.3126[a] *17*	4$^-$		AB EFGHIJ	J$^\pi$: 3$^-$,4$^-$ from (n,γ) E=0.002-3 keV, (M1) γ from 5$^-$.
150.150[i] *3*	4$^+$		E GHI	J$^\pi$: M1 γ to 5$^+$, γ to 3$^-$.
163.047[h] *4*	6$^+$	<30 ps	B DE H	T$_{1/2}$: from (ce)(ce)(t) in ^{182}Ta IT decay (15.84 min) (1968Ho11). J$^\pi$: M1 γ to 5$^+$; not observed in (n,γ) E=0.002-3 keV where all low-lying 4$^+$ levels should be populated; no primary γ from 3$^+$,4$^+$ capture state; K^π=5$^+$ band member.
173.2370[b] *21*	5$^-$[#]		B EFG IJ	
237.2860[&] *20*	5$^-$[#]		B EFGHIJ	
245.5 *10*			G	
249.982[j] *3*	(3)$^+$		EFGHI	J$^\pi$: 3$^+$,4$^+$ from (n,γ) E=0.002-3 keV, band member.
269.047[i] *3*	(5)$^+$		E H j	J$^\pi$: parity from (n,γ) E=0.002-3 keV, M1 γ to 4$^+$; band assignment.
270.4027[c] *21*	2$^-$[#]	1.2 ns *2*	A EFGHIj	T$_{1/2}$: from $\gamma\gamma$(t) in (n,γ) E=thermal (1974An12).
292.9352[a] *22*	5$^-$[#]		B EFGHIJ	

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Adopted Levels, Gammas (continued)

^{182}Ta Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
316.403[b] *3*	6^-		B E J	Jπ: γ from 7^-, γ to 4^-, not observed in (n,γ) E=0.002-3 keV.
331.2 *7*	$2^+,5^+$[#]		I	
334.627[h] *5*	7^+	<30 ps	B DE H	$T_{1/2}$: from (ce)(ce)(t) in ^{182}Ta IT decay (15.84 min) (1968Ho11). Jπ: E3 γ from 10^-.
360.518[c] *3*	3^-		EFGHIJ	Jπ: $3^-,4^-$ for (n,γ) E=0.002-3 keV, band assignment in (d,p).
364.359[j] *3*	4^+		E GH	Jπ: $3^+,4^+$ from (n,γ) E=0.002-3 keV, γ from 5^-.
390.154 *7*	$(6)^+$		B E H	Jπ: M1 to 5^+; γ from (7^-); possible configuration=$K^\pi=6^+$, $\pi9/2[514]+\nu3/2[512]$.
396.335[&] *4*	(6^-)		E H J	Jπ: (M1) γ to 5^-; γ to 6^+; band assignment.
402.626[d] *4*	2^+	1.00 ns *5*	E HI	$T_{1/2}$: from γγ(t) in (n,γ) E=thermal (1974An12). Jπ: $2^+,5^+$ from (n,γ) E=0.002-3 keV, γ to 2^-.
411.306[i] *7*	(6^+)		E	Jπ: (M1) γ to $(5)^+$; band assignment.
443.610[m] *3*	1^-	2.2 ns *2*	E H	$T_{1/2}$: from γγ(t) in (n,γ) E=thermal (1974An12). Jπ: M1 γ to 2^-, not observed in (n,γ) E=0.002-3 keV.
458.2 *12*			G	
475.558[d] *6*	$(3)^+$		E I	Jπ: $3^+,4^+$ from (n,γ) E=2 keV, band assignment.
480.036[c] *3*	4^-		EFGHIJ	Jπ: $3^-,4^-$ from (n,γ) E=0.002-3 keV, γ to 6^-; band assignment in (d,p).
488.247[a] *3*	6^-		B E J	Jπ: γ to 4^-, γ from 7^-, band assignment in (d,p).
491.423[m] *3*	2^-[#]		EFGHI	
505.613[j] *3*	5^+[#]		EFGHI	
519.577 *16*	10^-	15.84 min *10*	B D	%IT=100 $T_{1/2}$: from it decay (1966Bi10). Others: 16.2 min *5* (1947Se33), 16.4 min (1948Ho37), 16 min *2* (1950Wi67). Jπ: M4 γ to 6^+; possible configuration=$K^\pi=10^-$, $\pi9/2[514]+\nu11/2[615]$.
547.1030[k] *25*	$(3)^-$		EFGHI	Jπ: $3^-,4^-$ from (n,γ) E=0.002-3 keV, band assignment.
558.286[f] *3*	$(1)^-$		E H J	Jπ: M1 γ to 1^-, M1 γ from 2^-, not observed in (n,γ) E=0.002-3 keV.
565.693[m] *3*	$(3)^-$		EFG I	Jπ: $3^-,4^-$ in (n,γ) E=0.002-3 keV, (M1) to 2^-.
571.638[d] *6*	4^+		E GHIJ	Jπ: $3^+,4^+$ from (n,γ) E=0.002-3 keV, band assignment.
579.436[i] *6*	(7^+)		E H	Jπ: γs to 5^+ and 7^+; band assignment.
581.196[&] *12*	(7^-)		E	Jπ: γs to 5^- and (6^-); band assignment.
583.272[f] *4*	(0^-)		E H J	Jπ: γ to 1^-; band assignment.
592.960[e] *4*	$(1)^+$		E H	Jπ: E2 γ to 2^+; γs to 2^- and 1^-; band assignment.
628.425[c] *4*	5^-[#]		EFG IJ	
647.431[e] *5*	(2^+)		E	Jπ: γ to 1^+, band assignment.
647.652[l] *3*	$(2)^-$		E H	Jπ: E2 γ to 2^-, band assignment.
651.215[k] *3*	$(4)^-$		EFG I	Jπ: $3^-,4^-$ from (n,γ) E=0.002-3 keV, band assignment.
652.37 *11*	(9^-)		B	Jπ: (M1) γ to 10^-; log *ft*=6.3 from (8^-); Possible configuration=$K^\pi=9^-$, $\pi9/2[514]+\nu9/2[624]$.
659.862[m] *3*	$(4)^-$		EFGHI	Jπ: $2^-,3^-,4^-$ from (n,γ) E=0.002-3 keV, M1 γ to $(3)^-$; (M1) γ from 5^-.
662.8 *10*			G	
666.149[f] *4*	2^-[#]		EFGHIJ	
673.041[j] *4*	(6^+)		E H	Jπ: γs to 4^+, 6^+ and (6^-); band assignment.
696.0			J	
701.967[f] *4*	3^-		EFGHIJ	XREF: J(705.0). Jπ: $(3)^-$ from (n,γ) E=0.002-3 keV, M1 γ to 2^-.
719.552[l] *3*	$(3)^-$		EFGHI	Jπ: $3^-,4^-$ from (n,γ) E=0.002-3 keV, γ to $(1)^-$.
723.981[e] *6*	3^+		E	Jπ: γs to 2^-, 2^+ and 4^+.
740.132[n] *3*	$(2)^-$		EFGHI	Jπ: $2^-,3^-,4^-$ from (n,γ) E=0.002-3 keV; γ to 1^-, band assignment.
749.080 *5*	$(3)^+$		E H	Jπ: M1 γ to 2^+; γs to 1^- and 5^+ Possible configuration=$\pi5/2[402]$-$\nu11/2[615]$, $K^\pi=3^+$.

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Adopted Levels, Gammas (continued)

^{182}Ta Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
776.391 *25*	(7⁻)	B E J	Jπ: γs to 5⁻ and 6⁺; γ from 7⁻; proposed configuration is K^{π}=7⁻, π7/2[404]+ν7/2[503] in (d,p) from σ data; absence of primary γ from 3⁺,4⁺ capture state supports high spin.
781.396[k] *4*	5⁻[#]	Efg i	
782.538[m] *4*	(5⁻)	EFg i	Jπ: (M1) γ to (4)⁻; band assignment.
791.0 *16*		G	
805.071[c] *13*	(6⁻)	E J	Jπ: γs to 4⁻ and 6⁻; band assignment.
817.021[l] *4*	(4)⁻	EFGHI	Jπ: 3⁻,4⁻ from (n,γ) E=0.002-3 keV, band assignment.
830.5 *16*		G	
835.289[n] *5*	3⁻	EFGHI	Jπ: 3⁻,4⁻ from (n,γ) E=0.002-3 keV, γ to 1⁻.
843.30 *25*	3⁻,4⁻,5⁻[#]	FG IJ	
856.052[f] *4*	(4)⁻	EFGHI	Jπ: M1,E2 γ to 3⁻; γ to 5⁻ and 2⁻; band assignment.
866.3 *4*	2⁻,5⁻[#]	G IJ	
881.4 *6*	3⁺,4⁺,5⁺[#]	EFG I	
897.80 *25*	3⁻,4⁻[#]	EFG IJ	
909.8 *6*	5⁻[#]	EfG I	
915.4 *5*	3⁻,4⁻[#]	EfG I	
935.8 *13*	(2 to 5)⁺[#]	I	
939.634[l] *5*	5⁻[#]	EFGHI	
960.415[n] *6*	(4⁻)	EfGHI	Jπ: (M1) γ to 3⁻; band assignment; assigned 3⁻,4⁻ in (n,γ) E=0.002-3 keV, but this level is not resolved from 960.5 level.
960.528[f] *5*	(5⁻)	Ef	Jπ: γs to (4)⁻ and 3⁻; band assignment, not resolved from 960.4 in (n,γ) E=0.002-3 keV.
987.0 *8*	3⁻,4⁻[#]	EFG I	
1000.3 *6*	3⁻,4⁻[#]	E G	
1003.4 *3*	2⁻,5⁻[#]	I	
1021.6 *15*	3⁺,4⁺[#]	G	
1028.2 *6*	3⁻,4⁻[#]	EFG I	
1049.9 *9*	3⁻,4⁻[#]	FG I	XREF: F(1054.2).
1057.3 *6*	3⁻,4⁻[#]	EFG I	
1082.0 *5*	3⁻,4⁻[#]	EFG I	
1101.2 *8*	5⁻[#]	EFG I	
1113.6 *5*	5⁻[#]	EFG I	
1115.96[g] *5*	(7⁻)	B	Jπ: log *ft*=4.61 from (8⁻); γ to 5⁻.
1125.0 *15*	(2⁻,5⁻)[#]	EFG I	
1136.9 *6*	3⁻,4⁻[#]	EFG I	
1150.4 *5*	3⁻,4⁻[#]	EFG I	
1170.4 *6*	3⁻,4⁻[#]	EFG I	
1196.0 *10*	2⁻,3⁻,4⁻[#]	FG I	
1203.1 *18*	3⁺,4⁺,5⁺[#]	G	
1216.1 *11*	2⁻[#]	G I	
1229.7 *5*	3⁻,4⁻[#]	EFG I	
1240.4 *5*	3⁻,4⁻[#]	EFG I	
1260.1 *5*	3⁻,4⁻[#]	EFG I	
1269.5 *5*	3⁻,4⁻[#]	EFG I	
1279.8 *5*	3⁻,4⁻[#]	EFG I	
1284.4 *5*	3⁻,4⁻[#]	G	

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Adopted Levels, Gammas (continued)

^{182}Ta Levels (continued)

E(level)†	Jπ‡	XREF	Comments
1289.5 *7*		I	
1298.6 *10*	2,3,4,5#	G	
1302.5 *6*	$3^-,4^-$#	FG IJ	
1321.0 *15*	$3^-,4^-$#	fG I	
1326.0 *22*	5^-#	fG	
1332.5 *15*		E	
1336.84g *12*	(8^-)	B	Jπ: log *ft*=5.1 from (8^-); band member.
1350.5 *9*	$3^-,4^-$#	G	
1360.4 *8*	5^-#	G	
1371.1 *5*	$3^-,4^-$#	E G I	
1377.3 *14*	$3^-,4^-$#	G I	
1389.0 *5*	$3^-,4^-$#	E G I	
1393.4 *8*	$3^-,4^-$#	G I	
1396.2 *8*		E	
1416.7 *15*	$3^-,4^-$#	G I	
1433.2 *5*		E	
1445.1 *16*	$3^-,4^-$#	E G I	
1452.2 *30*	$3^-,4^-$#	G	
1471.9 *7*	$3^-,4^-$#	G	
1479.7 *5*	$3^-,4^-$#	G j	
1482.9 *6*		E j	
1490.4 *15*	$3^-,4^-$#	G j	
1496.4 *5*	$3^-,4^-$#	E G J	XREF: J(1511).
1527.1 *5*	$3^-,4^-$#	E G	
1538.1 *15*	3,4,5#	G j	
1541.7 *6*	$3^-,4^-$#	G j	
1545.6 *23*	2^-#	G j	
1551.6 *5*	5^-#	G j	
1555.7 *8*	5^-#	G	
1570.8 *12*	2^-#	G J	
1577.2 *8*	$3^-,4^-$#	G	
1579.8 *5*		E	
1582.3 *6*	$3^-,4^-$#	G	
1604.9 *17*	$3^-,4^-$#	E G	
1612.0 *8*	$3^-,4^-$#	G j	
1617.5 *25*	$3^-,4^-$#	E G j	
1628.3 *8*	$3^-,4^-$#	G J	
1635.6 *8*	$3^-,4^-$#	G	
1641.8 *15*	$3^-,4^-$#	G	
1646.1 *20*	(2 to 5)	G	Jπ: primary γ from $3^+,4^+$.
1650.5 *27*	5^-#	G	
1657.6 *6*	$2^-,3^-,4^-$#	G j	
1661.7 *6*	5^-#	G j	
1667.0 *15*	(2 to 5)	G j	Jπ: primary γ from $3^+,4^+$.
1674.3 *6*	$3^-,4^-$#	G	
1679.6 *5*	$3^-,4^-$#	E G	

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Adopted Levels, Gammas (continued)

^{182}Ta Levels (continued)

E(level)†	J^{π}‡	XREF	Comments
1695.4 *5*	$3^-,4^-$#	E G J	
1701.1 *15*	$3^-,4^-$#	G	
1711.6 *12*	$3^-,4^-$#	G j	
1714.1 *5*		E j	
1724.7 *9*	$3^-,4^-$#	G	
1734.1 *9*	3,4#	G	
1746.5 *9*	$3^-,4^-$#	E G j	
1756.3 *14*	5^-#	G j	
1762.5 *12*	5^-#	G j	
1765.9 *19*	(2 to 5)	G j	J^{π}: primary γ from $3^+,4^+$.
1769.6 *10*	3,4#	G j	
1778.3 *12*	$3^-,4^-$#	G	
1803 *7*		J	
1827 *7*		J	
1843.0 *5*		E J	XREF: J(1853).
1890.2 *5*		E J	
1905.0 *5*		E J	
1924.5 *6*		E	
1944.8 *6*		E	
1960.3 *6*		E J	
1984 *7*		J	
2009.0 *5*		E	
2017.2 *5*		E	
2029.7 *5*		E J	
2043 *7*		J	
2055 *7*		J	
2080.8 *6*		E	
2146 *7*		J	
2160.6 *7*		E J	
2180.2 *5*		E	
2274 *7*		J	
2369 *7*		J	
2394 *7*		J	
2420 *7*		J	
2478 *7*		J	
2659 *7*		J	
2674 *7*		J	
(6062.92 *11*)	$3^+,4^+$	E	E(level): S(n)=6062.94 *11* (2012Wa38), neutron capture state. J^{π}: s-wave capture in $7/2^+$ g.s. of ^{181}Ta. Component of J=4 is deduced as 73% *24* from (pol n,γ) experiment (1970Ei04) with circular polarization of integral γ-ray spectrum in 1.7-8 MeV region.
(6064.94 *11*)	$3^+,4^+$	I	E(level): S(n)+2 keV, where S(n)=6062.94 *11* (2012Wa38). J^{π}: s-wave capture in $7/2^+$ g.s. of ^{181}Ta.

† From least-squares fit to Eγ data. Reduced χ^2=3.2 as compared to critical χ^2=1.3. Nine γ rays out of 211 γ rays deviate by 3 or more σ values.

‡ For levels populated by ^{182}Ta(n,γ) E=0.002-3 keV 1977St15 excited 19 (n,γ) resonances between 4-200 eV with known spin and parity (3^+ or 4^+). They also excited broad resonances at 20-100, 100-200, 200-400, 600-1000, and 1000-3000 eV. From the relative intensity of primary γ rays in broad resonance capture, strong M1,E1 feeding J=3,4 levels was distinguished from weak M1,E1 feeding to J=2,5 levels. Population by discrete resonance capture γ rays allowed discrimination between J=2 and J=5. All low-lying levels with J=2,3,4,5 are assumed to be populated by the resonance capture.

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Adopted Levels, Gammas (continued)

^{182}Ta Levels (continued)

From (n,γ) E=0.002-3 keV.

@ The following measured values (in days) have been used in the different averaging procedures in the AVETOOLS computer code available at ANU website to arrive at the recommended value: 114.43 *4* (1980Sc07,4π ionization chamber), 114.740 *24* (1973Vi13, well-type NaI(Tl) detector, authors quoted uncertainty of 0.08 is 3.3σ), 115.0 *2* (1972Em01,4π ionization chamber), 117.3 *10* (1967Wa29, differential ionization chamber), 118.4 *5* (1958Sp17, GM counter), 114.80 *12* (1958Ke26), 115.05 *25* (1957Wr37, single-ion chamber, same group as 1972Em01 but different experimental setup used), 111.2 *5* (1952Ei12, single-ion chamber), 111 *1* (1951Si25, single-ion chamber), 117.5 *18* (Meitner, Ann.Phys. 6, 113 (1948)), 117 *3* (1947Se33), 117 *3* (Zumstein et al., Phys.Rev. 63, 59 (1943)). Others: 97 *8* (Oldenberg: Phys Rev 53, 35 (1938), 200 *100* (Fomin and Houtermans: Physik Zeits d. Sowjetunion 9, 273 (1936). The above measurements present a discrepant set of values; the weighted average or the LWM methods, both giving 114.62 *12*, are unacceptable with normalized χ^2=15.5. The normalized residuals method (NRM) gives 114.74 *5* with normalized χ^2=3.8, somewhat larger than the critical χ^2; with the following uncertainties adjusted: 0.04 to 0.12 in 1980Sc07, 0.5 to 1.4 in 1958Sp17 and 1952Ei12, 1 to 1.4 in 1951Si25. The Rajeval (RT) method gives 114.744 *23* with χ^2=2.2, but with larger adjustments in the uncertainties. Selection of the five most precise data points (1980Sc07,1973Vi13, 1972Em01,1958Ke26,1957Wr37) gives 114.739 *23* with χ^2=2.2 using the NRM method, with uncertainty adjustment from 0.04 to 0.14 in 1980Sc07. Weighted average and the LWM method give 114.62 *12*, still suffer from high χ^2 of 10.5. Thus the evaluators recommend value of 114.739 *23* from NRM method used on five most precise data points, but with uncertainty increased to 0.1%, to account for any systematic uncertainties which may not have been included in some of the precisely quoted measurements used in the present analysis.

& Band(A): $K^\pi=3^-$,π7/2[404]-ν1/2[510].
[a] Band(B): $K^\pi=4^-$,π7/2[404]+ν1/2[510].
[b] Band(C): $K^\pi=5^-$,π7/2[404]+ν3/2[512].
[c] Band(D): $K^\pi=2^-$,π7/2[404]-ν3/2[512].
[d] Band(E): $K^\pi=2^+$,π7/2[404]-ν11/2[615].
[e] Band(F): $K^\pi=1^+$,π7/2[404]-ν9/2[624].
[f] Band(G): $K^\pi=0^-$,π7/2[404]-ν7/2[503].
[g] Band(H): $K^\pi=7^-$,π7/2[404]+ν7/2[514].
[h] Band(I): $K^\pi=5^+$,π9/2[514]+ν1/2[510].
[i] Band(J): $K^\pi=4^+$,π9/2[514]-ν1/2[510].
[j] Band(K): $K^\pi=3^+$,π9/2[514]-ν3/2[512].
[k] Band(L): $K^\pi=3^-$,π5/2[402]+ν1/2[510].
[l] Band(M): $K^\pi=2^-$,π5/2[402]-ν1/2[510].
[m] Band(N): $K^\pi=1^-$,π5/2[402]-ν3/2[512].
[n] Band(O): $K^\pi=2^-$,π1/2[411]+ν3/2[512](?). Configuration is tentative.

$\gamma(^{182}Ta)$

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[&]	δ	α[a]	Comments
16.273	5^+	(16.273 4)	100	0.0	3^-	(M2)		4.30×10^4	B(M2)(W.u.)=6.6×10^{-5} 2 α(L)=3.21×10^4 5; α(M)=8.54×10^3 12; α(N+..)=2.40×10^3 4 α(N)=2.07×10^3 3; α(O)=309 5; α(P)=15.30 22 E_γ: deduced from level-scheme fitting procedure (evaluators). This Eγ is adopted in all the other datasets. Apparently, there is no direct measurement of this energy.
97.8304	4^-	97.8318 19	100	0.0	3^-	M1		4.64	α(K)=3.86 6; α(L)=0.609 9; α(M)=0.1382 20 α(N)=0.0331 5; α(O)=0.00523 8; α(P)=0.000362 5
114.3126	4^-	114.3151 25	100	0.0	3^-	(M1)		2.97	α(K)=2.47 4; α(L)=0.389 6; α(M)=0.0882 13 α(N)=0.0211 3; α(O)=0.00334 5; α(P)=0.000231 4
150.150	4^+	133.877 3	100 11	16.273	5^+	M1(+E2)	<0.5	1.89	α(K)=1.576 22; α(L)=0.247 4; α(M)=0.0561 8 α(N)=0.01343 19; α(O)=0.00213 3; α(P)=0.0001472 21 δ: from ce data in (n,γ) E=thermal.
		150.142 4	1.28 17	0.0	3^-				
163.047	6^+	146.7731 25	100	16.273	5^+	M1		1.460	B(M1)(W.u.)>0.090 α(K)=1.214 17; α(L)=0.190 3; α(M)=0.0432 6 α(N)=0.01033 15; α(O)=0.001636 23; α(P)=0.0001133 16
173.2370	5^-	58.9277 19	65 8	114.3126	4^-	(M1)		3.44	α(L)=2.67 4; α(M)=0.605 9 α(N)=0.1447 21; α(O)=0.0229 4; α(P)=0.001580 23
		75.414 5	100 57	97.8304	4^-	(M1)		9.81	α(K)=8.14 12; α(L)=1.296 19; α(M)=0.294 5 α(N)=0.0703 10; α(O)=0.01113 16; α(P)=0.000769 11
237.2860	5^-	122.9727 25	55 6	114.3126	4^-	(M1+E2)		2.0 4	α(K)=1.3 7; α(L)=0.6 3; α(M)=0.14 7 α(N)=0.033 16; α(O)=0.0045 19; α(P)=0.00011 8
		139.455 3	100 9	97.8304	4^-	M1		1.687	α(K)=1.403 20; α(L)=0.220 3; α(M)=0.0500 7 α(N)=0.01195 17; α(O)=0.00189 3; α(P)=0.0001310 19
		237.287 4	20.9 19	0.0	3^-				
249.982	$(3)^+$	99.8304 22	100 8	150.150	4^+	M1		4.38	α(K)=3.64 5; α(L)=0.575 8; α(M)=0.1303 19 α(N)=0.0312 5; α(O)=0.00494 7; α(P)=0.000341 5
		233.714 4	23.3 17	16.273	5^+				
		249.955[@] 7	2.4 3	0.0	3^-				E_γ: level-energy difference=249.982.
269.047	$(5)^+$	106.006 11	8.4 20	163.047	6^+				
		118.8960 25	100 9	150.150	4^+	M1		2.66	α(K)=2.21 3; α(L)=0.347 5; α(M)=0.0788 11 α(N)=0.0189 3; α(O)=0.00298 5; α(P)=0.000207 3
		252.769 5	15.8 13	16.273	5^+				
270.4027	2^-	156.089 3	9.8 9	114.3126	4^-	E2		0.700	B(E2)(W.u.)=6.3 13 α(K)=0.327 5; α(L)=0.284 4; α(M)=0.0706 10 α(N)=0.01654 24; α(O)=0.00222 4; α(P)=2.26×10^{-5} 4
		172.563 9	0.38 7	97.8304	4^-	[E2]		0.492	B(E2)(W.u.)=0.15 4 α(K)=0.251 4; α(L)=0.184 3; α(M)=0.0456 7 α(N)=0.01069 15; α(O)=0.001443 21; α(P)=1.766×10^{-5} 25
		270.406 4	100 5	0.0	3^-	E2(+M1)	>3	0.120 8	B(E2)(W.u.)=4.1 8 α(K)=0.081 8; α(L)=0.0298 5; α(M)=0.00722 11

$\gamma(^{182}Ta)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[&]	α[a]	Comments
								α(N)=0.00170 *3*; α(O)=0.000239 *5*; α(P)=6.5×10^{-6} *8* δ: from ce data in (n,γ) E=thermal.
292.9352	5⁻	119.700 *3*	47 *6*	173.2370	5⁻	(M1)	2.61	α(K)=2.17 *3*; α(L)=0.341 *5*; α(M)=0.0773 *11* α(N)=0.0185 *3*; α(O)=0.00293 *4*; α(P)=0.000203 *3*
		178.621 *3*	100 *6*	114.3126	4⁻			
		195.111 *3*	82 *6*	97.8304	4⁻			
316.403	6⁻	143.177[@] *3*	100 *9*	173.2370	5⁻	(M1,E2)	1.3 *3*	α(K)=0.9 *5*; α(L)=0.31 *11*; α(M)=0.07 *3* α(N)=0.018 *7*; α(O)=0.0025 *8*; α(P)=7.E−5 *5* E_γ: level-energy difference=143.166.
		218.550 *14*	3.0 *4*	97.8304	4⁻			
334.627	7⁺	65.573[b] *4*		269.047	(5)⁺			
		171.579 *3*	100 *5*	163.047	6⁺	M1	0.940	B(M1)(W.u.)>0.067 α(K)=0.782 *11*; α(L)=0.1224 *18*; α(M)=0.0278 *4* α(N)=0.00664 *10*; α(O)=0.001052 *15*; α(P)=7.29×10^{-5} *11*
		318.381 *23*	14.0 *9*	16.273	5⁺	E2	0.0688	B(E2)(W.u.)>6.2 α(K)=0.0478 *7*; α(L)=0.01604 *23*; α(M)=0.00388 *6* α(N)=0.000913 *13*; α(O)=0.0001293 *19*; α(P)=3.81×10^{-6} *6*
360.518	3⁻	90.120 *6*	29 *14*	270.4027	2⁻			
		246.204 *5*	17.4 *14*	114.3126	4⁻			
		262.666 *16*	2.9 *6*	97.8304	4⁻			
		360.531 *8*	100 *6*	0.0	3⁻	M1,E2	0.09 *4*	α(K)=0.07 *4*; α(L)=0.013 *3*; α(M)=0.0030 *6* α(N)=0.00072 *14*; α(O)=0.00011 *3*; α(P)=6.E−6 *4*
364.359	4⁺	114.376 *3*	100 *10*	249.982	(3)⁺			
		214.207 *3*	33.8 *15*	150.150	4⁺	M1	0.507	α(K)=0.422 *6*; α(L)=0.0658 *10*; α(M)=0.01491 *21* α(N)=0.00357 *5*; α(O)=0.000565 *8*; α(P)=3.92×10^{-5} *6*
		348.086 *7*	14.0 *10*	16.273	5⁺			
390.154	(6)⁺	227.112 *12*	12.1 *24*	163.047	6⁺			
		373.880 *7*	100 *5*	16.273	5⁺	M1,E2	0.08 *4*	α(K)=0.06 *3*; α(L)=0.012 *3*; α(M)=0.0027 *6* α(N)=0.00065 *14*; α(O)=9.9×10^{-5} *25*; α(P)=6.E−6 *3*
396.335	(6⁻)	159.047 *3*	100 *9*	237.2860	5⁻	(M1)	1.164	α(K)=0.968 *14*; α(L)=0.1517 *22*; α(M)=0.0344 *5* α(N)=0.00823 *12*; α(O)=0.001303 *19*; α(P)=9.03×10^{-5} *13*
		233.24 *9*	30 *10*	163.047	6⁺			
		282.026 *12*	13.5 *17*	114.3126	4⁻			
		298.501 *13*	18.3 *17*	97.8304	4⁻			
402.626	2⁺	132.231 *10*	0.72 *19*	270.4027	2⁻	[E1]	0.1772	B(E1)(W.u.)=6.4×10^{-7} *18* α(K)=0.1462 *21*; α(L)=0.0241 *4*; α(M)=0.00546 *8* α(N)=0.001285 *18*; α(O)=0.000191 *3*; α(P)=1.009×10^{-5} *15*
		402.619 *7*	100 *6*	0.0	3⁻	E1	0.01106	B(E1)(W.u.)=3.2×10^{-6} *4* α(K)=0.00928 *13*; α(L)=0.001383 *20*; α(M)=0.000311 *5* α(N)=7.40×10^{-5} *11*; α(O)=1.147×10^{-5} *16*; α(P)=7.27×10^{-7} *11*
411.306	(6⁺)	142.270 *20*	100 *31*	269.047	(5)⁺	(M1)	1.594	α(K)=1.326 *19*; α(L)=0.208 *3*; α(M)=0.0472 *7* α(N)=0.01129 *16*; α(O)=0.00179 *3*; α(P)=0.0001238 *18*

$^{182}_{73}Ta_{109}$-8

Adopted Levels, Gammas (continued)

$\gamma(^{182}Ta)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[&]	α[a]	Comments
411.306	(6^+)	248.268 21	10.6 25	163.047	6^+			
		261.18 3	9 3	150.150	4^+			
		395.01 3	18 4	16.273	5^+			
443.610	1^-	173.204 3	100 7	270.4027	2^-	M1	0.916	B(M1)(W.u.)=0.00098 14 α(K)=0.762 11; α(L)=0.1192 17; α(M)=0.0270 4 α(N)=0.00647 9; α(O)=0.001024 15; α(P)=7.10×10^{-5} 10
		443.591 13	3.10 17	0.0	3^-	[E2]	0.0274	B(E2)(W.u.)=0.0038 5 α(K)=0.0206 3; α(L)=0.00517 8; α(M)=0.001226 18 α(N)=0.000290 4; α(O)=4.24×10^{-5} 6; α(P)=1.722×10^{-6} 25
475.558	$(3)^+$	72.929 6	100	402.626	2^+			
480.036	4^-	119.516 4	60 8	360.518	3^-	(M1)	2.62	α(K)=2.18 3; α(L)=0.342 5; α(M)=0.0776 11 α(N)=0.0186 3; α(O)=0.00294 5; α(P)=0.000204 3
		163.637 10	22 10	316.403	6^-			
		209.633 4	28.0 24	270.4027	2^-			
		242.745 8	17.2 16	237.2860	5^-			
		306.76 3	9.6 16	173.2370	5^-			
		365.73 5	8.4 16	114.3126	4^-			
		382.186 10	100 4	97.8304	4^-	M1,E2	0.07 4	α(K)=0.06 3; α(L)=0.011 3; α(M)=0.0025 6 α(N)=0.00060 13; α(O)=9.2×10^{-5} 24; α(P)=5.E−6 3
		480.022 15	84 12	0.0	3^-			
488.247	6^-	171.868[@] 5	78 15	316.403	6^-			E_γ: level-energy difference=171.844.
		195.329[@] 5	100 9	292.9352	5^-			E_γ: level-energy difference=195.312.
		250.972 6	84 6	237.2860	5^-			
		315.003 11	72 8	173.2370	5^-			
		390.40 3	41 7	97.8304	4^-			
491.423	2^-	47.8096 17	100 26	443.610	1^-	M1	6.35	α(L)=4.92 7; α(M)=1.117 16 α(N)=0.267 4; α(O)=0.0423 6; α(P)=0.00292 4
		130.910 6	9.0 18	360.518	3^-			
		491.26 7	12 4	0.0	3^-			
505.613	5^+	141.245 3	100 15	364.359	4^+	M1	1.627	α(K)=1.353 19; α(L)=0.212 3; α(M)=0.0482 7 α(N)=0.01153 17; α(O)=0.00182 3; α(P)=0.0001264 18
		236.561 4	23.9 18	269.047	$(5)^+$			
		255.607 8	10.0 12	249.982	$(3)^+$			
		268.19 5	6 3	237.2860	5^-			
		332.30 3	7.0 18	173.2370	5^-			
		342.544 23	6.4 15	163.047	6^+			
		355.477 14	12.1 12	150.150	4^+			
519.577	10^-	184.951 15	100 6	334.627	7^+	E3	3.20	B(E3)(W.u.)=2.03×10^{-5} 21 α(K)=0.633 9; α(L)=1.93 3; α(M)=0.501 7 α(N)=0.1181 17; α(O)=0.01561 22; α(P)=7.48×10^{-5} 11 E_γ,Mult.: from ^{182}Ta IT decay (15.84 min).
		356.47 10	1.19 13	163.047	6^+	M4	4.76	B(M4)(W.u.)=0.20 3

$\gamma(^{182}Ta)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ ‡	E_f	J^π_f	Mult. &	α a	Comments
								α(K)=2.99 5; α(L)=1.331 19; α(M)=0.344 5 α(N)=0.0829 12; α(O)=0.01220 18; α(P)=0.000560 8 E_γ,Mult.: from ^{182}Ta IT decay (15.84 min).
547.1030	(3)⁻	144.464 5	1.7 3	402.626	2⁺			
		182.750 3	7.9 4	364.359	4⁺			
		276.713 5	4.0 3	270.4027	2⁻			
		297.123 5	100 4	249.982	(3)⁺	E1	0.0226	α(K)=0.0189 3; α(L)=0.00288 4; α(M)=0.000650 10 α(N)=0.0001542 22; α(O)=2.37×10⁻⁵ 4; α(P)=1.445×10⁻⁶ 21
		396.952 9	10.0 4	150.150	4⁺			
		432.81 6	1.1 4	114.3126	4⁻			
		547.16 4	2.8 4	0.0	3⁻			
558.286	(1)⁻	114.6788 24	100 10	443.610	1⁻	M1	2.95	α(K)=2.45 4; α(L)=0.385 6; α(M)=0.0874 13 α(N)=0.0209 3; α(O)=0.00331 5; α(P)=0.000229 4
		155.650 7	4.5 10	402.626	2⁺			
		558.29 9	7.3 14	0.0	3⁻			
565.693	(3)⁻	74.266 3	100	491.423	2⁻	(M1)	10.25	α(K)=8.50 12; α(L)=1.355 19; α(M)=0.308 5 α(N)=0.0736 11; α(O)=0.01164 17; α(P)=0.000804 12
571.638	4⁺	96.077 6	40 13	475.558	(3)⁺			
		278.705 22	13 3	292.9352	5⁻			
		473.796 16	100 10	97.8304	4⁻			
579.436	(7⁺)	168.132 5	52 5	411.306	(6⁺)			
		244.808 4	100 7	334.627	7⁺			
		416.36 5	17 3	163.047	6⁺			
		563.54 19	34 11	16.273	5⁺			
581.196	(7⁻)	184.859 14	100 26	396.335	(6⁻)			
		343.912 18	66 11	237.2860	5⁻			
583.272	(0⁻)	139.662 3	100	443.610	1⁻			
592.960	(1)⁺	149.345 7	6.3 11	443.610	1⁻			
		190.338 3	100 8	402.626	2⁺	E2	0.351	α(K)=0.192 3; α(L)=0.1212 17; α(M)=0.0300 5 α(N)=0.00703 10; α(O)=0.000956 14; α(P)=1.382×10⁻⁵ 20
		322.546 6	19.0 13	270.4027	2⁻			
628.425	5⁻	148.391 4	55 6	480.036	4⁻			
		232.079 9	19 3	396.335	(6⁻)			
		267.908 5	59 4	360.518	3⁻			
		391.140 16	46 4	237.2860	5⁻			
		514.11 4	36 11	114.3126	4⁻			
		530.63 3	100 7	97.8304	4⁻			
647.431	(2⁺)	54.4710 24	100 25	592.960	(1)⁺	[M1]	4.33	α(L)=3.36 5; α(M)=0.762 11 α(N)=0.182 3; α(O)=0.0288 4; α(P)=0.00199 3
		647.46 5	60 5	0.0	3⁻			
647.652	(2)⁻	81.951 5	20 7	565.693	(3)⁻			
		100.553 3	50 9	547.1030	(3)⁻			
		156.233 4	39.1 22	491.423	2⁻			

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$\gamma(^{182}Ta)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[&]	α[a]	Comments
647.652	(2)$^-$	204.039 *4*	21.7 *15*	443.610	1$^-$			
		287.135 *6*	19.3 *22*	360.518	3$^-$			
		377.248 *7*	100 *4*	270.4027	2$^-$	E2,M1	0.08 *4*	α(K)=0.06 *3*; α(L)=0.011 *3*; α(M)=0.0026 *6* α(N)=0.00063 *13*; α(O)=9.6×10^{-5} *25*; α(P)=5.E−6 *3*
		550.25 *16*	11 *3*	97.8304	4$^-$			
651.215	(4)$^-$	104.115 *3*	100 *25*	547.1030	(3)$^-$	M1,E2	3.5 *4*	α(K)=2.0 *12*; α(L)=1.1 *7*; α(M)=0.28 *17* α(N)=0.07 *4*; α(O)=0.009 *5*; α(P)=0.00018 *13*
		286.861 *6*	30 *3*	364.359	4$^+$			
		358.40 *6*	7 *4*	292.9352	5$^-$			
		401.221 *10*	61 *4*	249.982	(3)$^+$			
		501.08 *3*	46 *4*	150.150	4$^+$			
		536.80 *4*	39 *7*	114.3126	4$^-$			
		651.34 *7*	35 *5*	0.0	3$^-$			
652.37	(9$^-$)	132.8[#] *1*	100	519.577	10$^-$	(M1)	1.94	α(K)=1.612 *23*; α(L)=0.253 *4*; α(M)=0.0574 *9* α(N)=0.01374 *20*; α(O)=0.00218 *3*; α(P)=0.0001506 *22*
659.862	(4)$^-$	94.1677 *25*	100 *19*	565.693	(3)$^-$	M1	5.18	α(K)=4.31 *6*; α(L)=0.680 *10*; α(M)=0.1543 *22* α(N)=0.0369 *6*; α(O)=0.00584 *9*; α(P)=0.000404 *6*
		168.462 *10*	4.2 *9*	491.423	2$^-$			
		299.33 *4*	3.2 *15*	360.518	3$^-$			
		422.76 *7*	7.6 *14*	237.2860	5$^-$			
666.149	2$^-$	82.880 *9*	22 *10*	583.272	(0$^-$)			
		107.865 *4*	100 *10*	558.286	(1)$^-$	M1	3.51	α(K)=2.92 *4*; α(L)=0.460 *7*; α(M)=0.1043 *15* α(N)=0.0249 *4*; α(O)=0.00395 *6*; α(P)=0.000273 *4*
		174.722 *6*	7.0 *12*	491.423	2$^-$			
		222.541 *7*	6.2 *10*	443.610	1$^-$			
673.041	(6$^+$)	167.412[@] *3*	57 *5*	505.613	5$^+$			E_γ: level-energy difference=167.428.
		184.810[@] *3*	19 *9*	488.247	6$^-$			E_γ: level-energy difference=184.793.
		308.683 *22*	11 *4*	364.359	4$^+$			
		509.936 *21*	100 *24*	163.047	6$^+$			
701.967	3$^-$	136.256[@] *8*	11.2 *24*	565.693	(3)$^-$			
		143.684 *4*	26 *3*	558.286	(1)$^-$			
		210.544 *3*	100 *6*	491.423	2$^-$	M1	0.532	α(K)=0.443 *7*; α(L)=0.0690 *10*; α(M)=0.01564 *22* α(N)=0.00374 *6*; α(O)=0.000593 *9*; α(P)=4.11×10^{-5} *6*
		431.68 *5*	11 *3*	270.4027	2$^-$			
		464.56 *5*	19.1 *21*	237.2860	5$^-$			
719.552	(3)$^-$	59.692 *4*	70 *22*	659.862	(4)$^-$			
		71.900 *5*	100 *26*	647.652	(2)$^-$			
		161.267 *9*	22 *7*	558.286	(1)$^-$			
		172.456 *5*	21 *3*	547.1030	(3)$^-$			
		228.117 *6*	12.2 *17*	491.423	2$^-$			
		239.513 *13*	10.9 *17*	480.036	4$^-$			
		359.001 *16*	18.3 *22*	360.518	3$^-$			

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γ(^{182}Ta) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[&]	α[a]	Comments
719.552	(3)$^-$	449.137 *22*	36 *3*	270.4027	2$^-$			
		482.17 *7*	35 *17*	237.2860	5$^-$			
723.981	3$^+$	76.557 *10*	100 *45*	647.431	(2$^+$)			
		152.341 *4*	59 *7*	571.638	4$^+$			
		321.355 *11*	39 *4*	402.626	2$^+$			
		453.74 *6*	36 *6*	270.4027	2$^-$			
		573.73[b] *15*	28 *16*	150.150	4$^+$			
		708.10[b] *22*	73 *36*	16.273	5$^+$			
740.132	(2)$^-$	92.480 *3*	100 *12*	647.652	(2)$^-$	M1	5.46	α(K)=4.53 *7*; α(L)=0.717 *10*; α(M)=0.1626 *23* α(N)=0.0389 *6*; α(O)=0.00616 *9*; α(P)=0.000426 *6*
		174.453 *8*	12.8 *24*	565.693	(3)$^-$			
		248.701 *11*	8.0 *12*	491.423	2$^-$			
		260.085 *4*	60 *4*	480.036	4$^-$			
		296.537 *8*	31 *6*	443.610	1$^-$			
749.080	(3)$^+$	101.442 *7*	17 *7*	647.652	(2)$^-$			
		257.639[@] *6*	14.6 *14*	491.423	2$^-$			E_γ: level-energy difference=257.657.
		346.465 *7*	100 *8*	402.626	2$^+$	M1	0.1370	α(K)=0.1143 *16*; α(L)=0.01761 *25*; α(M)=0.00399 *6* α(N)=0.000954 *14*; α(O)=0.0001512 *22*; α(P)=1.055×10^{-5} *15*
		478.694 *19*	41 *5*	270.4027	2$^-$			
		499.05 *4*	46 *8*	249.982	(3)$^+$			
		732.41 *15*	24 *8*	16.273	5$^+$			
776.391	(7$^-$)	386.27 *4*	43 *5*	390.154	(6)$^+$			
		483.67 *9*	39 *6*	292.9352	5$^-$			
		538.85 *9*	32 *10*	237.2860	5$^-$			
		603.14 *4*	100 *7*	173.2370	5$^-$			
		613.23 *14*	30 *6*	163.047	6$^+$			
781.396	5$^-$	121.534 *3*	60 *5*	659.862	(4)$^-$			
		130.182 *3*	75 *10*	651.215	(4)$^-$			
		234.276 *9*	16.5 *25*	547.1030	(3)$^-$			
		416.95 *6*	25 *4*	364.359	4$^+$			
		465.11 *9*	24 *12*	316.403	6$^-$			
		488.44 *7*	24 *7*	292.9352	5$^-$			
		512.43 *4*	100 *45*	269.047	(5)$^+$			
		683.58 *14*	80 *10*	97.8304	4$^-$			
782.538	(5$^-$)	122.675 *3*	100 *10*	659.862	(4)$^-$	(M1)	2.43	α(K)=2.02 *3*; α(L)=0.318 *5*; α(M)=0.0720 *10* α(N)=0.01724 *25*; α(O)=0.00273 *4*; α(P)=0.000189 *3*
		216.822 *14*	5.1 *10*	565.693	(3)$^-$			
		489.525[b] *22*	36 *3*	292.9352	5$^-$			
805.071	(6$^-$)	325.041 *14*	51 *5*	480.036	4$^-$			
		408.67 *4*	43 *6*	396.335	(6$^-$)			
		488.89 *8*	56 *32*	316.403	6$^-$			
		567.71 *5*	100 *12*	237.2860	5$^-$			

$^{182}_{73}$Ta$_{109}$-12

γ(^{182}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[&]	α[a]	Comments
817.021	(4)$^-$	97.466 *4*	100 *12*	719.552	(3)$^-$			
		165.809 *5*	16.8 *24*	651.215	(4)$^-$			
		188.662[@] *22*	12 *4*	628.425	5$^-$			E_γ: level-energy difference=188.596.
		251.322 *7*	16.8 *16*	565.693	(3)$^-$			
		336.953 *25*	12 *4*	480.036	4$^-$			
		456.57 *3*	22 *3*	360.518	3$^-$			
		566.92 *9*	24 *7*	249.982	(3)$^+$			
835.289	3$^-$	95.155 *3*	100 *10*	740.132	(2)$^-$	(M1,E2)	4.8 *3*	α(K)=2.6 *16*; α(L)=1.7 *10*; α(M)=0.4 *3* α(N)=0.10 *6*; α(O)=0.013 *8*; α(P)=0.00023 *16*
		269.646 *17*	23 *13*	565.693	(3)$^-$			
		391.83 *6*	15 *4*	443.610	1$^-$			
		597.72 *24*	19 *7*	237.2860	5$^-$			
856.052	(4)$^-$	73.499 *8*	50 *23*	782.538	(5$^-$)			
		154.085 *3*	100 *9*	701.967	3$^-$	M1,E2	1.0 *3*	α(K)=0.7 *4*; α(L)=0.23 *7*; α(M)=0.056 *19* α(N)=0.013 *5*; α(O)=0.0019 *5*; α(P)=6.E−5 *4*
		189.909 *7*	6.1 *11*	666.149	2$^-$			
		196.24 *4*	3.9 *19*	659.862	(4)$^-$			
		290.363 *6*	19.1 *16*	565.693	(3)$^-$			
		308.85 *6*	5.0 *18*	547.1030	(3)$^-$			
939.634	5$^-$	122.612 *3*	100 *14*	817.021	(4)$^-$			
		220.16 *4*	20 *8*	719.552	(3)$^-$			
		279.777 *10*	24 *4*	659.862	(4)$^-$			
		549.51[b] *4*	56 *6*	390.154	(6)$^+$			
960.415	(4$^-$)	125.126 *3*	100	835.289	3$^-$	(M1)	2.30	α(K)=1.91 *3*; α(L)=0.300 *5*; α(M)=0.0681 *10* α(N)=0.01629 *23*; α(O)=0.00258 *4*; α(P)=0.0001785 *25*
960.528	(5$^-$)	104.476 *5*	100 *20*	856.052	(4)$^-$			
		143.511 *6*	68 *12*	817.021	(4)$^-$			
		258.551 *11*	40 *4*	701.967	3$^-$			
		300.649 *16*	32 *5*	659.862	(4)$^-$			
1115.96	(7$^-$)	339.6[#] *1*	30 *3*	776.391	(7$^-$)			
		627.4[#@] *1*	5.6 *15*	488.247	6$^-$			E_γ: level-energy difference=627.7.
		799.6[#] *1*	50 *6*	316.403	6$^-$			
		823.2[#] *1*	14 *3*	292.9352	5$^-$			
		942.8[#] *1*	100 *9*	173.2370	5$^-$			
		952.9[#] *1*	1.3 *6*	163.047	6$^+$			
1336.84	(8$^-$)	220.8[#] *1*	100	1115.96	(7$^-$)			
(6062.92)	3$^+$,4$^+$	3882.7 *6*	25 *10*	2180.2				
		3902.3 *7*	19 *8*	2160.6				
		3982.1 *6*	33 *10*	2080.8				
		4033.1 *5*	13 *6*	2029.7				
		4045.7 *5*	30 *10*	2017.2				

$^{182}_{73}$Ta$_{109}$-13

Adopted Levels, Gammas (continued)

γ(^{182}Ta) (continued)

E_i(level)	E_γ†	I_γ‡	E_f	J^π_f
(6062.92)	4053.9 5	29 11	2009.0	
	4102.6 6	13 6	1960.3	
	4118.1 6	9 5	1944.8	
	4138.4 6	17 5	1924.5	
	4157.9 5	22 8	1905.0	
	4172.7 5	22 8	1890.2	
	4219.8 5	27 8	1843.0	
	4315.6 5	68 6	1746.5	$3^-,4^-$
	4348.8 5	13 6	1714.1	
	4366.2 6	22 6	1695.4	$3^-,4^-$
	4383.2 5	17 5	1679.6	$3^-,4^-$
	4444.0 5	25 5	1617.5	$3^-,4^-$
	4458.2 6	14 6	1604.9	$3^-,4^-$
	4483.1 5	41 8	1579.8	
	4536.1 5	25 5	1527.1	$3^-,4^-$
	4566.4 6	24 6	1496.4	$3^-,4^-$
	4580.0 6	25 5	1482.9	
	4618.0 5	37 6	1445.1	$3^-,4^-$
	4629.7 5	11 4	1433.2	
	4666.6 8	9 4	1396.2	
	4673.4 6	13 4	1389.0	$3^-,4^-$
	4691.7 5	30 6	1371.1	$3^-,4^-$
	4739.4 5	25 5	1332.5	
	4782.3 5	73 6	1279.8	$3^-,4^-$
	4793.1 5	37 6	1269.5	$3^-,4^-$
	4802.9 5	33 6	1260.1	$3^-,4^-$
	4821.8 5	11 4	1240.4	$3^-,4^-$
	4833.2 5	25 5	1229.7	$3^-,4^-$
	4890.6 8	3.3 13	1170.4	$3^-,4^-$
	4912.6 5	22 4	1150.4	$3^-,4^-$
	4925.9 6	5 2	1136.9	$3^-,4^-$
	4937.8 5	12 4	1125.0	$(2^-,5^-)$
	4949.3 5	8 3	1113.6	5^-
	4961.7 4	5 3	1101.2	5^-
	4980.2 5	21 2	1082.0	$3^-,4^-$
	5005.6 5	29 3	1057.3	$3^-,4^-$
	5034.6 5	13 3	1028.2	$3^-,4^-$
	5062.5 6	4.0 16	1000.3	$3^-,4^-$
	5075.8 8	4.0 16	987.0	$3^-,4^-$
	5102.2 5	15 3	960.528	(5^-)
	5123.0 5	9 3	939.634	5^-
	5147.4 4	9 3	915.4	$3^-,4^-$
	5153.0 6	11 3	909.8	5^-

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f	Mult.&
(6062.92)	$3^+,4^+$	5165.4 5	7 2	897.80	$3^-,4^-$	
		5181.4 5	4.9 14	881.4	$3^+,4^+,5^+$	
		5206.8 5	30 3	856.052	$(4)^-$	
		5227.7 6	7 2	835.289	3^-	
		5245.8 5	38 4	817.021	$(4)^-$	
		5280.6 5	9 2	782.538	(5^-)	
		5343.3 5	35 4	719.552	$(3)^-$	
		5396.6 5	7 4	666.149	2^-	
		5402.7 5	4 2	659.862	$(4)^-$	
		5411.9 5	7 3	651.215	$(4)^-$	
		5434.6 5	7 3	628.425	5^-	
		5497.0 5	10 2	565.693	$(3)^-$	
		5515.7 5	18 2	547.1030	$(3)^-$	
		5557.4 5	7.9 16	505.613	5^+	
		5583.8 6	10 2	480.036	4^-	
		5665.5 8	2.5 10	396.335	(6^-)	[M2,E3]
		5702.1 6	4.0 8	360.518	3^-	
		5769.9 5	11.9 13	292.9352	5^-	
		5792.5 5	20 2	270.4027	2^-	
		5812.6 8	3.0 10	249.982	$(3)^+$	
		5825.0 8	1.8 8	237.2860	5^-	
		5889.6 7	6.5 13	173.2370	5^-	
		5912.1 6	3.0 13	150.150	4^+	
		5948.7 5	14.0 14	114.3126	4^-	
		5965.0 5	100	97.8304	4^-	
		6062.9 5	60 3	0.0	3^-	
(6064.94)	$3^+,4^+$	4618.9 7	28 6	1445.1	$3^-,4^-$	
		4648.5 6	29 4	1416.7	$3^-,4^-$	
		4671.0 6	28 6	1393.4	$3^-,4^-$	
		4676.5 6	29 6	1389.0	$3^-,4^-$	
		4688.1 7	26 5	1377.3	$3^-,4^-$	
		4693.6 7	34 7	1371.1	$3^-,4^-$	
		4742.4 6	49 7	1321.0	$3^-,4^-$	
		4761.4 6	21 3	1302.5	$3^-,4^-$	
		4783.8 6	37 6	1279.8	$3^-,4^-$	
		4794.6 7	21 4	1269.5	$3^-,4^-$	
		4805.5 7	18 4	1260.1	$3^-,4^-$	
		4824.5 6	20 3	1240.4	$3^-,4^-$	
		4835.1 6	26 5	1229.7	$3^-,4^-$	
		4848.6 9	18 5	1216.1	2^-	
		4867.0 6	32 5	1196.0	$2^-,3^-,4^-$	
		4895.3 6	11.4 23	1170.4	$3^-,4^-$	
		4914.6 6	19 4	1150.4	$3^-,4^-$	

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Adopted Levels, Gammas (continued)

$\gamma(^{182}Ta)$ (continued)

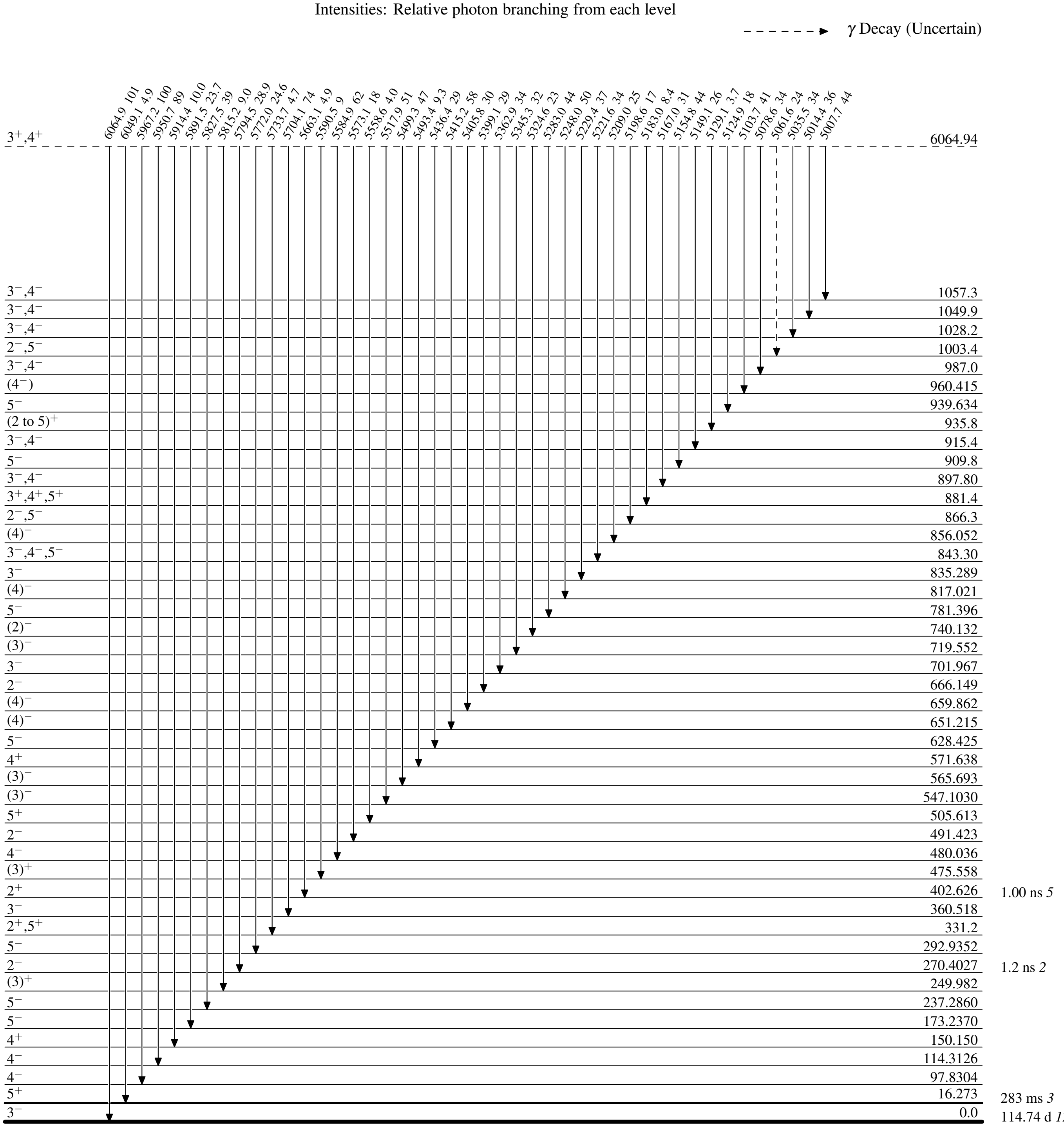
E_i(level)	J_i^π	E_γ†	I_γ‡	E_f	J_f^π
(6064.94)	$3^+,4^+$	4927.7 6	21 3	1136.9	$3^-,4^-$
		4939.8 6	17 3	1125.0	$(2^-,5^-)$
		4951.4 7	10.1 20	1113.6	5^-
		4964.2 6	18 3	1101.2	5^-
		4982.3 5	42 4	1082.0	$3^-,4^-$
		5007.7 5	44 4	1057.3	$3^-,4^-$
		5014.4 6	36 5	1049.9	$3^-,4^-$
		5035.5 5	34 3	1028.2	$3^-,4^-$
		5061.6[b] 6	24 4	1003.4	$2^-,5^-$
		5078.6 5	34 3	987.0	$3^-,4^-$
		5103.7 5	41 4	960.415	(4^-)
		5124.9 6	18 3	939.634	5^-
		5129.1 14	3.7 15	935.8	$(2\text{ to }5)^+$
		5149.1 6	26 4	915.4	$3^-,4^-$
		5154.8 5	44 7	909.8	5^-
		5167.0 5	31 3	897.80	$3^-,4^-$
		5183.0 9	8.4 21	881.4	$3^+,4^+,5^+$
		5198.6 6	17 4	866.3	$2^-,5^-$
		5209.0 5	25 4	856.052	$(4)^-$
		5221.6 5	34 5	843.30	$3^-,4^-,5^-$
		5229.4 5	37 6	835.289	3^-
		5248.0 5	50 5	817.021	$(4)^-$
		5283.0 5	44 4	781.396	5^-
		5324.6 5	23 3	740.132	$(2)^-$
		5345.3 5	32 5	719.552	$(3)^-$
(6064.94)	$3^+,4^+$	5362.9 5	34 3	701.967	3^-
		5399.1 7	29 4	666.149	2^-
		5405.8 7	30 5	659.862	$(4)^-$
		5415.2 5	58 6	651.215	$(4)^-$
		5436.4 5	29 3	628.425	5^-
		5493.4 9	9.3 23	571.638	4^+
		5499.3 5	47 3	565.693	$(3)^-$
		5517.9 5	51 4	547.1030	$(3)^-$
		5558.6 9	4.0 12	505.613	5^+
		5573.1 7	18 3	491.423	2^-
		5584.9 5	62 4	480.036	4^-
		5590.5 9	9 3	475.558	$(3)^+$
		5663.1 9	4.9 15	402.626	2^+
		5704.1 5	74 5	360.518	3^-
		5733.7 9	4.7 19	331.2	$2^+,5^+$
		5772.0 5	24.6 25	292.9352	5^-
		5794.5 5	28.9 20	270.4027	2^-
		5815.2 6	9.0 18	249.982	$(3)^+$
		5827.5 5	39 3	237.2860	5^-
		5891.5 5	23.7 17	173.2370	5^-
		5914.4 6	10.0 20	150.150	4^+
		5950.7 5	89 4	114.3126	4^-
		5967.2 5	100	97.8304	4^-
		6049.1 10	4.9 15	16.273	5^+
		6064.9 5	101 5	0.0	3^-

† From (n,γ) E=thermal, unless otherwise stated.
‡ Primarily from (n,γ) E=thermal. Values from the decay studies are also considered when a level is populated in them.
# From ^{182}Hf β^- decay (61.5 min).
@ Poor fit in the level scheme.
& From ce data in ^{181}Ta(n,γ) E=thermal, ^{182}Hf β^- decay, and ^{182}Ta IT decays. Intensity-balance arguments are also used in some cases.
[a] 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.
[b] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

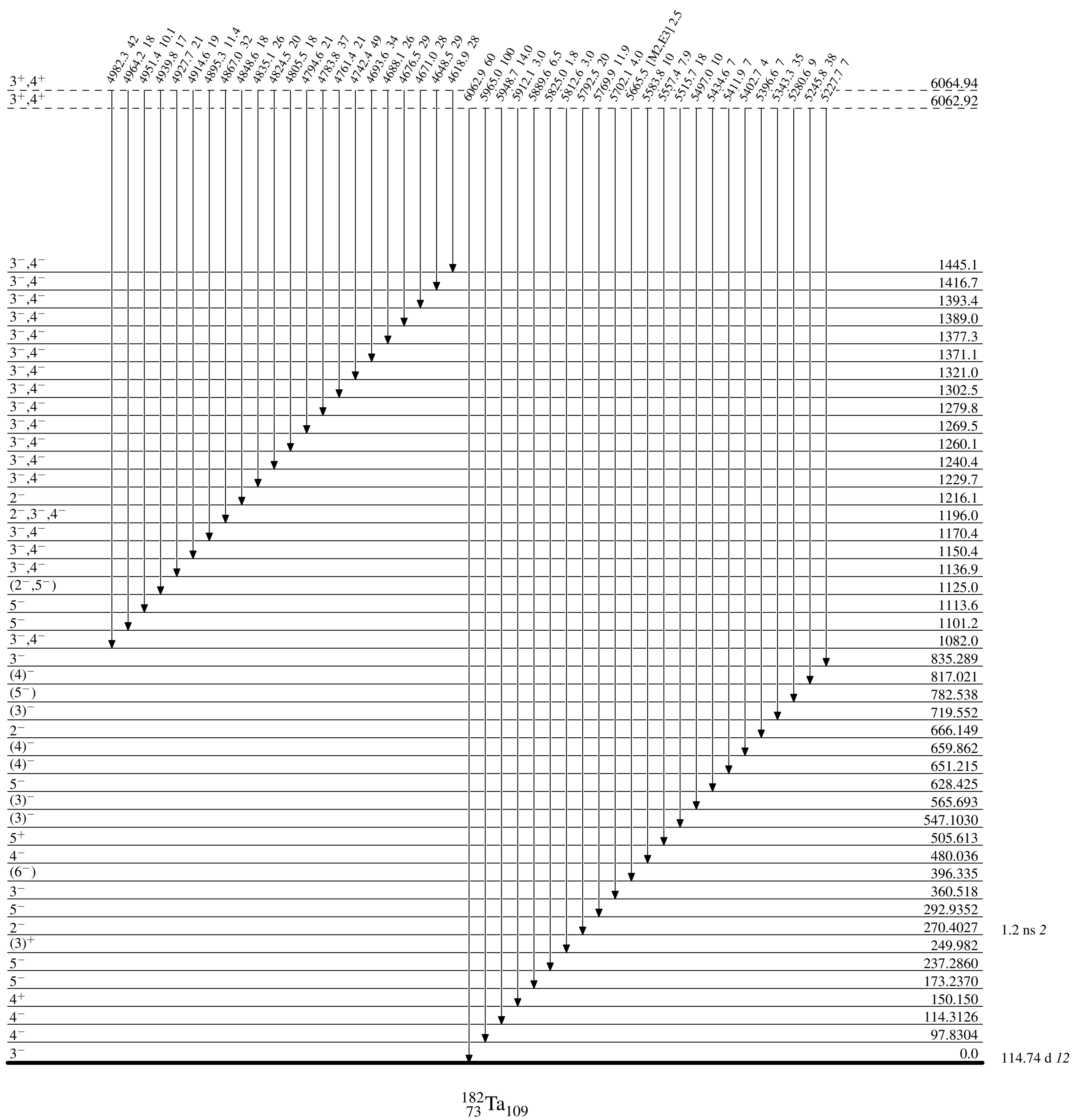


$^{182}_{73}Ta_{109}$

Adopted Levels, Gammas

Level Scheme (continued)

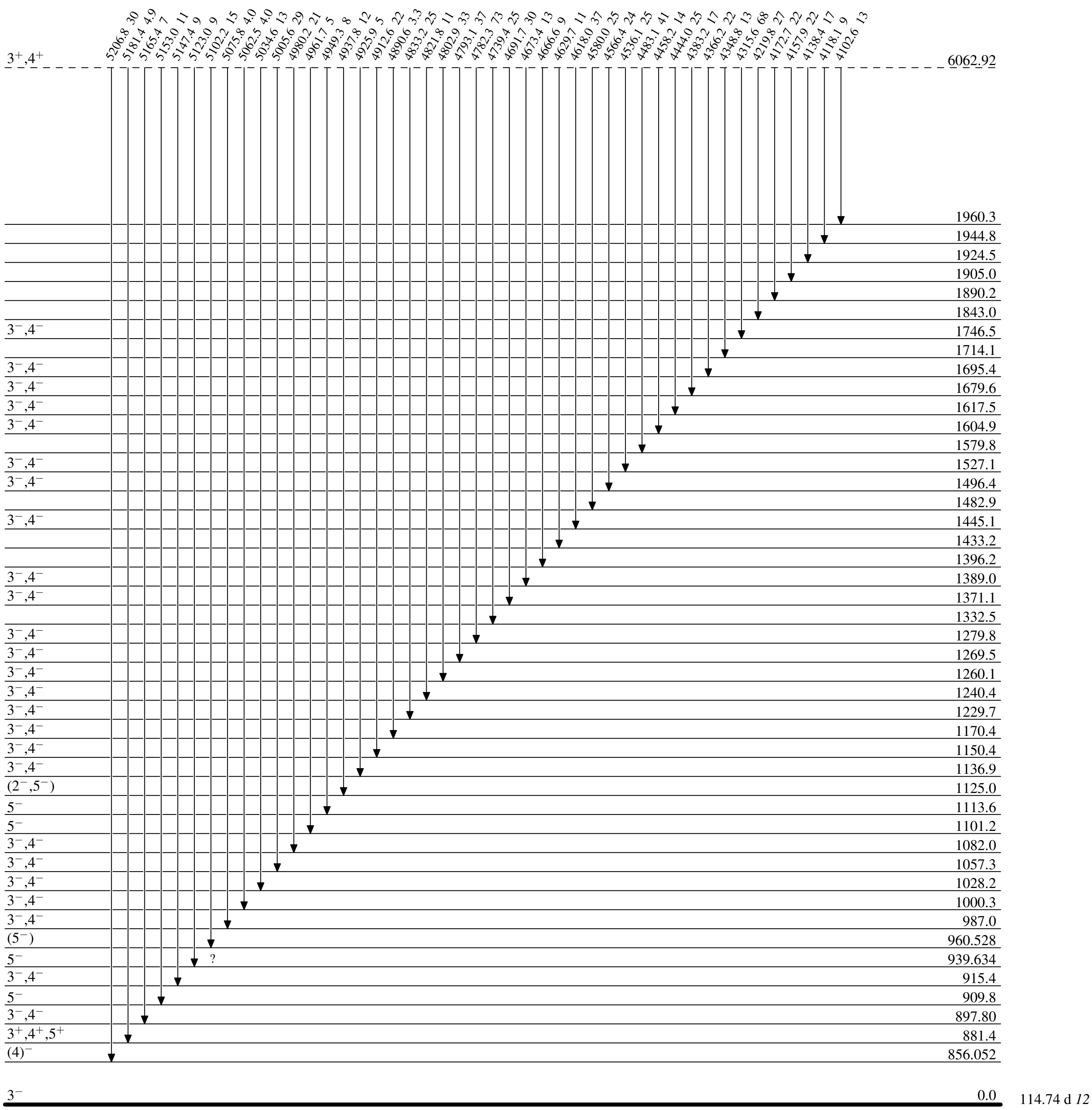
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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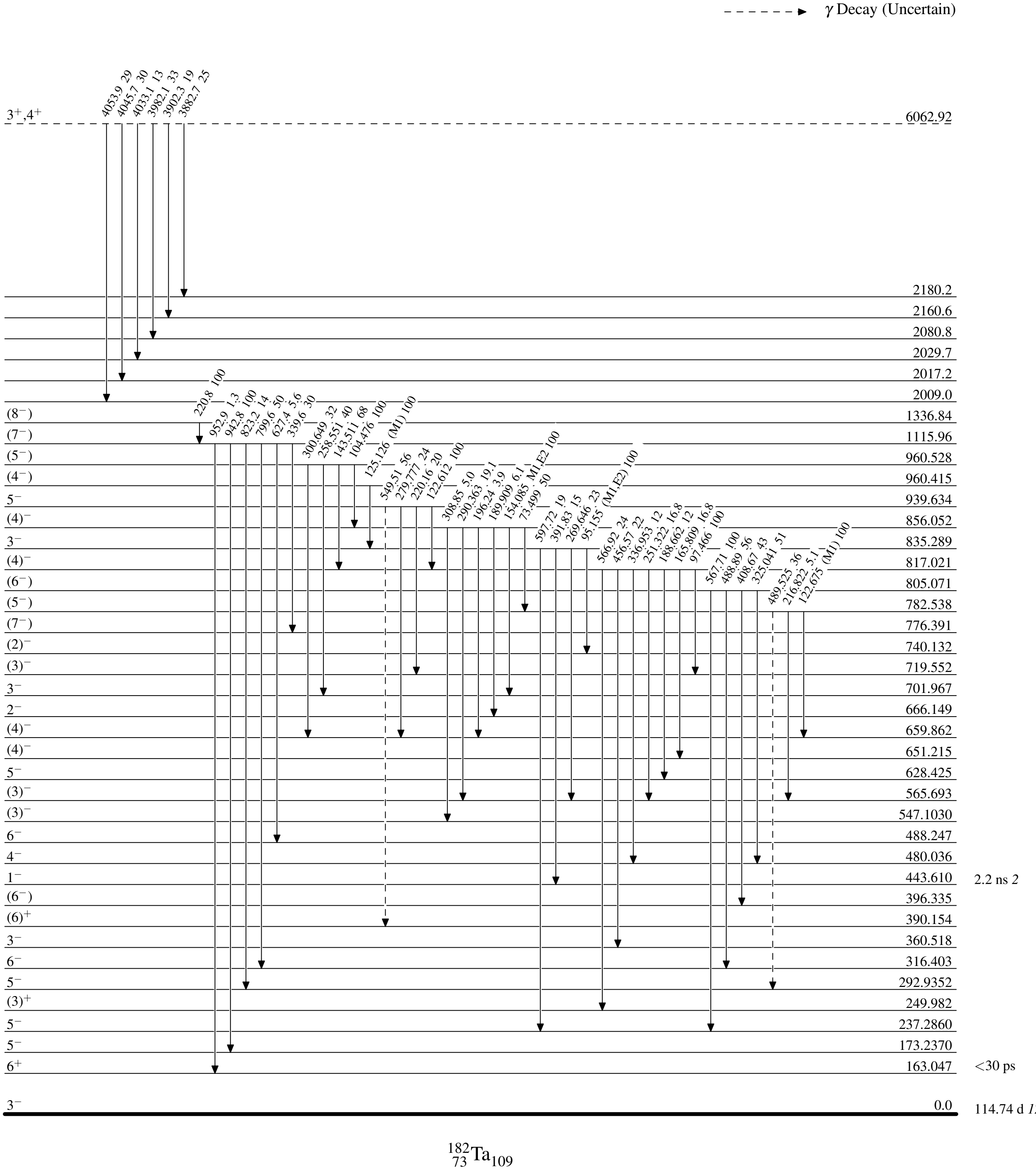
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



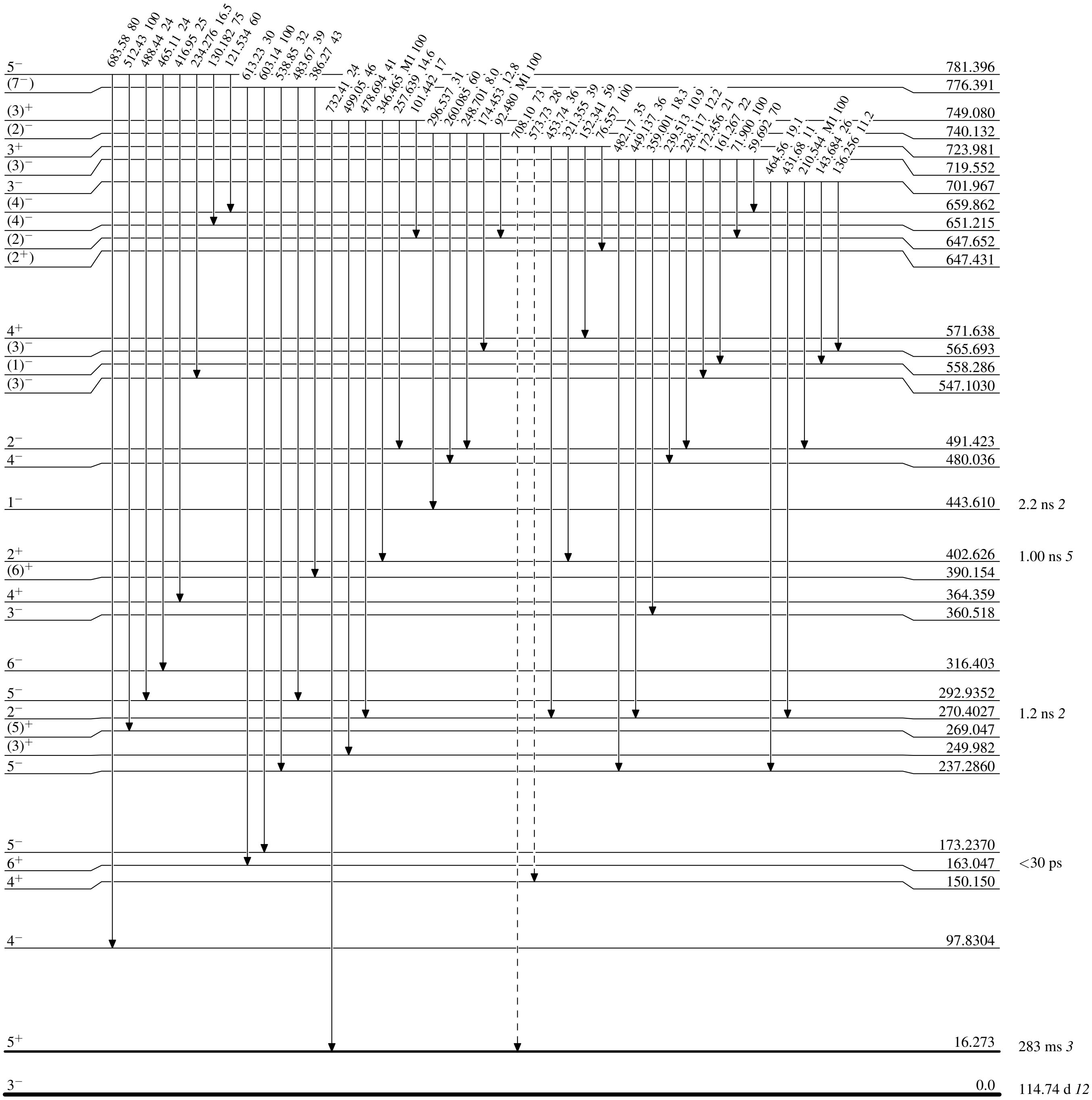
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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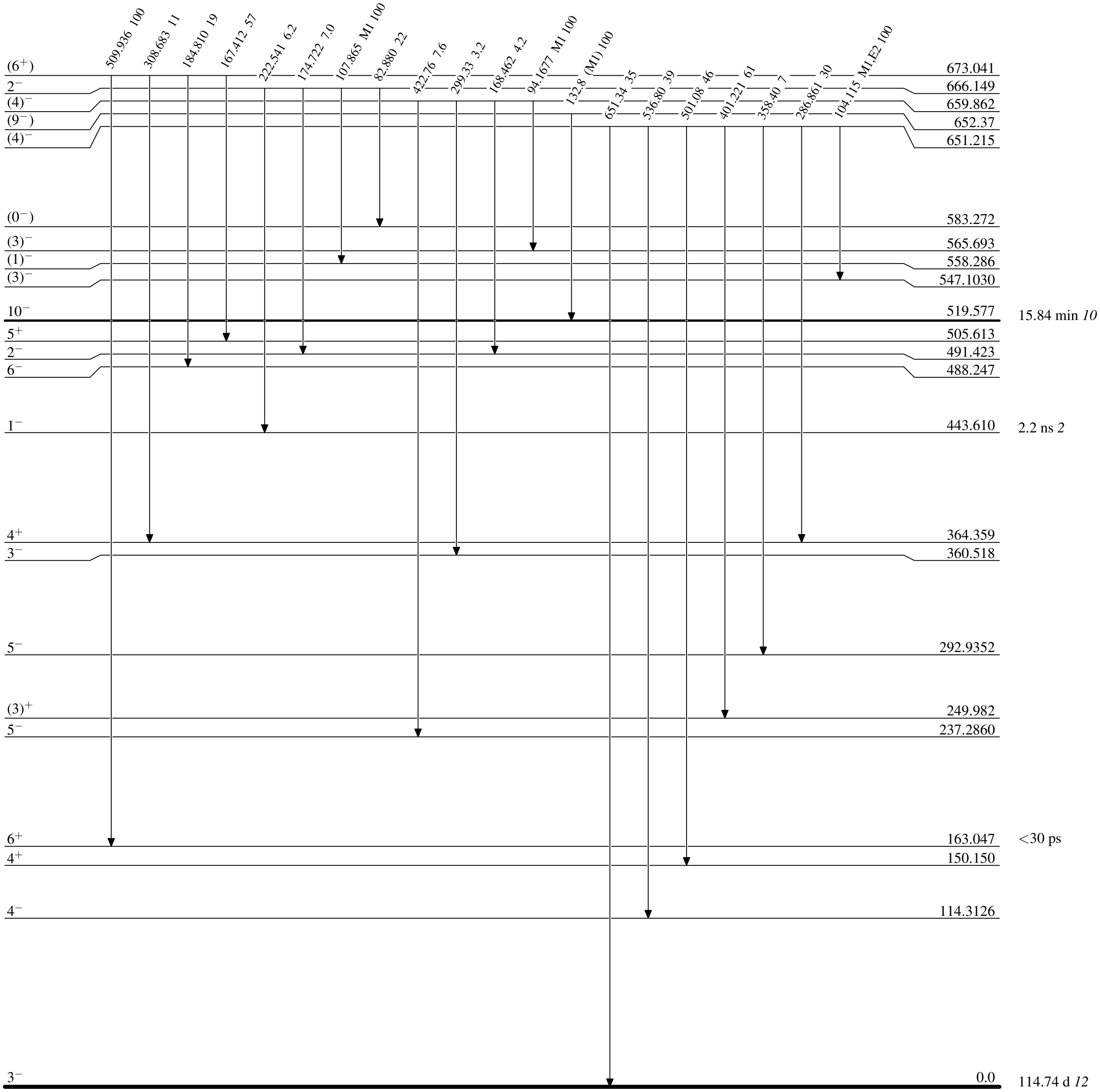
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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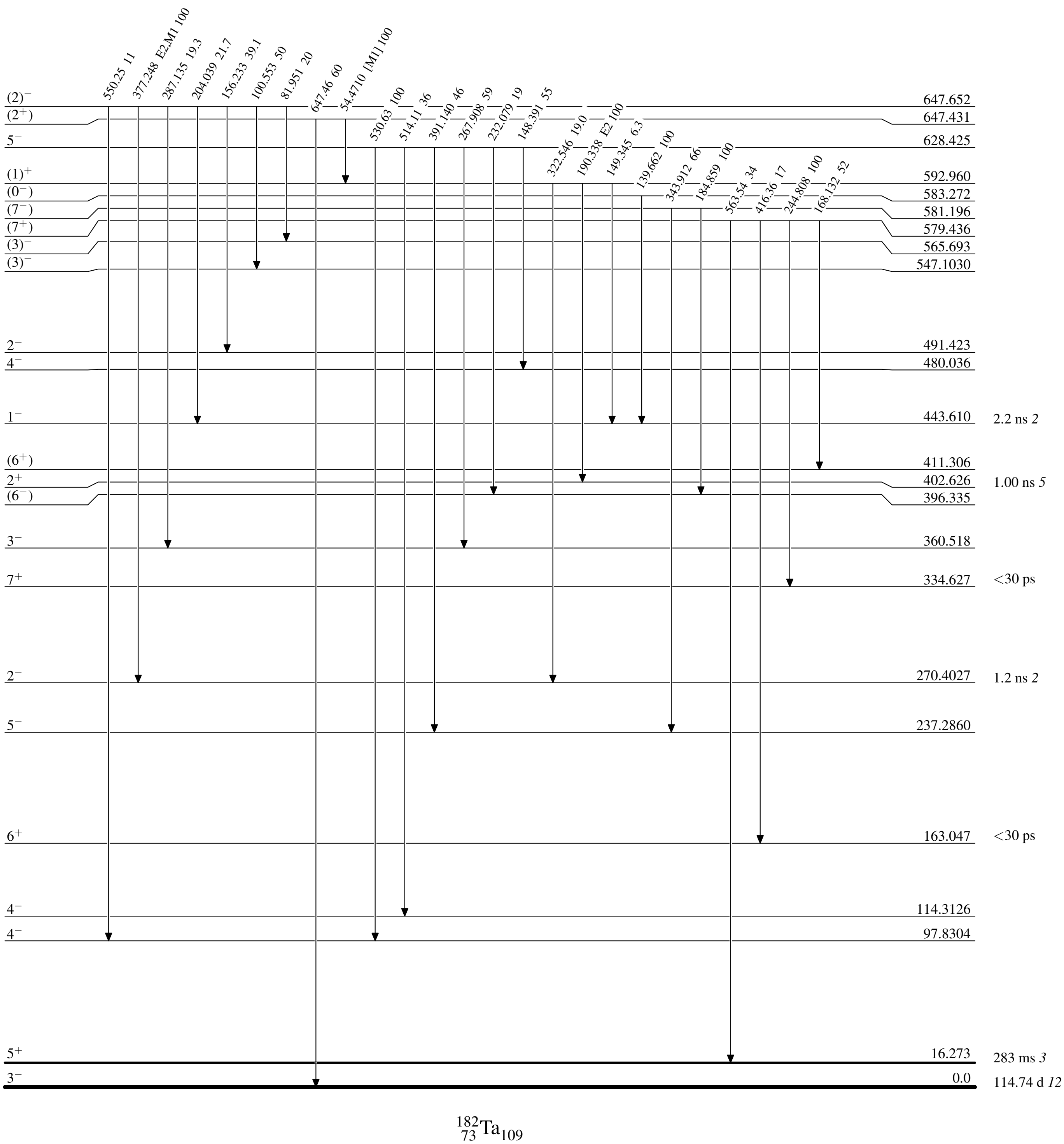
Adopted Levels, Gammas

Level Scheme (continued)

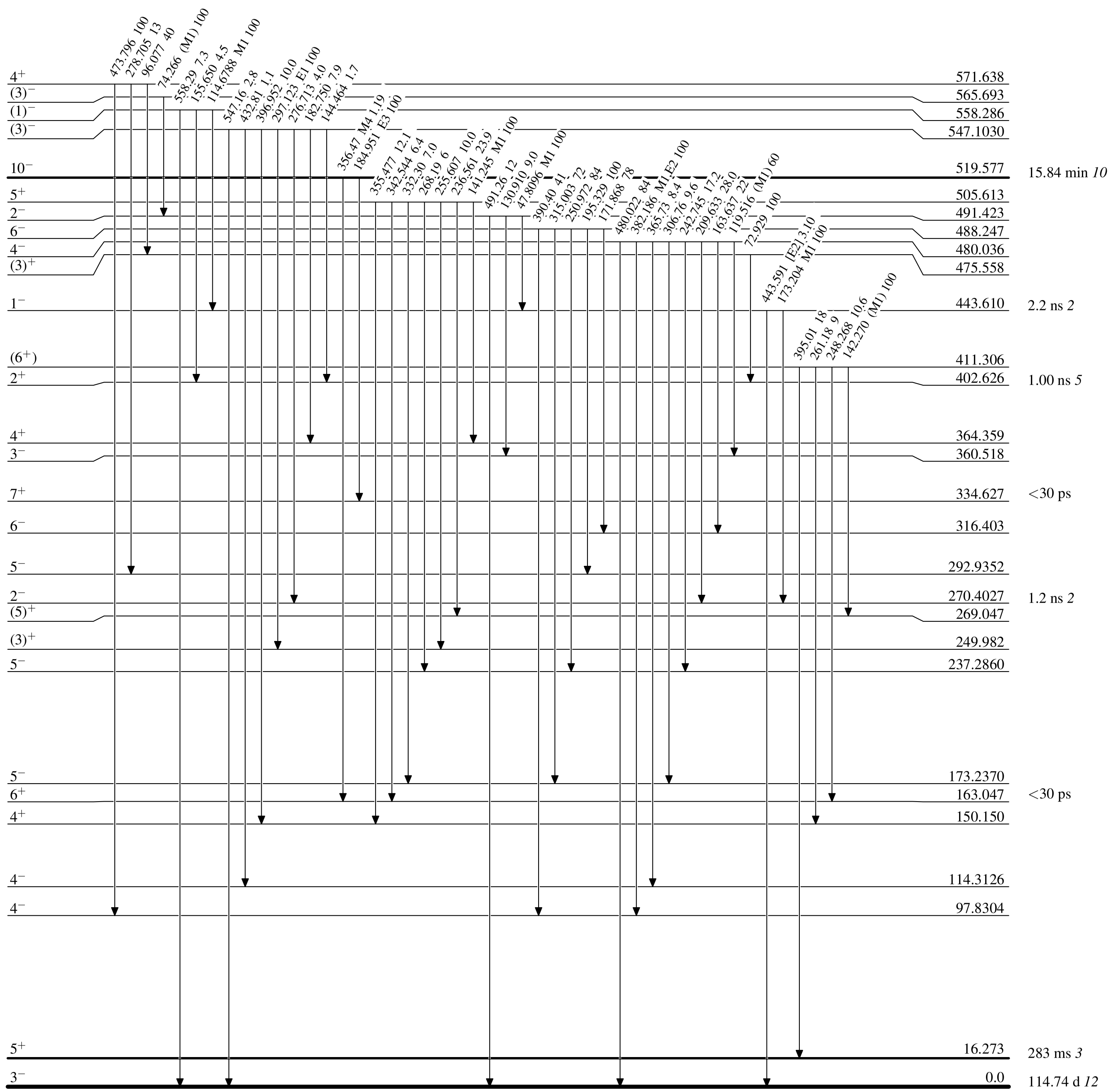
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

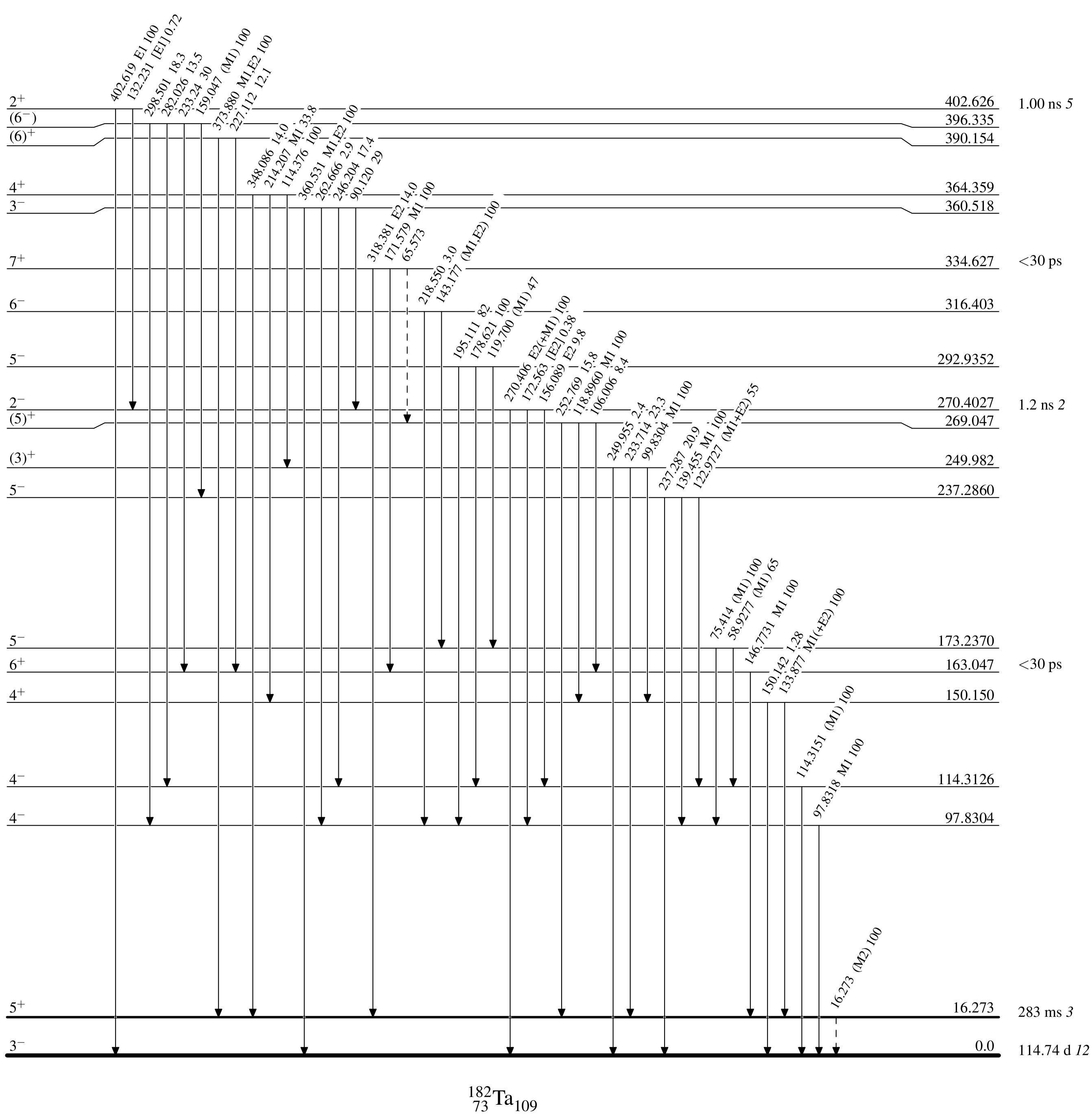


$^{182}_{73}Ta_{109}$

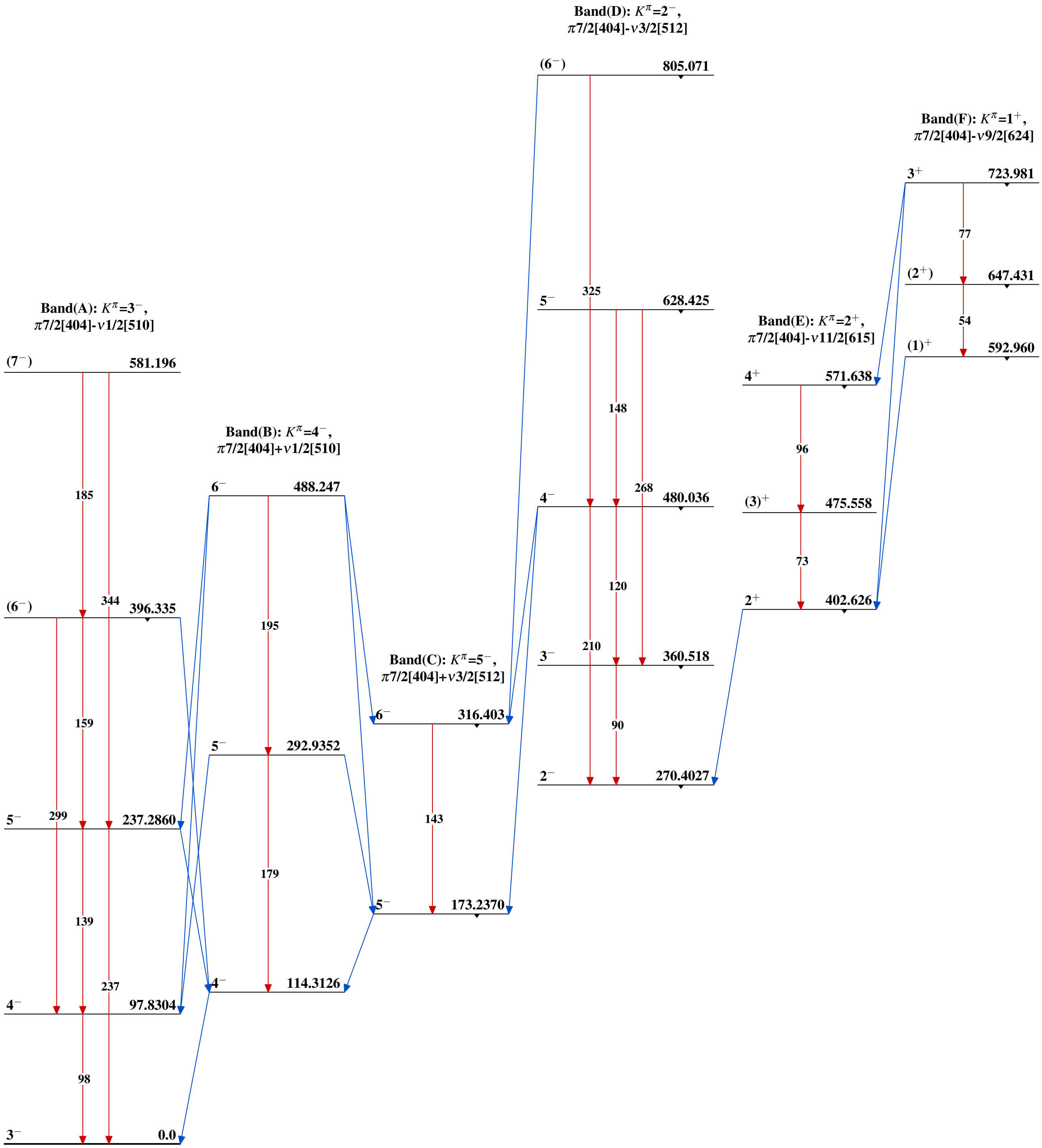
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

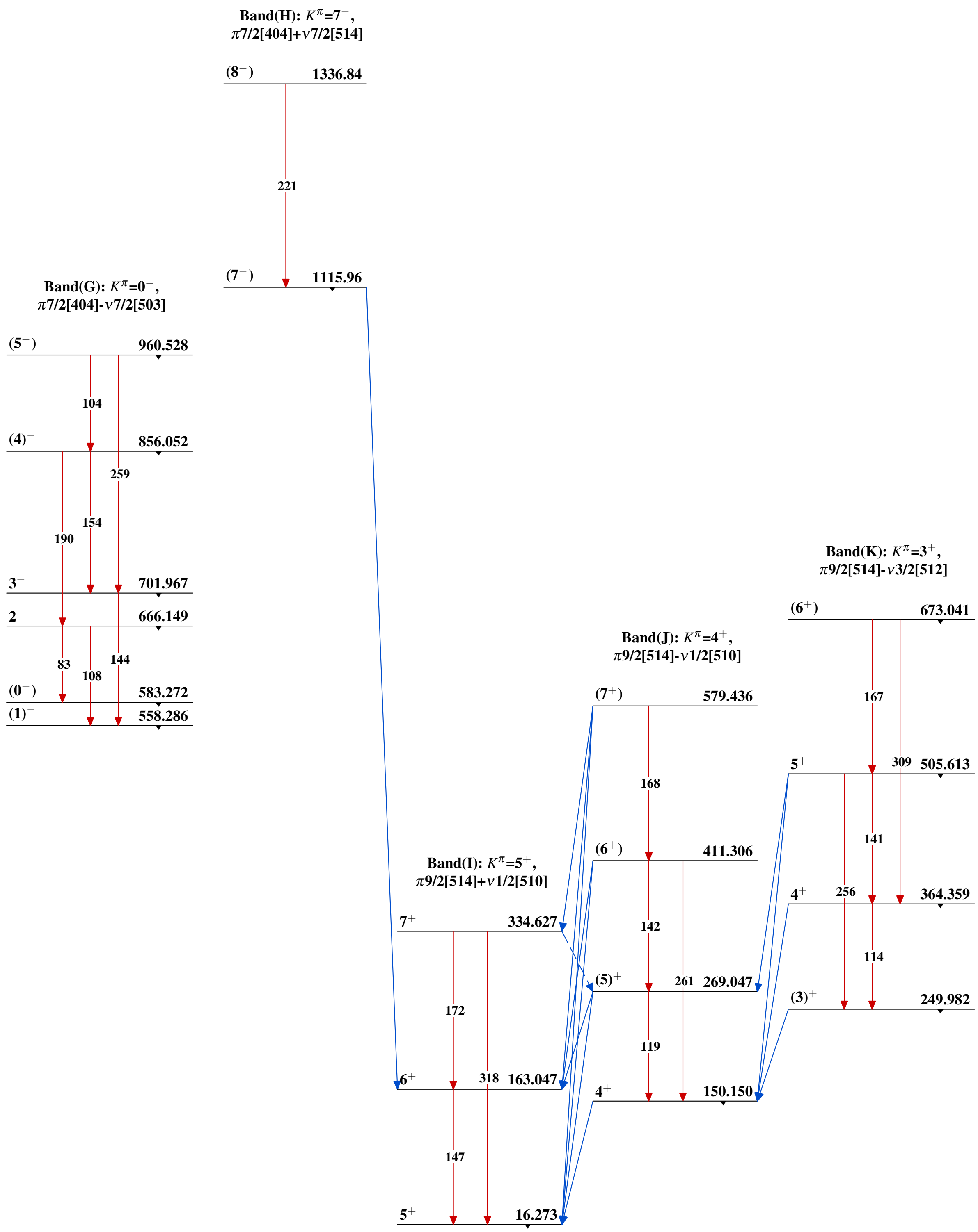


Adopted Levels, Gammas



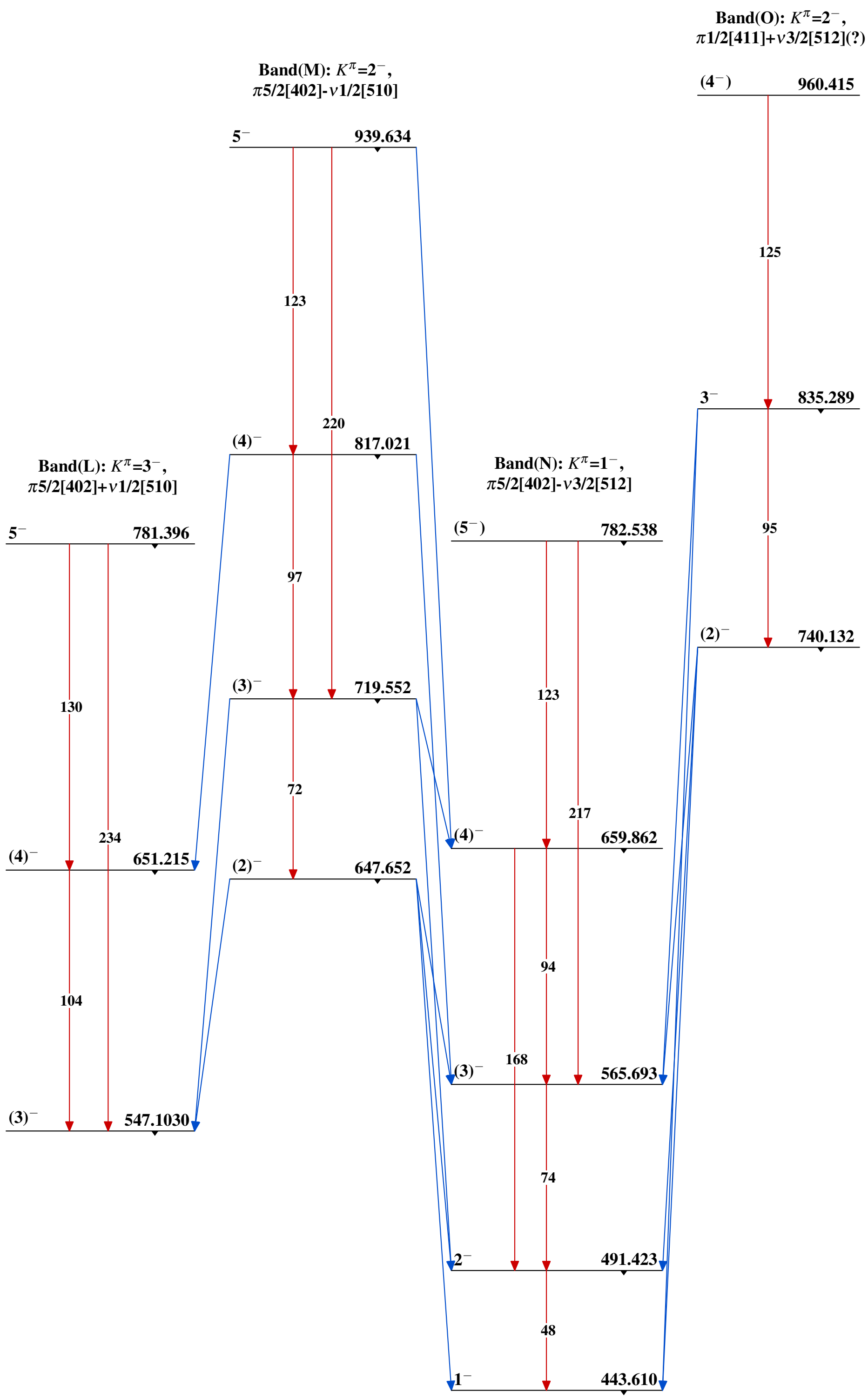
$^{182}_{73}Ta_{109}$

Adopted Levels, Gammas (continued)



$^{182}_{73}Ta_{109}$

Adopted Levels, Gammas (continued)



$^{182}_{73}Ta_{109}$