Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Achterberg, O. A. Capurro, G. V. Marti	NDS 110,1473 (2009)	31-May-2008

Q(β^-)=−1.9×10^2 *syst*; S(n)=6.96×10^3 *syst*; S(p)=5.01×10^3 *syst*; Q(α)=2.55×10^3 *syst* 2012Wa38
Note: Current evaluation has used the following Q record $ −91.3 *20* 6855 15 *4907* 15 *2643* 15 2003Au03.
Q(β^+)=1937 *15* keV (2003Au03).

^{178}Ta Levels

Level scheme, organization of the proposed bands, and their probable configurations have been adopted from ^{176}Yb(^{7}Li,5nγ) (1998Ko09), except where indicated otherwise.
B(M1)/B(E2) ratios are from 1998Ko09. See comments for those ratios in the ^{176}Yb(^{7}Li,5nγ) dataset.

Cross Reference (XREF) Flags

A	^{178}W ε decay	D	^{177}Hf(^{3}He,d),^{177}Hf(α,t)
B	^{176}Yb(^{7}Li,5nγ)	E	^{178}Hf(p,nγ)
C	^{176}Lu(α,2nγ)	F	^{178}Hf(d,2nγ)

E(level)[†]	J$^\pi$[@]	T$_{1/2}$[#]	XREF	Comments
0.0+x[&]	7$^-$	2.36 h *8*	BCDEF	%ε+%β^+=100 There is no experimental evidence to establish either the energy difference, or even the order, of the low lying 1$^+$ and 7$^-$ states for this nuclide. 1998Ko09 tentatively assume the 7$^-$ state as ground state in their work. The same assumption was made by 1979Du02 but the opposite choice was made by 2006Bu19. For that reason in the present evaluation we have included an unspecified offset of +x for the levels based on the 7$^-$ state, and of +y, for those above the 1$^+$ 9.31 min isomeric level. J$^\pi$: log *ft*≈5.0 to *J*$^\pi$=8$^-$ states in ^{178}Hf (2003Au02). T$_{1/2}$: weighted average of 2.1 h *1* (1950Wi67), 2.50 h *17* (1958Ca10), 2.2 h *1* (1963Ra14), 2.45 h *5* (1975Wa24).
24+x[‡] *3*			D	
101+x[‡][a] *2*	1$^-$		D	
128+x[‡] *3*			D	
151+x[‡][a] *2*	2$^-$		D	
180+x[‡] *2*			D	
198.03+x[&] *7*	8$^-$		BC F	
219.70+x[b] *10*	8$^+$	8.5 ns *10*	BCDEF	
225+x[‡][a] *2*	3$^-$		D	
250+x[‡] *3*			D	
289.10+x[c] *10*	6$^-$	≤1 ns	BCDEF	T$_{1/2}$: Other: 2.0 ns *5* (1979Du02, in ^{176}Lu(α,2nγ)). Configuration=π5/2[402]+ν7/2[514], *K*$^\pi$=6$^-$.
382+x[‡] *3*			D	
392.12+x[d] *8*	(9$^-$)	1.4 ns *5*	BC EF	
417.45+x[&] *8*	(9$^-$)		BC F	B(M1,219.4)/B(E2,417.5)=1.14 *18* μ_N^2/(eb)^2.
420+x[‡][e] *3*	4$^+$		D	
422.13+x[b] *14*	9$^+$		BCD F	
434+x[‡][e] *4*	(5$^+$)		D	
458.71+x[c] *13*	(7$^-$)		BC F	
485+x[‡][e] *2*	(6$^+$)		D	

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Adopted Levels, Gammas (continued)

^{178}Ta Levels (continued)

E(level)†	Jπ@	$T_{1/2}$#	XREF	Comments
525+x‡ *2*			D	
564+x‡*e* *2*	(7+)		D	
566.22+x*d* *11*	(10−)		BC F	
584+x‡ *2*			D	
631+x‡ *5*			D	
644.06+x*b* *16*	(10+)		BC F	B(M1,221.9)/B(E2,424.6)=5.50 *17* μ_N^2/(eb)^2.
647.83+x*c* *15*	(8−)		BC F	B(M1,189.1)/B(E2,358.9)=2.5 *3* μ_N^2/(eb)^2.
656.66+x& *11*	(10−)		BC	B(M1,239.4)/B(E2,458.6)=0.52 *9* μ_N^2/(eb)^2.
671+x‡*e* *2*	(8+)		D	
712+x‡ *4*			D	
766.72+x*d* *11*	(11−)		BC F	B(M1,200.5)/B(E2,374.6)=3.0 *3* μ_N^2/(eb)^2.
770+x‡ *3*			D	
812+x‡ *4*			D	
855.52+x*c* *16*	(9−)		BC F	B(M1,207.7)/B(E2,396.8)=1.95 *24* μ_N^2/(eb)^2.
881+x‡ *3*			D	
884.45+x*b* *18*	11+		BC F	B(M1,240.4)/B(E2,462.4)=2.8 *4* μ_N^2/(eb)^2.
901+x‡ *4*			D	
914.65+x& *12*	11−		B	B(M1,258.1)/B(E2,497.2)=0.55 *7* μ_N^2/(eb)^2.
925+x‡ *5*			D	
992.01+x*d* *12*	12−		BC F	B(M1,225.3)/B(E2,425.8)=1.55 *12* μ_N^2/(eb)^2.
1005+x‡ *3*			D	
1032+x‡ *3*			D	
1054+x‡ *4*			D	
1078.88+x*c* *19*	10−		B	B(M1,223.4)/B(E2,431.0)=0.94 *7* μ_N^2/(eb)^2.
1098+x‡ *4*			D	
1132+x‡ *4*			D	
1141.93+x*b* *20*	12+		BC	B(M1,257.5)/B(E2,497.7)=2.6 *4* μ_N^2/(eb)^2.
1172+x‡ *3*			D	
1190.28+x& *14*	12−		B	B(M1,275.8)/B(E2,533.6)=0.31 *7* μ_N^2/(eb)^2.
1203+x‡ *4*			D	
1223+x‡*f* *3*	(3+)		D	
1240.52+x*d* *13*	13−		BC	B(M1,248.5)/B(E2,473.8)=1.34 *7* μ_N^2/(eb)^2.
1281+x‡*f* *4*	(4+)		D	
1311+x‡ *5*			D	
1313.99+x*c* *21*	11−		B	B(M1,235.1)/B(E2,458.5)=0.99 *14* μ_N^2/(eb)^2.
1328+x‡ *5*			D	
1390+x‡*f* *4*	(5+)		D	
1414.92+x*b* *22*	13+		BC	B(M1,273.0)/B(E2,530.4)=1.89 *18* μ_N^2/(eb)^2.
1430+x‡ *4*			D	
1460+x‡ *4*			D	
1467.82+x*g* *16*	15−	58 ms *4*	BC	%IT=100
1481.44+x& *14*	13−		B	B(M1,291.1)/B(E2,566.8)=0.46 *11* μ_N^2/(eb)^2.
1494+x‡ *4*			D	
1510.82+x*d* *22*	14−		B	B(M1,270.3)/B(E2,518.8)=1.20 *18* μ_N^2/(eb)^2.
1519+x‡ *3*			D	

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Adopted Levels, Gammas (continued)

^{178}Ta Levels (continued)

E(level)†	Jπ@	$T_{1/2}$#	S	XREF	Comments
1540+x‡ *3*				D	
1551.92+x*h* *19*	14+	43 ns *8*		B	
1558.66+x*c* *19*	12−			B	B(M1,244.6)/B(E2,479.8)=1.05 *15* μ_N^2/(eb)^2.
1602+x‡ *5*				D	
1621+x‡ *4*				D	
1701.7+x*b* *3*	14+		20 *4*	B	B(M1,286.8)/B(E2,559.8)=1.91 *18* μ_N^2/(eb)^2.
1705+x‡ *6*				D	
1786.01+x*g* *19*	16−			B	
1786.98+x& *16*	14−			B	B(M1,305.5)/B(E2,597.7)=0.38 *10* μ_N^2/(eb)^2.
1801.9+x*d* *3*	15−			B	B(M1,291.1)/B(E2,561.4)=1.04 *18* μ_N^2/(eb)^2.
1818.8+x*c* *4*	(13−)			B	
1890.2+x*h* *4*	15+			B	
1892.24+x*i* *19*	16+	≤0.5 ns		B	
2000.5+x*b* *3*	15+			B	B(M1,298.8)/B(E2,585.5)=1.86 *21* μ_N^2/(eb)^2.
2106.8+x& *4*	15−			B	
2110.8+x*d* *3*	16−			B	B(M1,308.9)/B(E2,600.0)=0.62 *13* μ_N^2/(eb)^2.
2126.30+x*g* *21*	17−			B	B(M1,340.3)/B(E2,658.5)=4.0 *3* μ_N^2/(eb)^2.
2174.75+x*i* *21*	17+			B	
2241.0+x*h* *5*	16+			B	
2309.0+x*b* *4*	16+			B	B(M1,308.5)/B(E2,607.3)=1.8 *4* μ_N^2/(eb)^2.
2436.5+x& *4*	(16−)			B	
2438.4+x*d* *6*	17−			B	B(M1,327.6)/B(E2,636.5)=0.96 *19* μ_N^2/(eb)^2.
2471.08+x*i* *23*	18+			B	B(M1,296.3)/B(E2,578.9)=1.89 *22* μ_N^2/(eb)^2.
2487.0+x*g* *3*	18−			B	B(M1,360.9)/B(E2,700.9)=1.94 *10* μ_N^2/(eb)^2.
2602.2+x*h* *7*	17+			B	B(M1,361.3)/B(E2,712.0)=16 *5* μ_N^2/(eb)^2.
2622.8+x*b* *6*	17+			B	B(M1,313.8)/B(E2,622.7)=1.7 *4* μ_N^2/(eb)^2.
2775.6+x*d* *7*	18−			B	B(M1,337.2)/B(E2,664.8)=0.9 *3* μ_N^2/(eb)^2.
2778.1+x& *9*	(17−)			B	
2782.2+x*i* *3*	19+			B	B(M1,311.1)/B(E2,607.4)=0.7 *4* μ_N^2/(eb)^2.
2867.1+x*g* *3*	19−			B	B(M1,380.1)/B(E2,740.8)=1.17 *10* μ_N^2/(eb)^2.
2902.2+x*j* *9*	(21−)	290 ms *12*		B	%IT=100
2937.8+x*k* *4*	(17+)			B	
2941.1+x*b* *7*	(18+)			B	B(M1,318.6)/B(E2,631.8)=1.2 *5* μ_N^2/(eb)^2.
2956.91+x*l* *24*	19+	6.6 ns *7*		B	
2971.2+x*h* *8*	18+			B	B(M1,369.2)/B(E2,730.1)=11 *5* μ_N^2/(eb)^2.
3108.7+x*i* *4*	20+			B	B(M1,326.3)/B(E2,637.7)=1.2 *7* μ_N^2/(eb)^2.
3127.4+x& *9*	(18−)			B	
3130.0+x*k* *9*	(18+)			B	
3133.7+x*d* *10*	(19−)			B	
3134.3+x*m* *9*	22+	≤0.5 ns		B	
3138.8+x*l* *4*	20+			B	
3263.1+x*b* *10*	(19+)			B	
3265.6+x*g* *6*	20−			B	
3345.4+x*h* *9*	19+			B	B(M1,374.4)/B(E2,743.0)=10 *3* μ_N^2/(eb)^2.
3401.9+x*n* *4*	(20−)	≤1 ns		B	
3417.9+x*l* *5*	21+			B	B(M1,279.2)/B(E2,461.0)=1.0 *8* μ_N^2/(eb)^2.

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Adopted Levels, Gammas (continued)

^{178}Ta Levels (continued)

E(level)†	Jπ@	$T_{1/2}$#	XREF	Comments
3451.2+x[i] *6*	21^+		B	
3485.1+x[d] *11*	(20^-)		B	
3487.3+x[&] *12*	(19^-)		B	
3540.1+x[m] *10*	23^+		B	
3589.1+x[b] *11*	(20^+)		B	
3634.5+x[n] *9*	(21^-)		B	
3679.6+x[g] *7*	21^-		B	
3728.8+x[h] *10*	20^+		B	
3741.9+x[l] *7*	22^+		B	B(M1,324.4)/B(E2,602.7)=3.8 *11* $\mu_N^2/(eb)^2$.
3809.4+x[i] *7*	22^+		B	
3856.3+x[&] *12*	(20^-)		B	
3859.7+x[d] *13*	(21^-)		B	
3875.3+x[n] *12*	(22^-)		B	
3912.9+x[b] *13*	(21^+)		B	
3960.9+x[m] *10*	24^+		B	B(M1,420.7)/B(E2,827.0)=63 *49* $\mu_N^2/(eb)^2$.
4106.6+x[g] *13*	(22^-)		B	
4119.9+x[h] *13*	(21^+)		B	
4184.0+x[i] *8*	23^+		B	
4223.1+x[d] *14*	(22^-)		B	
4240.9+x[&] *15*	(21^-)		B	
4398.8+x[m] *11*	25^+		B	B(M1,438.0)/B(E2,858.3)=18 *5* $\mu_N^2/(eb)^2$.
4554.4+x[i] *11*	(24^+)		B	
4606.7+x[d] *14*	(23^-)		B	
4855.0+x[m] *12*	26^+		B	B(M1,456.0)/B(E2,894.4)=7 *3* $\mu_N^2/(eb)^2$.
4936.1+x[i] *12*	(25^+)		B	
4976.0+x[d] *15*	(24^-)		B	
5319.6+x[i] *14*	(26^+)		B	
5329.3+x[m] *14*	(27^+)		B	B(M1,474.3)/B(E2,931.0)=9 *4* $\mu_N^2/(eb)^2$.
5821.7+x[m] *15*	(28^+)		B	
0.0+y[o]	(1^+)	9.31 min *3*	AB	%ε+%β^+=100 μ=2.740 *12* Q=+0.65 *6* Additional information 1. E(level): See comment for the 0.0+x level regarding the status of the information about the respective energies and level order. μ,Q: Static (low temperature) nuclear orientation (1983Ha49, 1989Ra17), radiative detection of nuclear magnetic resonance (1987Ni05,1989Ra17). Jπ: log *ft*=4.7 from ^{178}W($J^\pi=0^+$), log *ft*=4.7 to ^{178}Hf($J^\pi=0^+$). Possible configuration=π 9/2[514] − ν 7/2[514] (1967Ni02). $T_{1/2}$: weighted average of 9.25 min *4* (1967Ni02), 9.5 min *1* (1958Ca10), and 9.35 min *3* (1950Wi67).
45.90+y[o] *10*	(2^+)		B	
118.5+y[o] *3*	(3^+)		B	
207.4+y *5*			B	
329.3+y *5*	(2^+)		B	
447.7+y[p] *4*	(4^+)	60 ns *5*	B	
531.2+y *5*	(3^+)		B	
447.7+z[p]	(5^+)		B	Additional information 2. E(level): See note in the ^{176}Yb(^{7}Li,5nγ) dataset for the energy of this state.
497.9+z[p] *4*	(6^+)		B	

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Adopted Levels, Gammas (continued)

^{178}Ta Levels (continued)

E(level)[†]	J$^{\pi}$[@]	XREF	Comments
576.5+z[p] *3*	(7$^+$)	B	B(M1,78.6)/B(E2,128.8)=0.010 *1* μ_N^2/(eb)^2.
681.8+z[p] *4*	(8$^+$)	B	B(M1,105.4)/B(E2,183.8)=0.07 *1* μ_N^2/(eb)^2.
810.9+z[p] *3*	(9$^+$)	B	B(M1,128.9)/B(E2,234.4)=0.08 *1* μ_N^2/(eb)^2.
965.0+z[p] *4*	(10$^+$)	B	B(M1,154.0)/B(E2,283.2)=0.050 *4* μ_N^2/(eb)^2.
1142.6+z[p] *4*	(11$^+$)	B	B(M1,177.4)/B(E2,331.7)=0.040 *4* μ_N^2/(eb)^2.
1344.5+z[p] *5*	(12$^+$)	B	B(M1,202.2)/B(E2,379.4)=0.10 *2* μ_N^2/(eb)^2.
1560.9+z[p] *4*	(13$^+$)	B	B(M1,216.2)/B(E2,418.3)=0.07 *3* μ_N^2/(eb)^2.
1802.9+z[p] *5*	(14$^+$)	B	
2064.7+z[p] *5*	(15$^+$)	B	
2345.6+z[p] *6*	(16$^+$)	B	
2647.9+z[p] *6*	(17$^+$)	B	
2944.0+z[p] *6*	(18$^+$)	B	

[†] Level energies are from a least-squares adjustment to the adopted γ-ray energies.
[‡] Levels reported only by 2006Bu19 in ^{177}Hf(^{3}He,d),^{177}Hf(α,t) reactions.
[#] Half-lives are from 1998Ko09 in ^{176}Yb(^{7}Li,5nγ), except as noted.
[@] From 1998Ko09 in ^{176}Yb(^{7}Li,5nγ), except as noted.
[&] Band(A): $K^{\pi}=7^-$ $\pi7/2[404]\nu7/2[514]$. based on the 0.0+x keV 2.36 h isomeric state.
[a] Band(B): $K^{\pi}=1^-$ $\pi5/2[402]$-$\nu7/2[514]$. based on the 101+x keV level. Proposed by 2006Bu19 in ^{177}Hf(^{3}He,d),^{177}Hf(α,t).
[b] Band(C): $K^{\pi}=8^+$ $\pi9/2[514]\nu7/2[514]$. based on the 220+x keV 8.5 ns level.
[c] Band(D): $K^{\pi}=6^-$ $\pi5/2[402]\nu7/2[514]$. based on the 289+x keV level.
[d] Band(E): $K^{\pi}=9^-$ $\pi9/2[514]\nu9/2[624]$. based on the 392+x keV level.
[e] Band(F): $K^{\pi}=4^+$ $\pi1/2^-[541]$-$\nu7/2^-[514]$. based on the 420+x keV level. Tentative assignment by 2006Bu19 in ^{177}Hf(^{3}He,d),^{177}Hf(α,t).
[f] Band(G): $K^{\pi}=3^+$ $\pi1/2^-[530]$-$\nu7/2^-[514]$. based on the 1223+x keV level. Tentative assignment by 2006Bu19 in ^{177}Hf(^{3}He,d),^{177}Hf(α,t).
[g] Band(H): $K^{\pi}=15^-$ mixed 4-qp band. 26% $\pi^3\nu$ + 74% $\pi\nu^3$ based on the 1468+x keV 58 ms isomeric level.
[h] Band(I): $K^{\pi}=14^+$. $\pi^3(5/2^+[402],7/2^+[404],9/2^-[514])\otimes\nu(7/2^-[514])$ 4−qp band based on the 1552+x keV 43 ns level.
[i] Band(J): $K^{\pi}=16^+$. $(\pi9/2^-[514])\otimes\nu^3(7/2^-[514],7/2^+[633],9/2^+[624])$ 4−qp band based on the 1892+x keV level.
[j] Band(K): $K^{\pi}=(21^-)$ band. based on the 2902+x 290 ms keV isomeric level.
[k] Band(L): $K^{\pi}=(17^+)$ band. based on the 2938+x keV level.
[l] Band(M): $K^{\pi}=19^+$ 6−qp band. based on the 2957+x keV 6.6 ns level, tentative configuration $\pi^3(7/2^+[404],9/2^-[514],1/2^-[541])\otimes\nu^3(5/2^-[512],7/2^-[514],9/2^+[624])$.
[m] Band(N): $K^{\pi}=22^+$ band. based on the 3134+x keV level.
[n] Band(O): $K^{\pi}=(20^-)$ 6−qp band. based on the 3402+x keV level, suggested configuration $\pi^3(7/2^+[404],9/2^-[514],1/2^-[541])\otimes\nu^3(5/2^-[512],7/2^+[633],9/2^+[624])$.
[o] Band(P): $K^{\pi}=1^+$ $\pi9/2[514]\nu7/2[514]$. based on the 0.0+y keV 9.31 min isomeric state.
[p] Band(Q): $K^{\pi}=4^+$ $\pi1/2^-[541]\otimes\nu7/2^-[514]$. based on the 448+y keV 60 ns level.

γ(^{178}Ta)

E$_i$(level)	J$_i^{\pi}$	E$_{\gamma}$[†]	I$_{\gamma}$[†]	E$_f$	J$_f^{\pi}$	Mult.[‡]	α[#]	Comments
198.03+x	8$^-$	198.0 *1*	100 *11*	0.0+x	7$^-$	M1+E2	0.47 *17*	
219.70+x	8$^+$	219.7 *1*	100 *6*	0.0+x	7$^-$	E1	0.0479	B(E1)(W.u.)=2.3×10^{-6} *3*
289.10+x	6$^-$	289.1 *1*	100 *10*	0.0+x	7$^-$	M1	0.223	B(M1)(W.u.)>0.00074
392.12+x	(9$^-$)	172.3 *8*	2.3 *9*	219.70+x	8$^+$			
		194.1 *1*	100 *9*	198.03+x	8$^-$	M1	0.666	B(M1)(W.u.)=0.0009 *4*
		392.1 *1*	80 *2*	0.0+x	7$^-$	E2	0.0381	B(E2)(W.u.)=0.23 *9*
417.45+x	(9$^-$)	219.4 *1*	100 *5*	198.03+x	8$^-$			

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Adopted Levels, Gammas (continued)

γ(^{178}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[#]	Comments
417.45+x	(9⁻)	417.5 *1*	55 *5*	0.0+x	7⁻			
422.13+x	9⁺	202.4 *1*	100 *3*	219.70+x	8⁺			
458.71+x	(7⁻)	169.6 *1*	100 *14*	289.10+x	6⁻			
566.22+x	(10⁻)	174.1 *1*	100 *7*	392.12+x	(9⁻)	M1	0.903	
644.06+x	(10⁺)	221.9 *1*	100 *4*	422.13+x	9⁺			
		424.6 *3*	15.0 *18*	219.70+x	8⁺			
647.83+x	(8⁻)	189.1 *1*	100 *6*	458.71+x	(7⁻)			
		358.9 *3*	22 *3*	289.10+x	6⁻			
656.66+x	(10⁻)	239.4 *3*	75 *6*	417.45+x	(9⁻)			
		458.6 *1*	100 *12*	198.03+x	8⁻			
766.72+x	(11⁻)	200.5 *1*	100 *7*	566.22+x	(10⁻)	M1+E2	0.45 *16*	
		374.6 *1*	19.1 *19*	392.12+x	(9⁻)	E2	0.0432	
855.52+x	(9⁻)	207.7 *1*	100 *8*	647.83+x	(8⁻)			
		396.8 *3*	38 *5*	458.71+x	(7⁻)			
884.45+x	11⁺	240.4 *1*	100 *7*	644.06+x	(10⁺)			
		462.4 *3*	35 *3*	422.13+x	9⁺			
914.65+x	11⁻	258.1 *3*	57 *4*	656.66+x	(10⁻)			
		497.2 *1*	100 *8*	417.45+x	(9⁻)			
992.01+x	12⁻	225.3 *1*	100 *8*	766.72+x	(11⁻)	M1+E2	0.32 *12*	
		425.8 *1*	45 *4*	566.22+x	(10⁻)			
1078.88+x	10⁻	223.4 *3*	100 *5*	855.52+x	(9⁻)			
		312.2 *8*	18 *5*	766.72+x	(11⁻)			
		431.0 *3*	97 *11*	647.83+x	(8⁻)			
		512.7 *8*	18 *5*	566.22+x	(10⁻)			
		686.7 *8*	≤13	392.12+x	(9⁻)			
1141.93+x	12⁺	257.5 *1*	100 *6*	884.45+x	11⁺			
		497.7 *3*	45 *4*	644.06+x	(10⁺)			
1190.28+x	12⁻	275.8 *3*	30.4 *18*	914.65+x	11⁻			
		533.6 *1*	100 *9*	656.66+x	(10⁻)			
1240.52+x	13⁻	248.5 *1*	100 *5*	992.01+x	12⁻	M1+E2	0.24 *10*	
		473.8 *1*	72 *6*	766.72+x	(11⁻)	E2	0.0231	
1313.99+x	11⁻	235.1 *3*	96 *9*	1078.88+x	10⁻			
		321.9 *8*	35 *9*	992.01+x	12⁻			
		458.5 *3*	100 *13*	855.52+x	(9⁻)			
		547.4 *8*	22 *4*	766.72+x	(11⁻)			
		747.2 *8*	22 *9*	566.22+x	(10⁻)			
1414.92+x	13⁺	273.0 *1*	100 *8*	1141.93+x	12⁺			
		530.4 *3*	72 *6*	884.45+x	11⁺			
1467.82+x	15⁻	227.3 *1*	100 *9*	1240.52+x	13⁻	E2	0.195	B(E2)(W.u.)=2.26×10^{-7} *16*
1481.44+x	13⁻	291.1 *3*	34 *4*	1190.28+x	12⁻			
		566.8 *1*	100 *7*	914.65+x	11⁻			
1510.82+x	14⁻	270.3 *3*	100 *11*	1240.52+x	13⁻			
		518.8 *3*	96 *7*	992.01+x	12⁻			
1551.92+x	14⁺	84.1 *1*	100 *12*	1467.82+x	15⁻	E1	0.573	B(E1)(W.u.)=5.3×10^{-6} *10*
1558.66+x	12⁻	244.6 *3*	91 *9*	1313.99+x	11⁻			
		318.0 *3*	91 *9*	1240.52+x	13⁻			
		479.8 *3*	100 *13*	1078.88+x	10⁻			
		566.9 *3*	66 *9*	992.01+x	12⁻			
		791.4 *8*	≤22	766.72+x	(11⁻)			
1701.7+x	14⁺	286.8 *3*	100 *8*	1414.92+x	13⁺			
		559.8 *3*	79 *6*	1141.93+x	12⁺			
1786.01+x	16⁻	318.2 *1*	100 *5*	1467.82+x	15⁻	M1+E2	0.12 *6*	
1786.98+x	14⁻	305.5 *3*	25 *4*	1481.44+x	13⁻			
		596.7 *1*	100 *11*	1190.28+x	12⁻			
1801.9+x	15⁻	291.1 *3*	76 *12*	1510.82+x	14⁻			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{178}Ta) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[#]	Comments
1801.9+x	15^-	561.4 *3*	100 *12*	1240.52+x	13^-			
1818.8+x	(13^-)	260.1 *3*	100 *17*	1558.66+x	12^-			
		505.4[@] *8*	≤42	1313.99+x	11^-			
1890.2+x	15^+	338.3 *3*	100 *8*	1551.92+x	14^+			
1892.24+x	16^+	424.4 *1*	100 *11*	1467.82+x	15^-			
2000.5+x	15^+	298.8 *3*	100 *12*	1701.7+x	14^+			
		585.5 *3*	92 *8*	1414.92+x	13^+			
2106.8+x	15^-	625.4 *3*	100 *21*	1481.44+x	13^-			
2110.8+x	16^-	308.9 *3*	41 *7*	1801.9+x	15^-			
		600.0 *3*	100 *15*	1510.82+x	14^-			
2126.30+x	17^-	340.3 *1*	100 *7*	1786.01+x	16^-	M1+E2	0.10 *5*	
		658.5 *3*	36 *7*	1467.82+x	15^-			
2174.75+x	17^+	282.5 *1*	100 *10*	1892.24+x	16^+			
		389.1 *8*	≤3.4	1786.01+x	16^-			
2241.0+x	16^+	350.8 *3*	100 *14*	1890.2+x	15^+			
		689.2[@] *8*	≤7.1	1551.92+x	14^+			
2309.0+x	16^+	308.5 *3*	100 *14*	2000.5+x	15^+			
		607.3 *3*	76 *10*	1701.7+x	14^+			
2436.5+x	(16^-)	649.5 *3*	100 *17*	1786.98+x	14^-			
2438.4+x	17^-	327.6 *8*	100 *29*	2110.8+x	16^-			
		636.5 *8*	71 *29*	1801.9+x	15^-			
2471.08+x	18^+	296.3 *1*	100 *12*	2174.75+x	17^+			
		345.2 *8*	≤7.2	2126.30+x	17^-			
		578.9 *3*	64 *7*	1892.24+x	16^+			
2487.0+x	18^-	360.9 *3*	100 *21*	2126.30+x	17^-	M1+E2	0.09 *4*	
		700.9 *3*	79 *21*	1786.01+x	16^-			
2602.2+x	17^+	361.3 *8*	100 *10*	2241.0+x	16^+			
		712.0 *8*	20 *10*	1890.2+x	15^+			
2622.8+x	17^+	313.8 *8*	100 *25*	2309.0+x	16^+			
		622.7 *8*	75 *13*	2000.5+x	15^+			
2775.6+x	18^-	337.2 *8*	50 *20*	2438.4+x	17^-			
		664.8 *8*	100 *20*	2110.8+x	16^-			
2778.1+x	(17^-)	671.3 *8*	100 *25*	2106.8+x	15^-			
2782.2+x	19^+	311.1 *3*	83 *25*	2471.08+x	18^+			
		607.4 *3*	100 *25*	2174.75+x	17^+			
2867.1+x	19^-	380.1 *3*	71 *18*	2487.0+x	18^-	M1+E2	0.07 *4*	
		740.8 *3*	100 *6*	2126.30+x	17^-			
2902.2+x	(21^-)	(34.2)	≈1.25	2867.1+x	19^-	(E2)	496	
		431.1 *8*	100	2471.08+x	18^+	E3	0.0986 *16*	B(E3)(W.u.)=0.00011 *5*
2937.8+x	(17^+)	763.0 *3*	100 *16*	2174.75+x	17^+			
		1046.0[@] *8*	≤8.0	1892.24+x	16^+			
2941.1+x	(18^+)	318.6 *8*	≤100	2622.8+x	17^+			
		631.8 *8*	100 *40*	2309.0+x	16^+			
2956.91+x	19^+	485.8 *1*	100 *14*	2471.08+x	18^+			
		782.4 *3*	22 *4*	2174.75+x	17^+			
2971.2+x	18^+	369.2 *8*	100 *20*	2602.2+x	17^+			
		730.1 *8*	≈20	2241.0+x	16^+			
3108.7+x	20^+	326.3 *3*	92 *31*	2782.2+x	19^+			
		637.7 *3*	100 *15*	2471.08+x	18^+			
3127.4+x	(18^-)	690.9 *8*	100 *29*	2436.5+x	(16^-)			
3130.0+x	(18^+)	192.2 *8*	100 *33*	2937.8+x	(17^+)			
3133.7+x	(19^-)	358.1[@] *8*	≤71	2775.6+x	18^-			
		695.3 *8*	100 *29*	2438.4+x	17^-			
3134.3+x	22^+	232.1 *3*	100 *15*	2902.2+x	(21^-)	E1	0.0417	B(E1)(W.u.)>3.3×10^{-5}

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{178}Ta) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
3138.8+x	20^+	181.9 *3*	100 *18*	2956.91+x	19^+
3263.1+x	(19^+)	640.3 *8*	100	2622.8+x	17^+
3265.6+x	20^-	397.8 *8*	100	2867.1+x	19^-
		778.6 *8*	100	2487.0+x	18^-
3345.4+x	19^+	374.4 *8*	100 *20*	2971.2+x	18^+
		743.0 *8*	≤40	2602.2+x	17^+
3401.9+x	(20^-)	445.0 *3*	100 *16*	2956.91+x	19^+
3417.9+x	21^+	279.2 *3*	100 *17*	3138.8+x	20^+
		461.0 *8*	25 *8*	2956.91+x	19^+
3451.2+x	21^+	342.5 *8*	≤50	3108.7+x	20^+
		669.1 *8*	100 *10*	2782.2+x	19^+
3485.1+x	(20^-)	351.4@ *8*	100	3133.7+x	(19^-)
		709.5 *8*	100	2775.6+x	18^-
3487.3+x	(19^-)	709.2 *8*	100 *40*	2778.1+x	(17^-)
3540.1+x	23^+	405.8 *3*	100 *10*	3134.3+x	22^+
3589.1+x	(20^+)	647.9@ *8*	100	2941.1+x	(18^+)
3634.5+x	(21^-)	232.6 *8*	100 *25*	3401.9+x	(20^-)
3679.6+x	21^-	413.5 *8*	100	3265.6+x	20^-
		813.0 *8*	100	2867.1+x	19^-
3728.8+x	20^+	383.5 *8*	100 *50*	3345.4+x	19^+
		757.5 *8*	≤50	2971.2+x	18^+
3741.9+x	22^+	324.4 *8*	100 *33*	3417.9+x	21^+
		602.7 *8*	83 *33*	3138.8+x	20^+
3809.4+x	22^+	358.4 *8*	≤62	3451.2+x	21^+
		700.7 *8*	100 *25*	3108.7+x	20^+
3856.3+x	(20^-)	728.9 *8*	100 *25*	3127.4+x	(18^-)
3859.7+x	(21^-)	726.0 *8*	100	3133.7+x	(19^-)
3875.3+x	(22^-)	240.8 *8*	100 *20*	3634.5+x	(21^-)
3912.9+x	(21^+)	649.8 *8*	100	3263.1+x	(19^+)
3960.9+x	24^+	420.7 *3*	100 *24*	3540.1+x	23^+
		827.0 *8*	≤5.9	3134.3+x	22^+
4106.6+x	(22^-)	425.4@ *8*	100	3679.6+x	21^-
		843.5 *8*	100	3263.1+x	(19^+)
4119.9+x	(21^+)	391.0@ *8*	100	3728.8+x	20^+
4184.0+x	23^+	374.7 *8*	100	3809.4+x	22^+
		732.6 *8*	100	3451.2+x	21^+
4223.1+x	(22^-)	738.0 *8*	100	3485.1+x	(20^-)
4240.9+x	(21^-)	753.5@ *8*	100	3487.3+x	(19^-)
4398.8+x	25^+	438.0 *8*	100 *25*	3960.9+x	24^+
		858.3 *8*	≤12	3540.1+x	23^+
4554.4+x	(24^+)	745.0 *8*	100	3809.4+x	22^+
4606.7+x	(23^-)	746.9@ *8*	100	3859.7+x	(21^-)
4855.0+x	26^+	456.0 *8*	100	4398.8+x	25^+
		894.4 *8*	20	3960.9+x	24^+
4936.1+x	(25^+)	752.0@ *8*	100	4184.0+x	23^+
4976.0+x	(24^-)	752.8@ *8*	100	4223.1+x	(22^-)
5319.6+x	(26^+)	765.0@ *8*	100	4554.4+x	(24^+)
5329.3+x	(27^+)	474.3 *8*	100	4855.0+x	26^+
		931.0@ *8*	≤20	4398.8+x	25^+
5821.7+x	(28^+)	492.0@ *8*	100	5329.3+x	(27^+)
45.90+y	(2^+)	45.9 *1*	100 *14*	0.0+y	(1^+)
118.5+y	(3^+)	72.6 *3*	100 *14*	45.90+y	(2^+)

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{178}Ta)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
207.4+y		88.8 *8*	100	118.5+y	(3$^+$)
329.3+y	(2$^+$)	121.9 *3*	100 *17*	207.4+y	
447.7+y	(4$^+$)	118.4 *3*	14 *3*	329.3+y	(2$^+$)
		329.2 *1*	100 *12*	118.5+y	(3$^+$)
		401.7 *8*	6.3 *18*	45.90+y	(2$^+$)
531.2+y	(3$^+$)	83.5 *3*	100 *15*	447.7+y	(4$^+$)
497.9+z	(6$^+$)	50.0 *8*	100 *40*	447.7+z	(5$^+$)
576.5+z	(7$^+$)	78.6 *3*	42 *8*	497.9+z	(6$^+$)
		128.8 *3*	100 *15*	447.7+z	(5$^+$)
681.8+z	(8$^+$)	105.4 *3*	67 *7*	576.5+z	(7$^+$)
		183.8 *3*	100 *9*	497.9+z	(6$^+$)
810.9+z	(9$^+$)	128.9 *3*	39 *4*	681.8+z	(8$^+$)
		234.4 *1*	100 *11*	576.5+z	(7$^+$)
965.0+z	(10$^+$)	154.0 *3*	18 *4*	810.9+z	(9$^+$)
		283.2 *1*	100 *8*	681.8+z	(8$^+$)
1142.6+z	(11$^+$)	177.4 *8*	11.2 *25*	965.0+z	(10$^+$)
		331.7 *1*	100 *11*	810.9+z	(9$^+$)
1344.5+z	(12$^+$)	202.2 *8*	18 *4*	1142.6+z	(11$^+$)
		379.4 *3*	100 *10*	965.0+z	(10$^+$)
1560.9+z	(13$^+$)	216.2 *8*	11 *4*	1344.5+z	(12$^+$)
		418.3 *1*	100 *11*	1142.6+z	(11$^+$)
1802.9+z	(14$^+$)	458.4 *1*	100 *12*	1344.5+z	(12$^+$)
2064.7+z	(15$^+$)	503.8 *3*	100 *16*	1560.9+z	(13$^+$)
2345.6+z	(16$^+$)	542.7 *3*	100 *10*	1802.9+z	(14$^+$)
2647.9+z	(17$^+$)	583.2 *3*	100 *13*	2064.7+z	(15$^+$)
2944.0+z	(18$^+$)	598.4 *3*	100 *11*	2345.6+z	(16$^+$)

† γ ray data are from 1998Ko09 in ^{176}Yb(^{7}Li,5nγ), except as noted. See that dataset also for differences in in-beam and out-of-beam intensity measurements.

‡ Adopted multipolarities are from conversion coefficient determinations and angular correlation coefficients from 1998Ko09 in ^{176}Yb(^{7}Li,5nγ), except when stated otherwise.

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.

@ Placement of transition in the level scheme is uncertain.

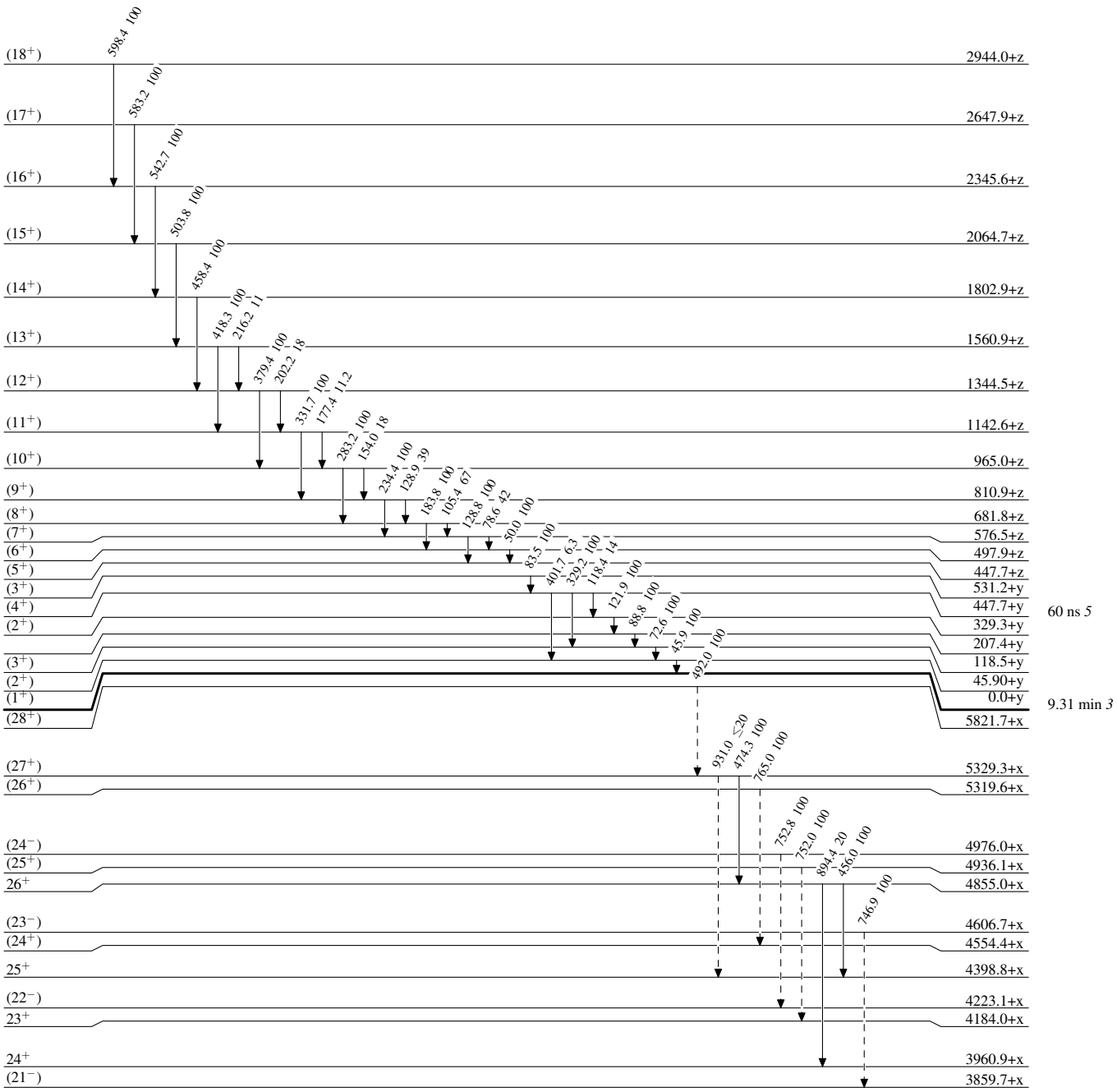
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{178}_{73}Ta_{105}$

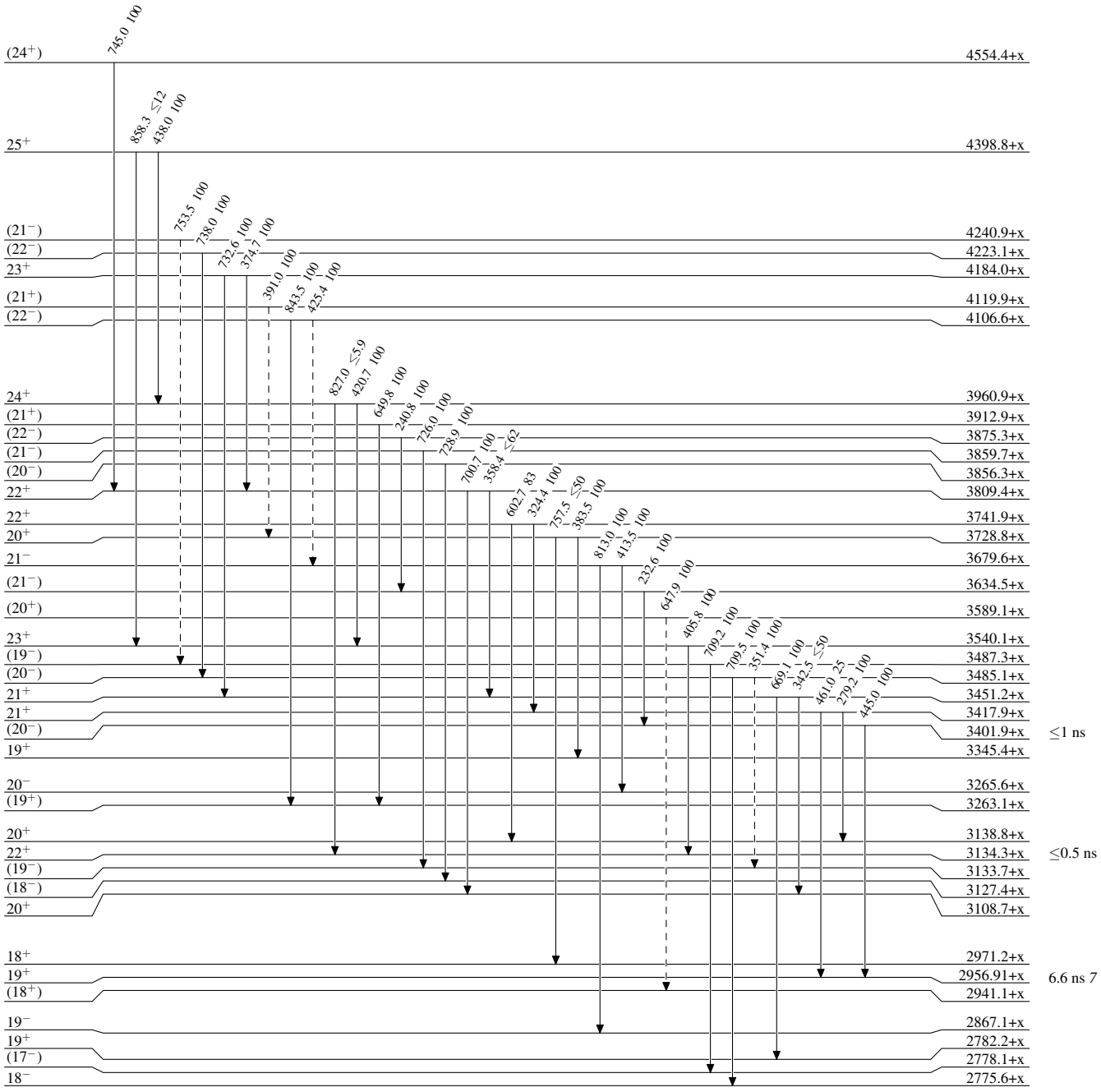
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{178}_{73}Ta_{105}$

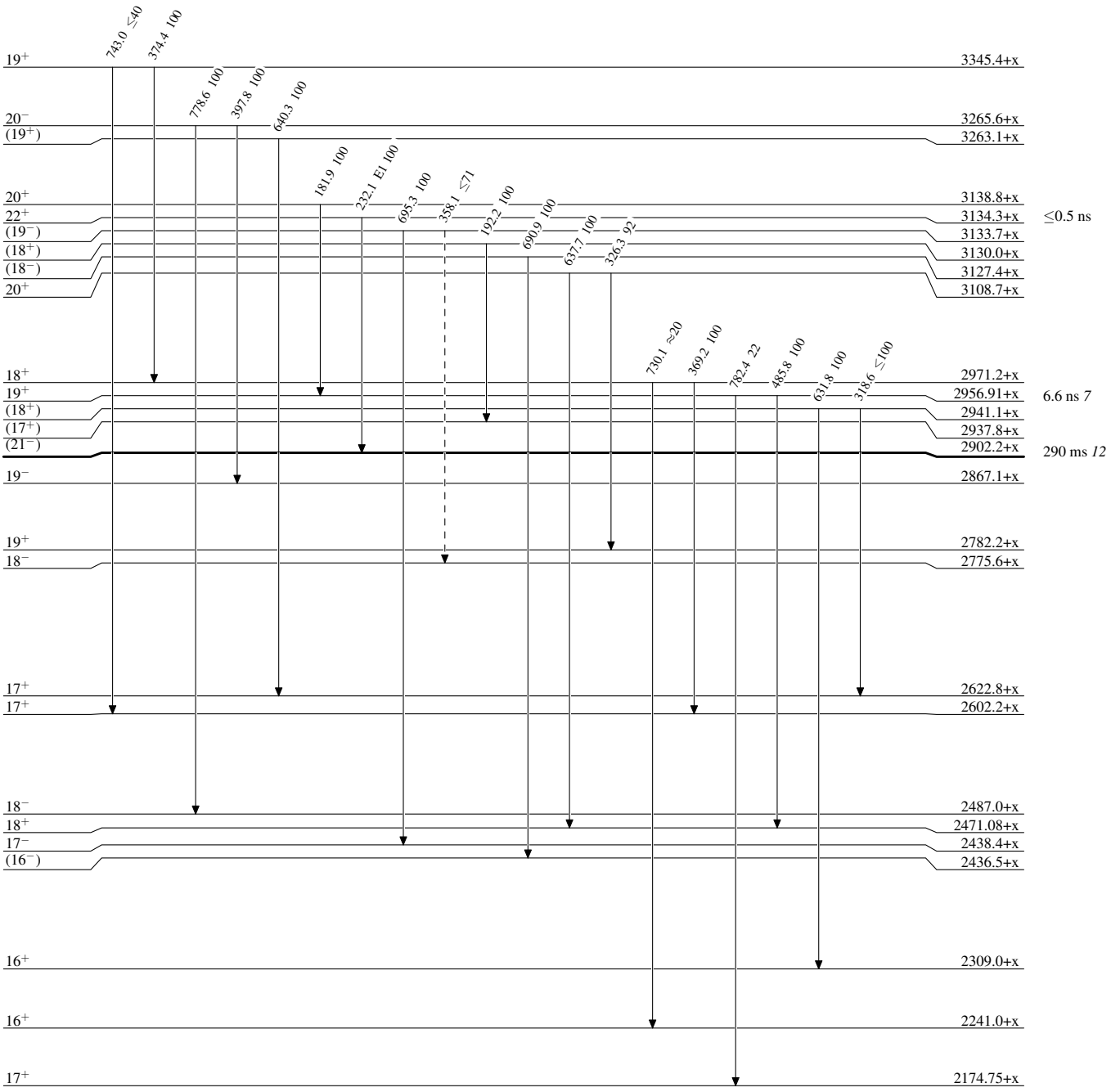
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{178}_{73}Ta_{105}$

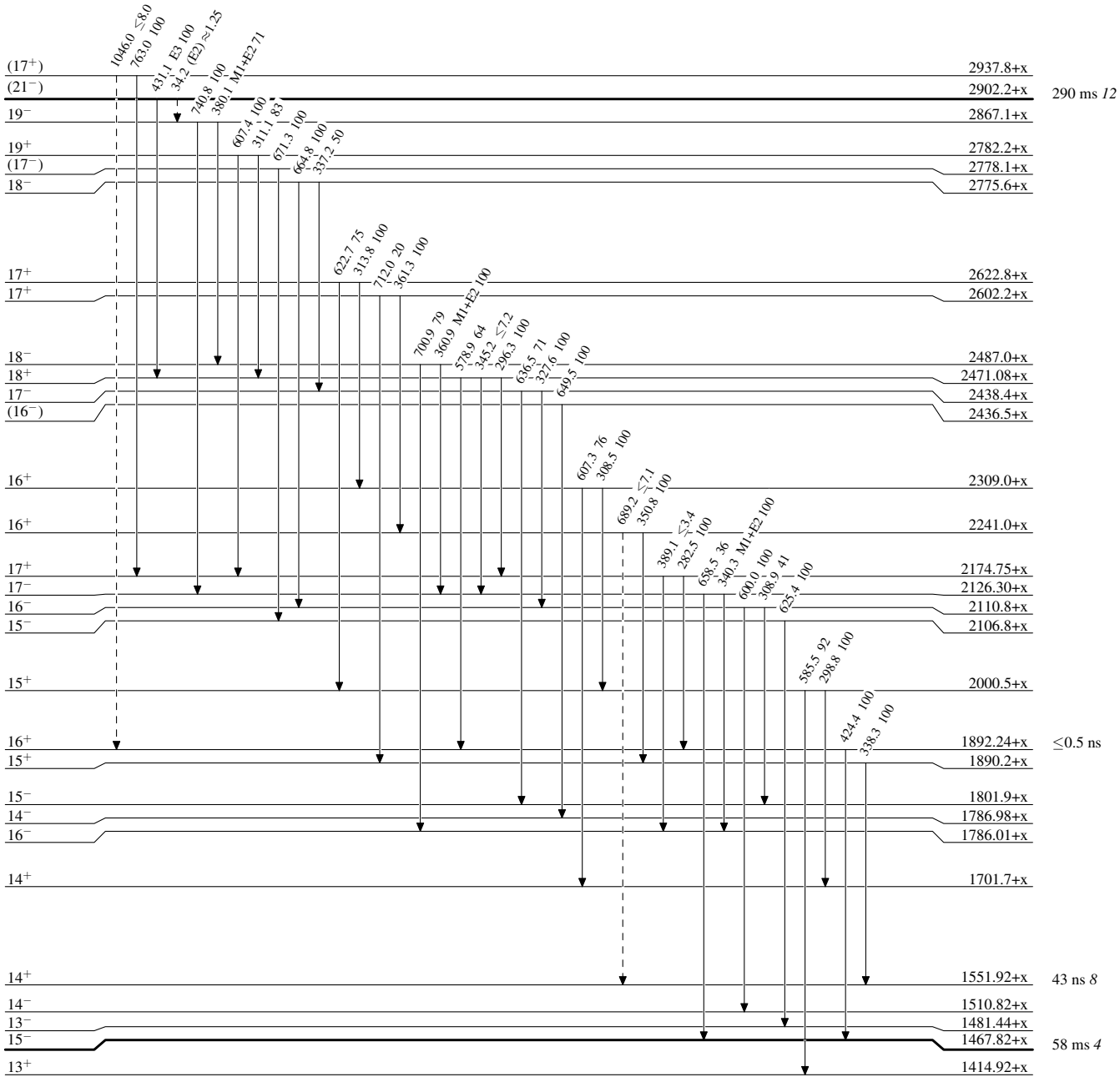
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{178}_{73}Ta_{105}$

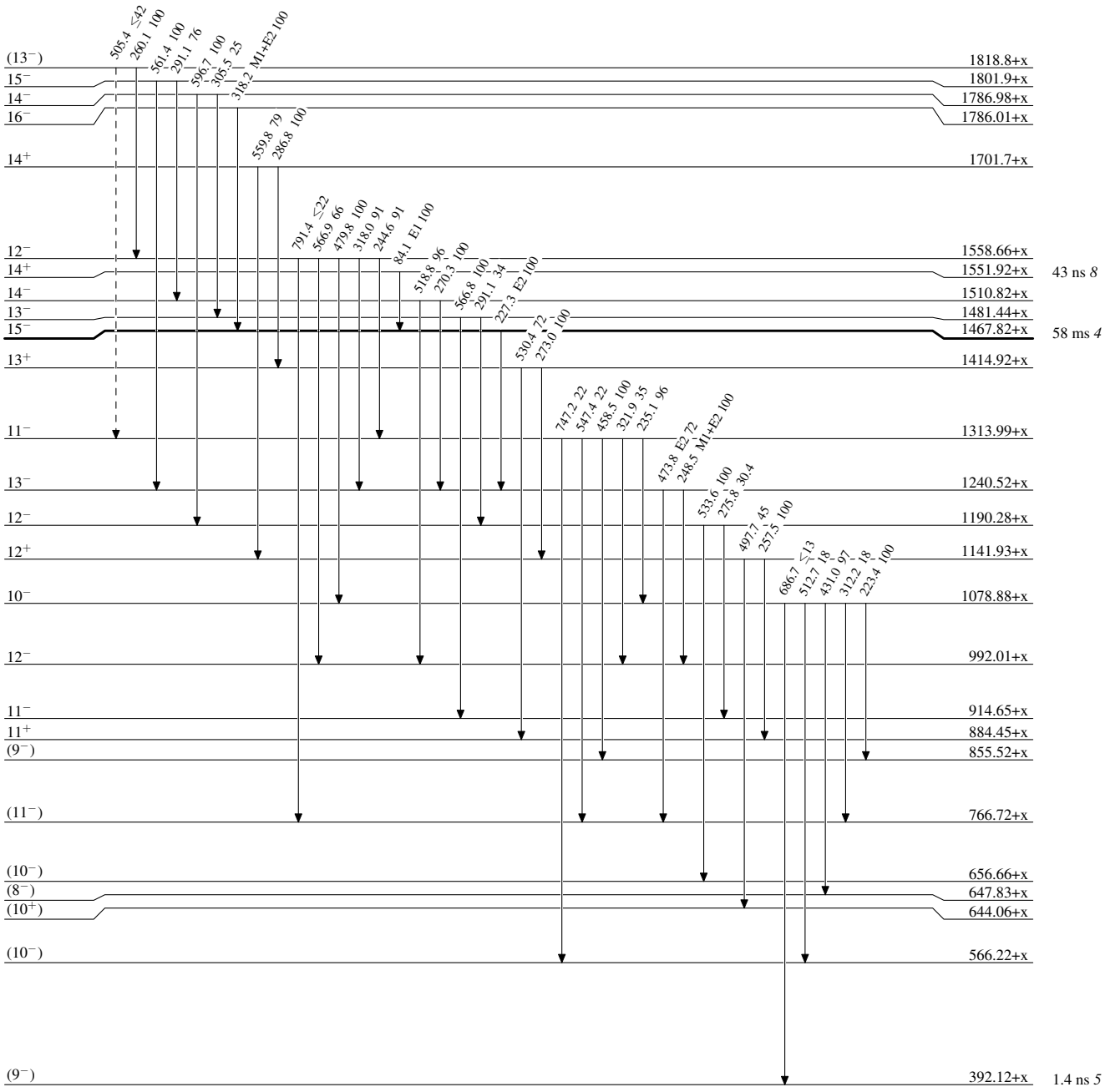
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

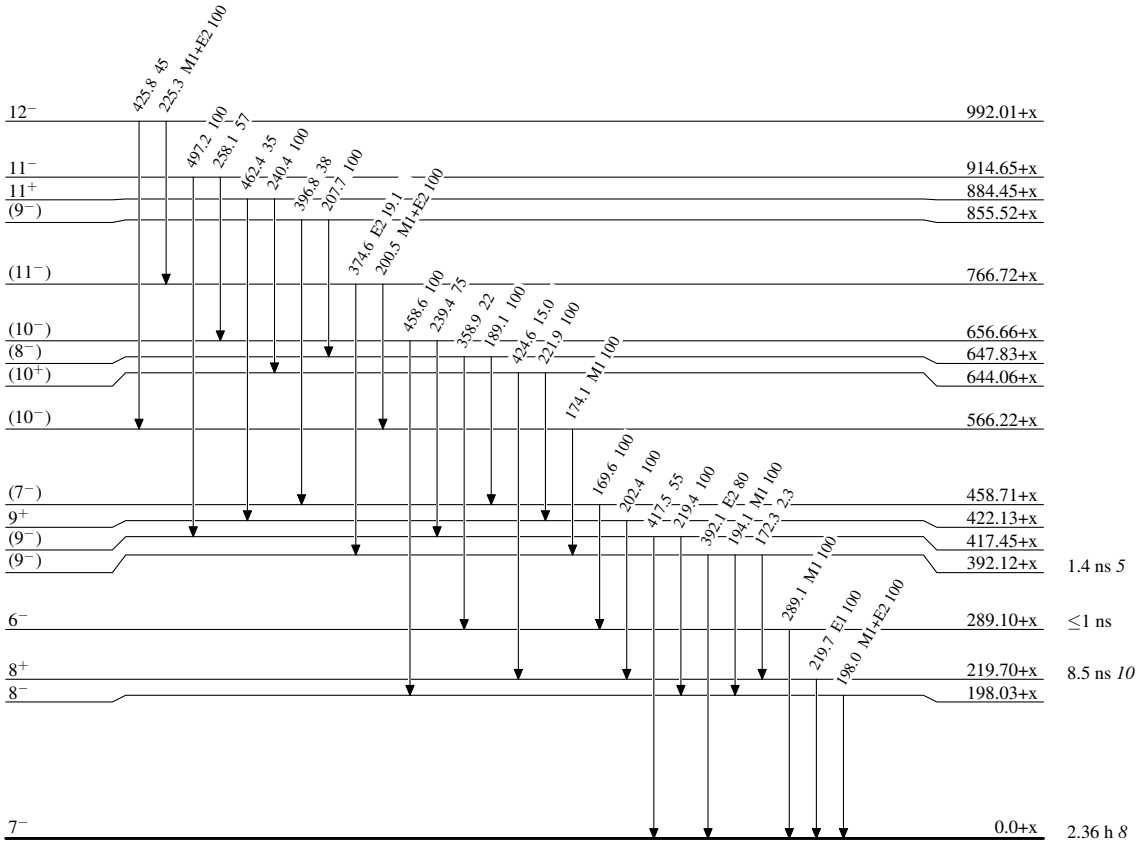


$^{178}_{73}Ta_{105}$

Adopted Levels, Gammas

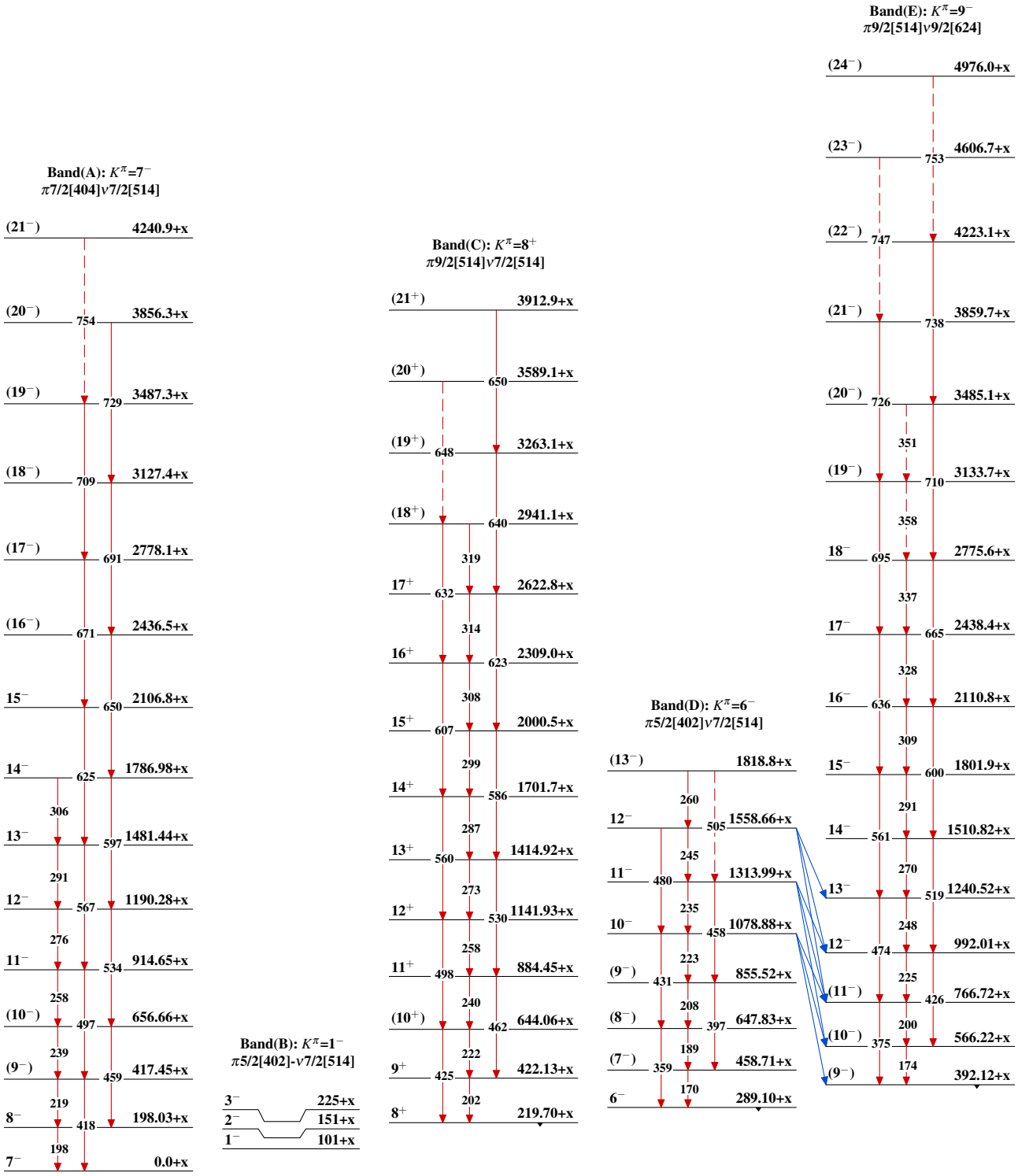
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{178}_{73}Ta_{105}$

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)

Band(G): $K^{\pi}=3^{+}$
$\pi 1/2^{-}[530]$
$-\nu 7/2^{-}[514]$

(5^{+}) **1390+x**

(4^{+}) **1281+x**

(3^{+}) **1223+x**

Band(F): $K^{\pi}=4^{+}$
$\pi 1/2^{-}[541]$
$-\nu 7/2^{-}[514]$

(8^{+}) **671+x**

(7^{+}) **564+x**

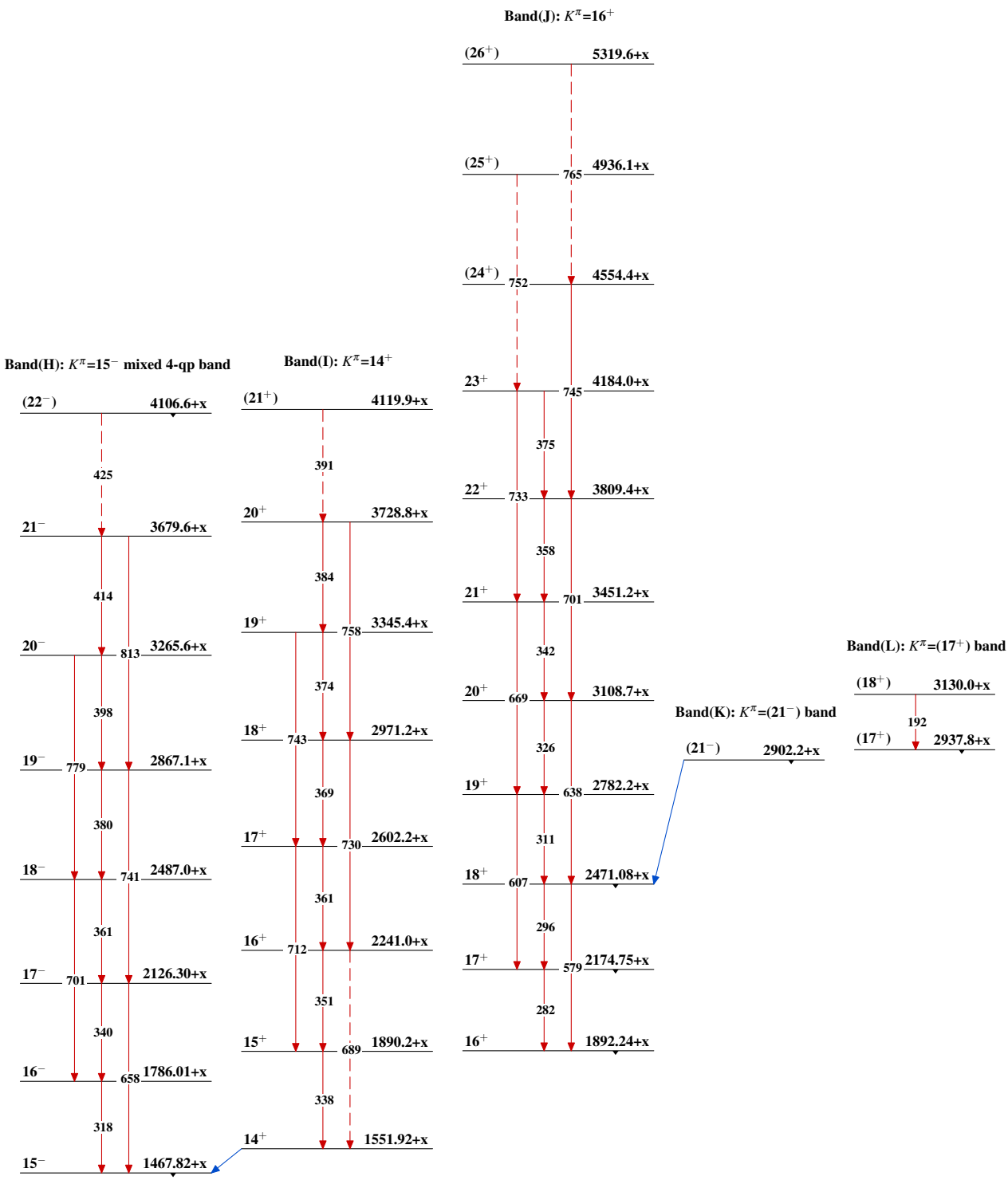
(6^{+}) **485+x**

(5^{+}) **434+x**

4^{+} **420+x**

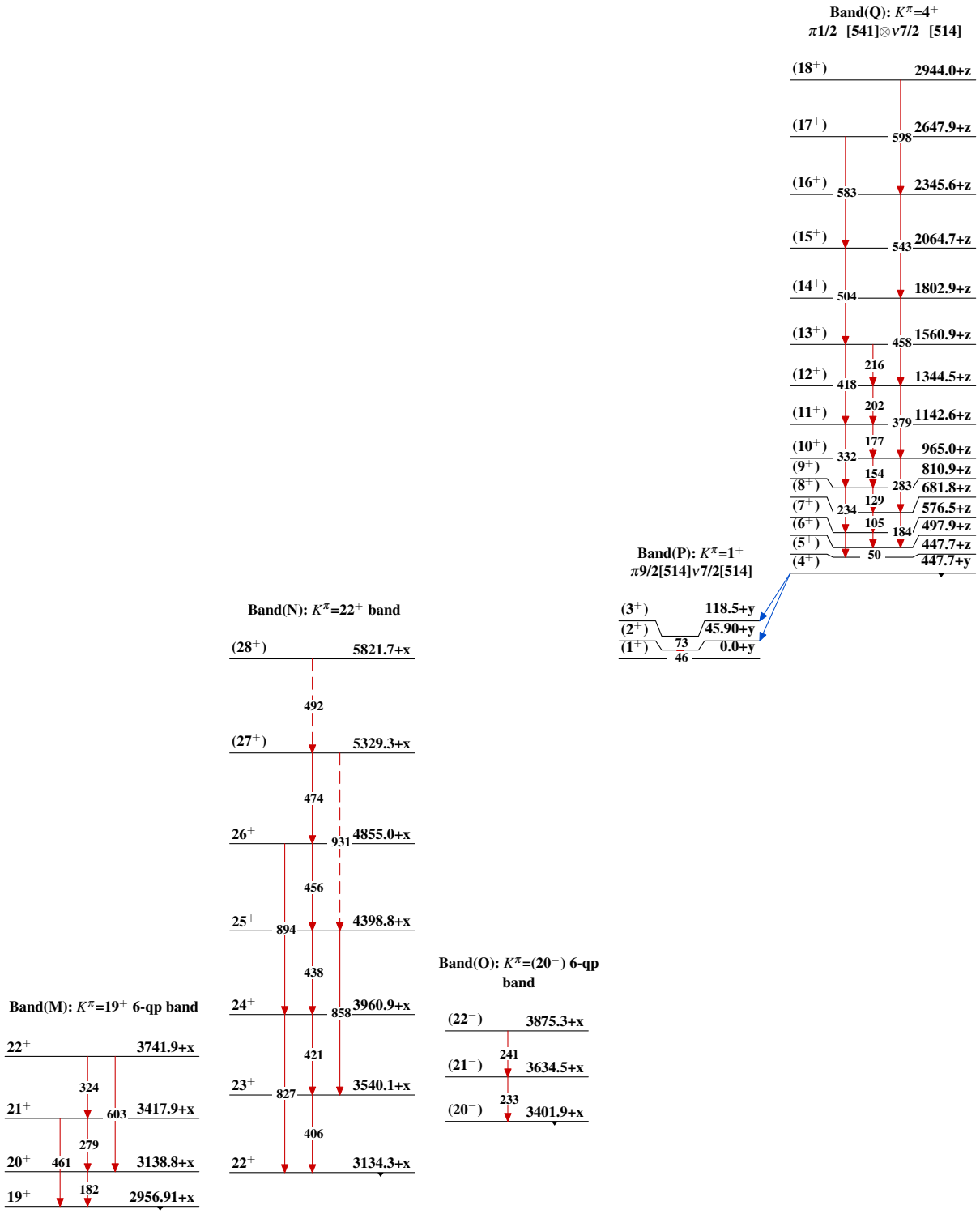
$^{178}_{73}Ta_{105}$

Adopted Levels, Gammas (continued)



$^{178}_{73}Ta_{105}$

Adopted Levels, Gammas (continued)



$^{178}_{73}Ta_{105}$