^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13

History

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

1998Ko09, 1996Ko13: ^{176}Yb(^{7}Li,5nγ), E=30-60 MeV, pulsed beams. Measured Eγ, Iγ, $\gamma\gamma$, excitation functions, $\gamma\gamma$(t), and γ(t), $\gamma(\theta)$, ce, ce-γ(t). Used the CAESAR array of six Compton suppressed Ge detectors at ±48°, ±97°, and ±145° from the beam axis, and two planar Ge detectors at ±45°, for γ-ray measurements. A superconducting solenoidal spectrometer with a Si(Li) detector was used for conversion electron measurements. 1996Ko13 is a partial report for this set of experiments.

^{178}Ta Levels

All data given here are from 1998Ko09, except where noted otherwise. Reduced transition probabilities B(M1)/B(E2) in the table are given in units of μ_N^2/e^2b^2, while the listed g_K-g_R data are absolute values.

E(level)	J$^\pi$	T$_{1/2}$	Comments
0.0+x†	7⁻	2.36 h *8*	%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. Note that other publications for this nuclide have made the opposite choice. 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. T$_{1/2}$: From Adopted Levels. g_K=0.55 *5*.
198.03+x† *7*	8⁻		
219.70+x‡ *10*	8⁺	8.5 ns *10*	g_K=0.77 *6*.
289.10+x# *10*	6⁻	≤1 ns	g_K=0.77 *6*.
392.12+x@ *8*	9⁻	1.4 ns *5*	g_K=0.59 *5*.
417.45+x† *8*	9⁻		g_K-g_R=0.26 *2*. B(M1)/B(E2)=1.14 *18*.
422.13+x‡ *14*	9⁺		
458.71+x# *13*	7⁻		
566.22+x@ *11*	10⁻		
644.06+x‡ *16*	10⁺		g_K-g_R=0.47 *+6−8*. B(M1)/B(E2)=5.5 *17*.
647.83+x# *15*	8⁻		g_K-g_R=0.48 *3*. B(M1)/B(E2)=2.5 *3*.
656.66+x† *11*	10⁻		g_K-g_R=0.23 *2*. B(M1)/B(E2)=0.52 *9*.
766.72+x@ *11*	11⁻		g_K-g_R=0.29 *2*. B(M1)/B(E2)=3.0 *3*.
855.52+x# *16*	9⁻		g_K-g_R=0.54 *3*. B(M1)/B(E2)=1.95 *24*.
884.45+x‡ *18*	11⁺		g_K-g_R=0.44 *3*. B(M1)/B(E2)=0.30 *2*.
914.65+x† *12*	11⁻		g_K-g_R=0.27 *2*. B(M1)/B(E2)=0.55 *7*.
992.01+x@ *12*	12⁻		g_K-g_R=0.28 *1*. B(M1)/B(E2)=1.55 *12*.
1078.88+x# *19*	10⁻		g_K-g_R=0.43 *2*. B(M1)(223)/B(E2)(431)=0.94 *7*.
1141.93+x‡ *20*	12⁺		g_K-g_R=0.49 *4*. B(M1)/B(E2)=2.6 *4*.
1190.28+x† *14*	12⁻		g_K-g_R=0.22 *3*. B(M1)/B(E2)=0.31 *7*.
1240.52+x@ *13*	13⁻		g_K-g_R=0.30 *1*. B(M1)/B(E2)=1.34 *7*.
1313.99+x# *21*	11⁻		g_K-g_R=0.47 *3*. B(M1)(235)/B(E2)(458)=0.99 *14*.
1414.92+x‡ *22*	13⁺		g_K-g_R=0.45 *2*. B(M1)/B(E2)=1.89 *18*.
1467.82+x& *16*	15⁻	58 ms *4*	%IT=100 g_K=0.46 *5* The value represents a mixed 15⁻ state.
1481.44+x† *14*	13⁻		g_K-g_R=0.28 *4*. B(M1)/B(E2)=0.46 *11*.

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^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

^{178}Ta Levels (continued)

E(level)	Jπ	T1/2	Comments
1510.82+x[@] 22	14−		g_K-g_R=0.31 2. B(M1)/B(E2)=1.20 18.
1551.92+x[a] 19	14+	43 ns 8	g_K=0.80 8.
1558.66+x[#] 19	12−		g_K-g_R=0.51 4. B(M1)(244)/B(E2)(479)=1.05 15.
1701.7+x[‡] 3	14+		g_K-g_R=0.48 2. B(M1)/B(E2)=1.91 18.
1786.02+x[&] 19	16−		
1786.98+x[†] 16	14−		g_K-g_R=0.26 4. B(M1)/B(E2)=0.38 10.
1801.9+x[@] 3	15−		g_K-g_R=0.31 3. B(M1)/B(E2)=1.04 18.
1818.8+x[#] 4	(13−)		
1890.2+x[a] 4	15+		
1892.23+x[b] 19	16+	≤0.5 ns	g_K=0.40 4.
2000.5+x[‡] 3	15+		g_K-g_R=0.50 3. B(M1)/B(E2)=1.86 21.
2106.8+x[†] 4	15−		
2110.8+x[@] 3	16−		g_K-g_R=0.25 3. B(M1)/B(E2)=0.62 13.
2126.30+x[&] 21	17−		g_K-g_R=0.166 6. B(M1)/B(E2)=4.0 3.
2174.75+x[b] 21	17+		
2241.0+x[a] 5	16+		
2309.0+x[‡] 4	16+		g_K-g_R=0.51 6. B(M1)/B(E2)=1.8 4.
2436.5+x[†] 4	(16−)		
2438.4+x[@] 6	17−		g_K-g_R=0.32 3. B(M1)/B(E2)=0.96 19.
2471.07+x[b] 23	18+		g_K-g_R=0.104 6. B(M1)/B(E2)=1.89 22.
2487.1+x[&] 3	18−		g_K-g_R=0.156 4. B(M1)/B(E2)=1.94 10.
2602.2+x[a] 7	17+		g_K-g_R=0.49 +7−9. B(M1)/B(E2)=16 5.
2622.8+x[‡] 6	17+		g_K-g_R=0.50 6. B(M1)/B(E2)=1.7 4.
2775.6+x[@] 7	18−		g_K-g_R=0.32 5. B(M1)/B(E2)=0.9 3.
2778.1+x[†] 9	(17−)		
2782.2+x[b] 3	19+		g_K-g_R=0.082 24. B(M1)/B(E2)=0.7 4.
2867.2+x[&] 3	19−		g_K-g_R=0.143 6. B(M1)/B(E2)=1.17 10.
2901.9+x[c] 7	(21−)	290 ms 12	%IT=100
2937.7+x[d] 4	(17+)		
2941.1+x[‡] 7	(18+)		g_K-g_R=0.42 +8−10. B(M1)/B(E2)=1.2 5.
2956.90+x[e] 24	19+	6.6 ns 7	g_K=0.19 5.
2971.2+x[a] 8	18+		g_K-g_R=0.48 +10−12. B(M1)/B(E2)=11 5.
3108.7+x[b] 4	20+		g_K-g_R=0.133 35. B(M1)/B(E2)=1.2 7.
3127.4+x[†] 9	(18−)		
3129.9+x[d] 9	(18+)		
3133.7+x[@] 10	(19−)		g_K=0.55 8.
3134.0+x[f] 8	22+	≤0.5 ns	
3138.8+x[e] 4	20+		
3263.1+x[‡] 10	(19+)		
3265.6+x[&] 6	20−		
3345.4+x[a] 9	19+		g_K-g_R=0.52 +7−9. B(M1)/B(E2)=10 3.
3401.9+x[g] 4	(20−)	≤1 ns	
3417.9+x[e] 5	21+		g_K-g_R=0.060 24. B(M1)/B(E2)=1.0 8.
3451.2+x[b] 6	21+		
3485.1+x[@] 11	(20−)		
3487.3+x[†] 12	(19−)		

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^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

^{178}Ta Levels (continued)

E(level)	J$^{\pi}$	T$_{1/2}$	Comments
3539.8+x[f] *8*	23^+		
3589.1+x[‡]	(20^+)		
3634.5+x[g] *9*	(21^-)		
3679.6+x[&] *7*	21^-		
3728.8+x[a] *10*	20^+		
3741.9+x[e] *7*	22^+		g_K-g_R=0.157 *22*. B(M1)/B(E2)=3.8 *11*.
3809.4+x[b] *7*	22^+		
3856.3+x[†] *12*	(20^-)		
3859.7+x[@] *13*	(21^-)		
3875.3+x[g] *12*	(22^-)		
3912.9+x[‡] *13*	(21^+)		
3960.5+x[f] *9*	24^+		g_K-g_R=0.38 *+9−7*. B(M1)/B(E2)=63 *49*.
4109.1+x[&] *10*	(22^-)		
4119.9+x[a]	(21^+)		
4184.0+x[b] *8*	23^+		
4223.1+x[@] *14*	(22^-)		
4240.9+x[†]	(21^-)		
4398.4+x[f] *10*	25^+		g_K-g_R=0.27 *+3−4*. B(M1)/B(E2)=18 *5*.
4554.4+x[b] *11*	(24^+)		
4606.7+x[@]	(23^-)		
4854.7+x[f] *11*	26^+		g_K-g_R=0.20 *4*. B(M1)/B(E2)=7 *3*.
4936.1+x[b]	(25^+)		
4976.0+x[@]	(24^-)		
5319.6+x[b]	(26^+)		
5329.0+x[f] *13*	(27^+)		g_K-g_R=0.26 *+5−6*. B(M1)/B(E2)=9 *4*.
5821.7+x[f]	(28^+)		
0.0+y[h]	(1^+)	9.31 min *3*	Additional information 1. E(level): See comment for the 0.0+x level. T$_{1/2}$: From Adopted Levels.
45.90+y[h] *10*	(2^+)		
118.5+y[h] *3*	(3^+)		
207.4+y *5*			
329.3+y *5*	(2^+)		
447.7+y[i] *4*	(4^+)	60 ns *5*	g_K=0.12 *2*.
531.2+y *5*	(3^+)		
447.7+z[i]	(5^+)		E(level): The energy for this level is as yet undefined, as there are no experimental data for the energy difference between this one and the 4^+ level. From the smooth trend of the M1 cascade above this level one might expect a transition energy of the order of 20-30 keV, but this extrapolation is much too uncertain and therefore has not been adopted here.
497.9+z[i] *4*	(6^+)		
576.5+z[i] *3*	(7^+)		g_K-g_R=0.07 *2*. B(M1)/B(E2)=0.010 *1*.
681.8+z[i] *4*	(8^+)		g_K-g_R=0.19 *1*. B(M1)/B(E2)=0.07 *1*.
810.9+z[i] *3*	(9^+)		g_K-g_R=0.21 *2*. B(M1)/B(E2)=0.08 *1*.
965.0+z[i] *4*	(10^+)		g_K-g_R=0.17 *1*. B(M1)/B(E2)=0.050 *4*.
1142.6+z[i] *4*	(11^+)		g_K-g_R=0.17 *2*. B(M1)/B(E2)=0.040 *4*.
1344.5+z[i] *5*	(12^+)		g_K-g_R=0.27 *3*. B(M1)/B(E2)=0.10 *2*.
1560.9+z[i] *4*	(13^+)		g_K-g_R=0.23 *5*. B(M1)/B(E2)=0.07 *3*.

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^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

^{178}Ta Levels (continued)

E(level)	J$^{\pi}$
1802.9+z[i] *5*	(14^{+})
2064.7+z[i] *5*	(15^{+})
2345.6+z[i] *6*	(16^{+})
2647.9+z[i] *6*	(17^{+})
2944.0+z[i] *7*	(18^{+})

† Band(A): K^{π}=7^{-} π7/2^{+}[404]⊗ν7/2^{-}[514] based on the 0+x keV 2.2 h isomeric state.
‡ Band(B): K^{π}=8^{+} π9/2^{-}[514]⊗ν7/2^{-}[514] based on the 220+x keV 8.5 ns level.
# Band(C): K^{π}=6^{-} π5/2^{+}[402]⊗ν7/2^{-}[514] based on the 289+x keV level.
@ Band(D): K^{π}=9^{-} π9/2^{-}[514]⊗ν9/2^{+}[624] based on the 392+x keV level.
& Band(E): K^{π}=15^{-} mixed 4-qp band 26% $\pi^{3}\nu$ + 74% $\pi\nu^{3}$ based on the 1468+x keV 58 ms isomeric level.
a Band(F): K^{π}=14^{+} π^{3}(5/2^{+}[402],7/2^{+}[404],9/2^{-}[514])⊗ν(7/2^{-}[514]) 4-qp band based on the 1552+x keV 43 ns level.
b Band(G): K^{π}=16^{+} (π9/2^{-}[514])⊗ν^{3}(7/2^{-}[514],7/2^{+}[633],9/2^{+}[624]) 4-qp band based on the 1892+x keV level.
c Band(H): K^{π}=(21^{-}) band based on the 2902+x 290 ms keV isomeric level.
d Band(I): K^{π}=(17^{+}) band based on the 2938+x keV level.
e Band(J): K^{π}=19^{+} 6-qp band based on the 2957+x keV 6.6 ns level, tentative configuration π^{3}(7/2^{+}[404],9/2^{-}[514],1/2^{-}[541])⊗ν^{3}(5/2^{-}[512],7/2^{-}[514],9/2^{+}[624]).
f Band(K): K^{π}=22^{+} band based on the 3134+x keV level.
g Band(L): K^{π}=(20^{-}) 6-qp band based on the 3402+x keV level, suggested configuration π^{3}(7/2^{+}[404],9/2^{-}[514],1/2^{-}[541])⊗ν^{3}(5/2^{-}[512],7/2^{+}[633],9/2^{+}[624]).
h Band(M): K^{π}=1^{+} π9/2[514]ν7/2[514] based on the 0+Y keV 9.31 min isomeric state.
i Band(N): K^{π}=4^{+} π1/2^{-}[541]⊗ν7/2^{-}[514] based on the 448+Y keV 60 ns level.

γ(^{178}Ta)

E$_{\gamma}$†	I$_{\gamma}$	E$_{i}$(level)	J$^{\pi}_{i}$	E$_{f}$	J$^{\pi}_{f}$	Mult.‡	α#	Comments
(34.2)	≈0.008	2901.9+x	(21^{-})	2867.2+x	19^{-}	(E2)	496	The existence of this unobserved transition is established from coincidence relations in 1998Ko09. I$_{\gamma}$: From Iγ(431.1)≈4 and Iγ(34)/Iγ(431)≈0.013. Mult.: From α_{T}>11 (1996Ko13).
45.9 *1*	13.1 *19*	45.90+y	(2^{+})	0.0+y	(1^{+})			
50.0 *8*	1.3 *5*	497.9+z	(6^{+})	447.7+z	(5^{+})			
72.6 *3*	5.9 *8*	118.5+y	(3^{+})	45.90+y	(2^{+})			
78.6 *3*	1.9 *3*	576.5+z	(7^{+})	497.9+z	(6^{+})			
83.5 *3*	3.4 *5*	531.2+y	(3^{+})	447.7+y	(4^{+})			A$_{2}$=−0.22 *18*.
84.1 *1*	11.0 *13*	1551.92+x	14^{+}	1467.82+x	15^{-}	E1	0.573	B(E1)(W.u.)=5.3×10^{-6} *10* Mult.: from α_{T}(exp)≤1.0.
88.8 *8*	≤0.8	207.4+y		118.5+y	(3^{+})			
105.4 *3*	4.9 *5*	681.8+z	(8^{+})	576.5+z	(7^{+})			A$_{2}$=−0.30 *15*.
118.4 *3*	2.7 *5*	447.7+y	(4^{+})	329.3+y	(2^{+})			
121.9 *3*	3.0 *5*	329.3+y	(2^{+})	207.4+y				A$_{2}$=+0.06 *9*.
128.8 *3*	4.4 *7*	576.5+z	(7^{+})	447.7+z	(5^{+})			
128.9 *3*	5.9 *7*	810.9+z	(9^{+})	681.8+z	(8^{+})			
154.0 *3*	2.2 *5*	965.0+z	(10^{+})	810.9+z	(9^{+})			
169.6 *1*	15 *2*	458.71+x	7^{-}	289.10+x	6^{-}			A$_{2}$=+0.29 *25*.
172.3 *8*	1.3 *5*	392.12+x	9^{-}	219.70+x	8^{+}			I$_{\gamma}$: out-of-beam intensity=12 *3*.
174.1 *1*	85 *6*	566.22+x	10^{-}	392.12+x	9^{-}	M1	0.903	A$_{2}$=+0.19 *3*.

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^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

γ(^{178}Ta) (continued)

E_γ †	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	α#	Comments
								I_γ: out-of-beam intensity=555 *14*. Mult.: from α_T(exp)=0.91 *11*.
177.4 *8*	1.5 *3*	1142.6+z	(11$^+$)	965.0+z	(10$^+$)			
181.9 *3*	2.9 *5*	3138.8+x	20$^+$	2956.90+x	19$^+$			
183.8 *3*	7.3 *7*	681.8+z	(8$^+$)	497.9+z	(6$^+$)			
189.1 *1*	11.6 *7*	647.83+x	8$^-$	458.71+x	7$^-$			A_2=+0.39 *15*.
192.2 *8*	1.0 *3*	3129.9+x	(18$^+$)	2937.7+x	(17$^+$)			
194.1 *1*	58 *5*	392.12+x	9$^-$	198.03+x	8$^-$	M1	0.666	B(M1)(W.u.)=0.0009 *4* I_γ: out-of-beam intensity=414 *16*. A_2=+0.25 *5*. Mult.: from α_T(exp)=0.75 *13*.
198.0 *1*	62 *7*	198.03+x	8$^-$	0.0+x	7$^-$			I_γ: out-of-beam intensity=590 *25*. A_2=+0.31 *4*.
200.5 *1*	78 *5*	766.72+x	11$^-$	566.22+x	10$^-$	M1+E2	0.45 *16*	I_γ: out-of-beam intensity=577 *11*. A_2=+0.21 *5*. Mult.: from α(L)exp=0.073 *9*, α(M)exp=0.020 *9*.
202.2 *8*	1.5 *3*	1344.5+z	(12$^+$)	1142.6+z	(11$^+$)			
202.4 *1*	37.6 *12*	422.13+x	9$^+$	219.70+x	8$^+$			A_2=+0.38 *11*.
207.7 *1*	9.4 *7*	855.52+x	9$^-$	647.83+x	8$^-$			A_2=+0.49 *16*.
216.2 *8*	1.0 *3*	1560.9+z	(13$^+$)	1344.5+z	(12$^+$)			
219.4 *1*	16.4 *8*	417.45+x	9$^-$	198.03+x	8$^-$			
219.7 *1*	69 *4*	219.70+x	8$^+$	0.0+x	7$^-$	E1	0.0479	B(E1)(W.u.)=2.3×10^{-6} *3* I_γ: out-of-beam intensity=13 *3*. A_2=0.00 *7*. Mult.: from α_T(exp)=0.002 *60*.
221.9 *1*	28.2 *10*	644.06+x	10$^+$	422.13+x	9$^+$			A_2=+0.34 *11*.
223.4 *3*	6.4 *3*	1078.88+x	10$^-$	855.52+x	9$^-$			
225.3 *1*	54 *4*	992.01+x	12$^-$	766.72+x	11$^-$	M1+E2	0.32 *12*	I_γ: out-of-beam intensity=403 *9*. Mult.: from α(L)exp=0.055 *3*.
227.3 *1*	100 *9*	1467.82+x	15$^-$	1240.52+x	13$^-$	E2	0.195	B(E2)(W.u.)=2.26×10^{-7} *16* I_γ: out-of-beam intensity=1000 *27*. Mult.: from α_T(exp)=0.21 *6*, α(L)exp=0.051 *2*, α(M)exp=0.019 *1*.
232.1 *3*	6.7 *10*	3134.0+x	22$^+$	2901.9+x	(21$^-$)	E1	0.0417	B(E1)(W.u.)>3.3×10^{-5} Mult.: from α_T(exp)=0.08 *5*.
232.6 *8*	1.3 *3*	3634.5+x	(21$^-$)	3401.9+x	(20$^-$)			
234.4 *1*	15.0 *17*	810.9+z	(9$^+$)	576.5+z	(7$^+$)			
235.1 *3*	3.7 *3*	1313.99+x	11$^-$	1078.88+x	10$^-$			
239.4 *3*	6.4 *5*	656.66+x	10$^-$	417.45+x	9$^-$			
240.4 *1*	17.7 *12*	884.45+x	11$^+$	644.06+x	10$^+$			A_2=+0.43 *12*.
240.8 *8*	0.84 *17*	3875.3+x	(22$^-$)	3634.5+x	(21$^-$)			
244.6 *3*	3.5 *3*	1558.66+x	12$^-$	1313.99+x	11$^-$			
248.5 *1*	64 *3*	1240.52+x	13$^-$	992.01+x	12$^-$	M1+E2	0.24 *10*	I_γ: out-of-beam intensity=566 *10*. Mult.: from α(K)exp=0.149 *11*, α(L)exp=0.037 *1*, α(M)exp=0.013 *1*.
257.5 *1*	14.2 *8*	1141.93+x	12$^+$	884.45+x	11$^+$			
258.1 *3*	4.9 *3*	914.65+x	11$^-$	656.66+x	10$^-$			
260.1 *3*	2.0 *3*	1818.8+x	(13$^-$)	1558.66+x	12$^-$			
270.3 *3*	4.7 *5*	1510.82+x	14$^-$	1240.52+x	13$^-$			A_2=+0.47 *8*.
273.0 *1*	8.4 *7*	1414.92+x	13$^+$	1141.93+x	12$^+$			
275.8 *3*	2.87 *17*	1190.28+x	12$^-$	914.65+x	11$^-$			
279.2 *3*	2.0 *3*	3417.9+x	21$^+$	3138.8+x	20$^+$			
282.5 *1*	24.8 *25*	2174.75+x	17$^+$	1892.23+x	16$^+$			I_γ: out-of-beam intensity=7 *2*. A_2=+0.51 *7*.
283.2 *1*	12.3 *10*	965.0+z	(10$^+$)	681.8+z	(8$^+$)			

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^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

γ(^{178}Ta) (continued)

E_γ †	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	α#	Comments
286.8 *3*	5.6 *10*	1701.7+x	14⁺	1414.92+x	13⁺			
289.1 *1*	16.4 *17*	289.10+x	6⁻	0.0+x	7⁻	M1	0.223	B(M1)(W.u.)>0.00074 A_2=+0.33 *11*. Mult.: from α_T(exp)=0.25 *13*.
291.1 *3*	4.0 *5*	1481.44+x	13⁻	1190.28+x	12⁻			
291.1 *3*	3.2 *5*	1801.9+x	15⁻	1510.82+x	14⁻			
296.3 *1*	11.6 *13*	2471.07+x	18⁺	2174.75+x	17⁺			I_γ: out-of-beam intensity=6 *1*. A_2=+0.45 *9*.
298.8 *3*	4.2 *5*	2000.5+x	15⁺	1701.7+x	14⁺			A_2=+0.31 *18*.
305.5 *3*	2.4 *3*	1786.98+x	14⁻	1481.44+x	13⁻			
308.5 *3*	3.5 *5*	2309.0+x	16⁺	2000.5+x	15⁺			
308.9 *3*	1.8 *3*	2110.8+x	16⁻	1801.9+x	15⁻			
311.1 *3*	3.4 *10*	2782.2+x	19⁺	2471.07+x	18⁺			
312.2 *8*	1.2 *3*	1078.88+x	10⁻	766.72+x	11⁻			
313.8 *8*	1.3 *3*	2622.8+x	17⁺	2309.0+x	16⁺			
318.0 *3*	3.5 *3*	1558.66+x	12⁻	1240.52+x	13⁻			
318.2 *1*	22.1 *12*	1786.02+x	16⁻	1467.82+x	15⁻	M1+E2	0.12 *6*	I_γ: out-of-beam intensity=43 *4*. A_2=+0.44 *8*. Mult.: from α(K)exp=0.099 *5*.
318.6 *8*	≤0.8	2941.1+x	(18⁺)	2622.8+x	17⁺			
321.9 *8*	1.4 *3*	1313.99+x	11⁻	992.01+x	12⁻			
324.4 *8*	1.0 *3*	3741.9+x	22⁺	3417.9+x	21⁺			
326.3 *3*	2.0 *7*	3108.7+x	20⁺	2782.2+x	19⁺			
327.6 *8*	1.2 *3*	2438.4+x	17⁻	2110.8+x	16⁻			
329.2 *1*	18.9 *22*	447.7+y	(4⁺)	118.5+y	(3⁺)			
331.7 *1*	13.5 *15*	1142.6+z	(11⁺)	810.9+z	(9⁺)			
337.2 *8*	0.8 *3*	2775.6+x	18⁻	2438.4+x	17⁻			
338.3 *3*	4.2 *3*	1890.2+x	15⁺	1551.92+x	14⁺			A_2=+0.58 *18*.
340.3 *1*	9.4 *7*	2126.30+x	17⁻	1786.02+x	16⁻	M1+E2	0.10 *5*	I_γ: out-of-beam intensity=22 *2*. A_2=+0.50 *5*. Mult.: from α(K)exp=0.084 *5*, α(L)exp=0.018 *1*.
342.5 *8*	≤0.8	3451.2+x	21⁺	3108.7+x	20⁺			
345.2 *8*	≤0.8	2471.07+x	18⁺	2126.30+x	17⁻			I_γ: out-of-beam intensity ≤0.3.
350.8 *3*	2.4 *3*	2241.0+x	16⁺	1890.2+x	15⁺			
351.4@ *8*	≤0.8	3485.1+x	(20⁻)	3133.7+x	(19⁻)			
358.1@ *8*	≤0.8	3133.7+x	(19⁻)	2775.6+x	18⁻			
358.4 *8*	≤0.8	3809.4+x	22⁺	3451.2+x	21⁺			
358.9 *3*	2.5 *3*	647.83+x	8⁻	289.10+x	6⁻			
360.9 *3*	2.4 *5*	2487.1+x	18⁻	2126.30+x	17⁻	M1+E2	0.09 *4*	I_γ: out-of-beam intensity=17 *2*. Mult.: from α(K)exp=0.069 *5*.
361.3 *8*	1.69 *17*	2602.2+x	17⁺	2241.0+x	16⁺			
369.2 *8*	0.84 *17*	2971.2+x	18⁺	2602.2+x	17⁺			
374.4 *8*	0.84 *17*	3345.4+x	19⁺	2971.2+x	18⁺			
374.6 *1*	15.0 *15*	766.72+x	11⁻	392.12+x	9⁻	E2	0.0432	I_γ: out-of-beam intensity=107 *4*. Mult.: from α(K)exp=0.032 *4*.
374.7 *8*	≤0.8	4184.0+x	23⁺	3809.4+x	22⁺			
379.4 *3*	8.3 *8*	1344.5+z	(12⁺)	965.0+z	(10⁺)			
380.1 *3*	2.0 *5*	2867.2+x	19⁻	2487.1+x	18⁻	M1+E2	0.07 *4*	I_γ: out-of-beam intensity=23 *3*. A_2=+0.38 *8*. Mult.: from α(K)exp=0.076 *5*, α(L)exp=0.011 *1*.
383.5 *8*	0.34 *17*	3728.8+x	20⁺	3345.4+x	19⁺			
389.1 *8*	≤0.8	2174.75+x	17⁺	1786.02+x	16⁻			I_γ: out-of-beam intensity ≈1.
391.0@ *8*	≤0.3	4119.9+x	(21⁺)	3728.8+x	20⁺			

Continued on next page (footnotes at end of table)

^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

γ(^{178}Ta) (continued)

E_γ[†]	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[#]	Comments
392.1 *1*	45.7 *12*	392.12+x	9⁻	0.0+x	7⁻	E2	0.0381	B(E2)(W.u.)=0.23 *9* I_γ: out-of-beam intensity=324 *5*. A_2=+0.22 *6*. Mult.: from α(K)exp=0.029 *1*, α(L)exp=0.0076 *5*, α(M)exp=0.0020 *2*.
396.8 *3*	3.5 *5*	855.52+x	9⁻	458.71+x	7⁻			
397.8 *8*	≤0.8	3265.6+x	20⁻	2867.2+x	19⁻			
401.7 *8*	1.2 *3*	447.7+y	(4⁺)	45.90+y	(2⁺)			
405.8 *3*	4.9 *5*	3539.8+x	23⁺	3134.0+x	22⁺			A_2=+0.38 *33*.
413.5 *8*	≤0.8	3679.6+x	21⁻	3265.6+x	20⁻			
417.5 *1*	9.1 *8*	417.45+x	9⁻	0.0+x	7⁻			
418.3 *1*	9.4 *10*	1560.9+z	(13⁺)	1142.6+z	(11⁺)			A_2=+0.46 *25*.
420.7 *3*	2.9 *7*	3960.5+x	24⁺	3539.8+x	23⁺			A_2=+0.31 *24*.
424.4 *1*	30 *3*	1892.23+x	16⁺	1467.82+x	15⁻			I_γ: out-of-beam intensity=10 *2*.
424.6 *3*	4.2 *5*	644.06+x	10⁺	219.70+x	8⁺			
425.4[@] *8*	≤0.8	4109.1+x	(22⁻)	3679.6+x	21⁻			
425.8 *1*	24.1 *20*	992.01+x	12⁻	566.22+x	10⁻			I_γ: out-of-beam intensity=173 *8*.
431.0 *3*	11.3 *7*	1078.88+x	10⁻	647.83+x	8⁻			
431.1 *8*	≈0.67	2901.9+x	(21⁻)	2471.07+x	18⁺	E3	0.0986 *16*	I_γ: out-of-beam intensity=10 *1*. Mult.: from α(K)exp=0.056 *7*, α(L)exp=0.033 *4*, K/L=1.7 *2*.
438.0 *8*	1.3 *3*	4398.4+x	25⁺	3960.5+x	24⁺			
445.0 *3*	3.2 *5*	3401.9+x	(20⁻)	2956.90+x	19⁺			
456.0 *8*	≤0.8	4854.7+x	26⁺	4398.4+x	25⁺			
458.4 *3*	4.2 *5*	1802.9+z	(14⁺)	1344.5+z	(12⁺)			
458.5 *3*	3.9 *5*	1313.99+x	11⁻	855.52+x	9⁻			
458.6 *1*	8.6 *10*	656.66+x	10⁻	198.03+x	8⁻			A_2=+0.29 *10*.
461.0 *8*	0.50 *17*	3417.9+x	21⁺	2956.90+x	19⁺			
462.4 *3*	3.2 *5*	884.45+x	11⁺	422.13+x	9⁺			
473.8 *1*	46 *4*	1240.52+x	13⁻	766.72+x	11⁻	E2	0.0231	I_γ: out-of-beam intensity=435 *13*. A_2=+0.14 *4*. Mult.: from α(K)exp=0.0162 *7*, α(L)exp=0.0040 *3*, α(M)exp=0.0011 *2*.
474.3 *8*	≤0.8	5329.0+x	(27⁺)	4854.7+x	26⁺			
479.8 *3*	3.9 *5*	1558.66+x	12⁻	1078.88+x	10⁻			
485.8 *1*	8.6 *12*	2956.90+x	19⁺	2471.07+x	18⁺			A_2=−0.39 *16*.
492.0[@] *8*	≤0.8	5821.7+x	(28⁺)	5329.0+x	(27⁺)			
497.2 *1*	8.6 *7*	914.65+x	11⁻	417.45+x	9⁻			
497.7 *3*	6.4 *5*	1141.93+x	12⁺	644.06+x	10⁺			
503.8 *3*	5.4 *8*	2064.7+z	(15⁺)	1560.9+z	(13⁺)			
505.4[@] *8*	≤0.8	1818.8+x	(13⁻)	1313.99+x	11⁻			
512.7 *8*	1.2 *3*	1078.88+x	10⁻	566.22+x	10⁻			
518.8 *3*	4.6 *3*	1510.82+x	14⁻	992.01+x	12⁻			A_2=+0.49 *24*.
530.4 *3*	6.1 *5*	1414.92+x	13⁺	884.45+x	11⁺			
533.6 *1*	9.4 *8*	1190.28+x	12⁻	656.66+x	10⁻			A_2=+0.41 *8*.
542.7 *3*	3.4 *3*	2345.6+z	(16⁺)	1802.9+z	(14⁺)			
547.4 *8*	0.84 *17*	1313.99+x	11⁻	766.72+x	11⁻			
559.8 *3*	4.4 *3*	1701.7+x	14⁺	1141.93+x	12⁺			
561.4 *3*	4.2 *5*	1801.9+x	15⁻	1240.52+x	13⁻			
566.8 *1*	11.8 *8*	1481.44+x	13⁻	914.65+x	11⁻			
566.9 *3*	2.5 *3*	1558.66+x	12⁻	992.01+x	12⁻			
578.9 *3*	7.4 *8*	2471.07+x	18⁺	1892.23+x	16⁺			I_γ: out-of-beam intensity=3 *1*.
583.2 *3*	2.5 *3*	2647.9+z	(17⁺)	2064.7+z	(15⁺)			
585.5 *3*	3.9 *3*	2000.5+x	15⁺	1414.92+x	13⁺			
596.7 *1*	9.3 *10*	1786.98+x	14⁻	1190.28+x	12⁻			

Continued on next page (footnotes at end of table)

^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

γ(^{178}Ta) (continued)

E_γ †	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
598.4 3	3.2 3	2944.0+z	(18+)	2345.6+z	(16+)	
600.0 3	4.6 7	2110.8+x	16−	1510.82+x	14−	
602.7 8	0.8 3	3741.9+x	22+	3138.8+x	20+	
607.3 3	2.7 3	2309.0+x	16+	1701.7+x	14+	
607.4 3	4.0 7	2782.2+x	19+	2174.75+x	17+	
622.7 8	1.01 17	2622.8+x	17+	2000.5+x	15+	
625.4 3	2.4 5	2106.8+x	15−	1481.44+x	13−	
631.8 8	0.8 3	2941.1+x	(18+)	2309.0+x	16+	
636.5 8	0.8 3	2438.4+x	17−	1801.9+x	15−	
637.7 3	2.2 3	3108.7+x	20+	2471.07+x	18+	
640.3 8	≤0.8	3263.1+x	(19+)	2622.8+x	17+	
647.9@ 8	≤0.8	3589.1+x	(20+)	2941.1+x	(18+)	
649.5 3	2.0 3	2436.5+x	(16−)	1786.98+x	14−	
649.8 8	≤0.8	3912.9+x	(21+)	3263.1+x	(19+)	
658.5 3	3.4 7	2126.30+x	17−	1467.82+x	15−	I_γ: out-of-beam intensity=8 1. A_2=+0.25 7.
664.8 8	1.7 3	2775.6+x	18−	2110.8+x	16−	
669.1 8	1.69 17	3451.2+x	21+	2782.2+x	19+	
671.3 8	1.4 3	2778.1+x	(17−)	2106.8+x	15−	
686.7 8	≤0.8	1078.88+x	10−	392.12+x	9−	
689.2@ 8	≤0.17	2241.0+x	16+	1551.92+x	14+	
690.9 8	1.2 3	3127.4+x	(18−)	2436.5+x	(16−)	
695.3 8	1.2 3	3133.7+x	(19−)	2438.4+x	17−	
700.7 8	1.3 3	3809.4+x	22+	3108.7+x	20+	
700.9 3	1.8 5	2487.1+x	18−	1786.02+x	16−	I_γ: out-of-beam intensity=14 1. A_2=+0.42 7.
709.2 8	0.8 3	3487.3+x	(19−)	2778.1+x	(17−)	
709.5 8	≤0.8	3485.1+x	(20−)	2775.6+x	18−	
712.0 8	0.34 17	2602.2+x	17+	1890.2+x	15+	
726.0 8	≤0.8	3859.7+x	(21−)	3133.7+x	(19−)	
728.9 8	0.67 17	3856.3+x	(20−)	3127.4+x	(18−)	
730.1 8	≈0.17	2971.2+x	18+	2241.0+x	16+	
732.6 8	≤0.8	4184.0+x	23+	3451.2+x	21+	
738.0 8	≤0.8	4223.1+x	(22−)	3485.1+x	(20−)	
740.8 3	2.87 17	2867.2+x	19−	2126.30+x	17−	I_γ: out-of-beam intensity=32 1. A_2=+0.19 9.
743.0 8	≤0.3	3345.4+x	19+	2602.2+x	17+	
745.0 8	≤0.8	4554.4+x	(24+)	3809.4+x	22+	
746.9@ 8	≤0.8	4606.7+x	(23−)	3859.7+x	(21−)	
747.2 8	0.8 3	1313.99+x	11−	566.22+x	10−	
752.0@ 8	≤0.8	4936.1+x	(25+)	4184.0+x	23+	
752.8@ 8	≤0.8	4976.0+x	(24−)	4223.1+x	(22−)	
753.5@ 8	≤0.5	4240.9+x	(21−)	3487.3+x	(19−)	
757.5 8	≤0.17	3728.8+x	20+	2971.2+x	18+	
763.0 3	4.2 7	2937.7+x	(17+)	2174.75+x	17+	
765.0@ 8	≤0.8	5319.6+x	(26+)	4554.4+x	(24+)	
778.6 8	≤0.8	3265.6+x	20−	2487.1+x	18−	
782.4 3	1.8 3	2956.90+x	19+	2174.75+x	17+	
791.4 8	≤0.8	1558.66+x	12−	766.72+x	11−	
813.0 8	≤0.8	3679.6+x	21−	2867.2+x	19−	
827.0 8	≤0.17	3960.5+x	24+	3134.0+x	22+	
843.5 8	≤0.8	4109.1+x	(22−)	3265.6+x	20−	
858.3 8	≤0.17	4398.4+x	25+	3539.8+x	23+	
894.4 8	≤0.17	4854.7+x	26+	3960.5+x	24+	

Continued on next page (footnotes at end of table)

^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)

γ(^{178}Ta) (continued)

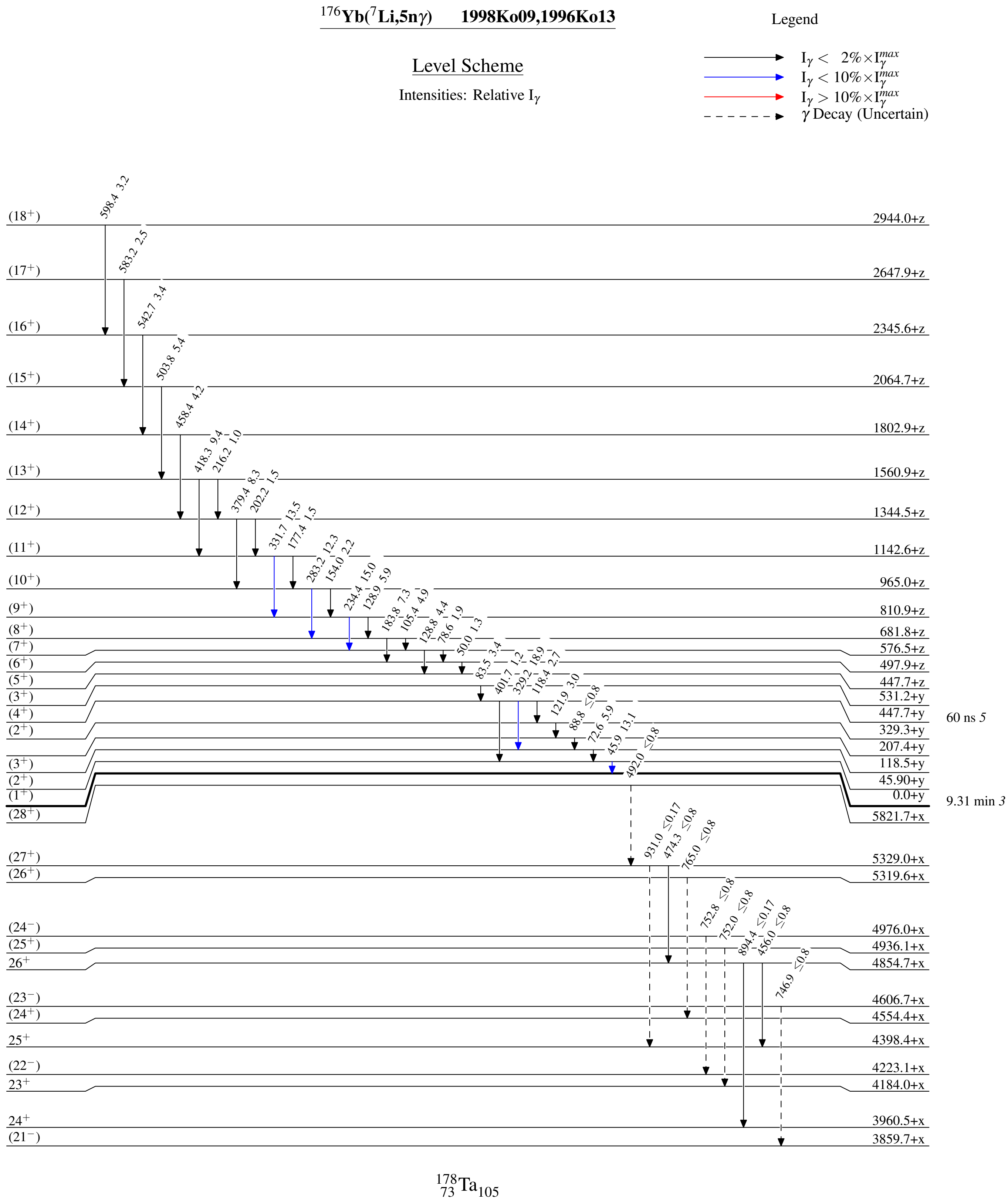
E_γ †	I_γ	E_i(level)	J^π_i	E_f	J^π_f
931.0@ *8*	≤0.17	5329.0+x	(27$^+$)	4398.4+x	25$^+$
1046.0@ *8*	≤0.3	2937.7+x	(17$^+$)	1892.23+x	16$^+$

† Uncertainty assigned as 0.1 keV for Iγ>50, 0.3 KeV for Iγ=10-50 and 0.8 KeV for Iγ≤10, based on a general statement in 1998Ko09.

‡ From conversion coefficients and angular distributions.in 1998Ko09. Quoted total conversion coefficients have been deduced from transition intensity balances; other conversion coefficients are from electron measurements.

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.

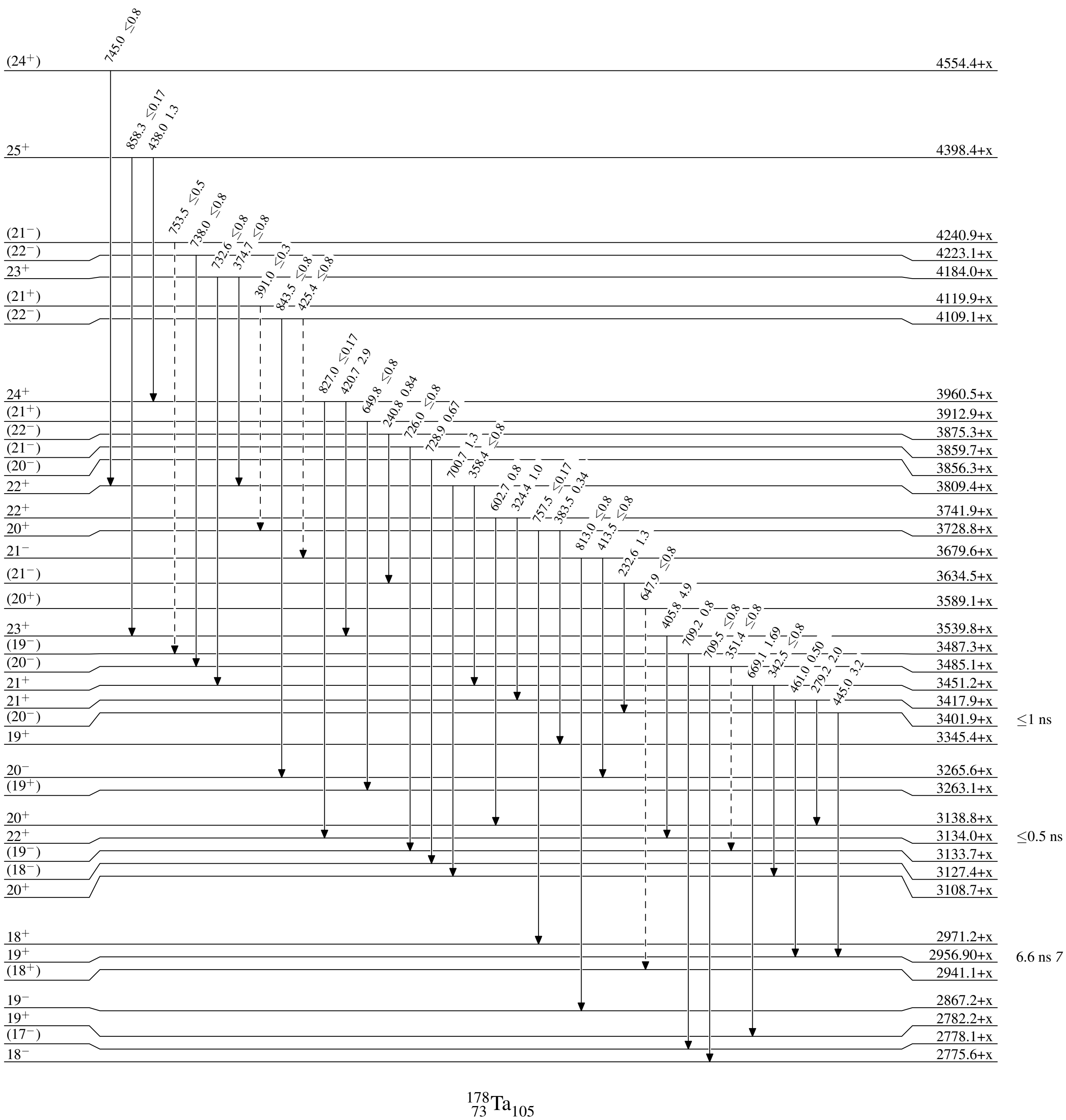
@ Placement of transition in the level scheme is uncertain.


^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγ^max
Iγ < 10%×Iγ^max
Iγ > 10%×Iγ^max
γ Decay (Uncertain)
(18+) 2944.0+z
(17+) 2647.9+z
(16+) 2345.6+z
(15+) 2064.7+z
(14+) 1802.9+z
(13+) 1560.9+z
(12+) 1344.5+z
(11+) 1142.6+z
(10+) 965.0+z
(9+) 810.9+z
(8+) 681.8+z
(7+) 576.5+z
(6+) 497.9+z
(5+) 447.7+z
(3+) 531.2+y
(4+) 447.7+y
60 ns 5
(2+) 329.3+y
207.4+y
(3+) 118.5+y
(2+) 45.90+y
(1+) 0.0+y
9.31 min 3
(28+) 5821.7+x
(27+) 5329.0+x
(26+) 5319.6+x
(24−) 4976.0+x
(25+) 4936.1+x
26+ 4854.7+x
(23−) 4606.7+x
(24+) 4554.4+x
25+ 4398.4+x
(22−) 4223.1+x
23+ 4184.0+x
24+ 3960.5+x
(21−) 3859.7+x
598.4 3.2
583.2 2.5
542.7 3.4
503.8 5.4
458.4 4.2
418.3 9.4
216.2 1.0
379.4 8.3
202.2 1.5
331.7 13.5
177.4 1.5
283.2 12.3
154.0 2.2
234.4 15.0
128.9 5.9
183.8 7.3
105.4 4.9
128.8 4.4
78.6 1.9
50.0 1.3
83.5 3.4
401.7 1.2
329.2 18.9
118.4 2.7
121.9 3.0
88.8 ≤0.8
72.6 5.9
45.9 13.1
492.0 ≤0.8
931.0 ≤0.17
474.3 ≤0.8
765.0 ≤0.8
752.8 ≤0.8
752.0 ≤0.8
894.4 ≤0.17
456.0 ≤0.8
746.9 ≤0.8
$^{178}_{73}Ta_{105}$

$^{176}Yb(^7Li,5n\gamma)$ 1998Ko09,1996Ko13

Level Scheme (continued)

Intensities: Relative I_γ



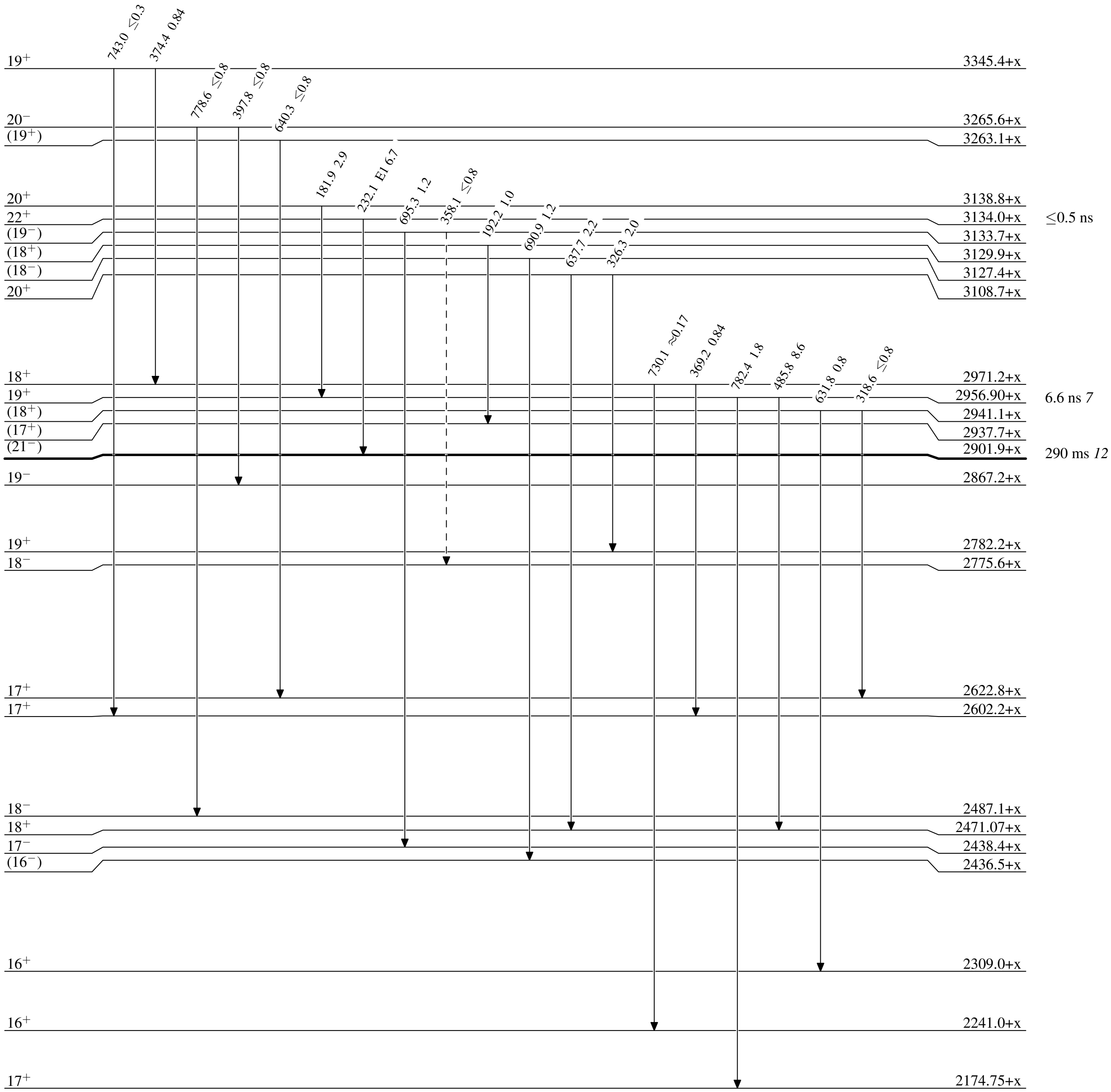
^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



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

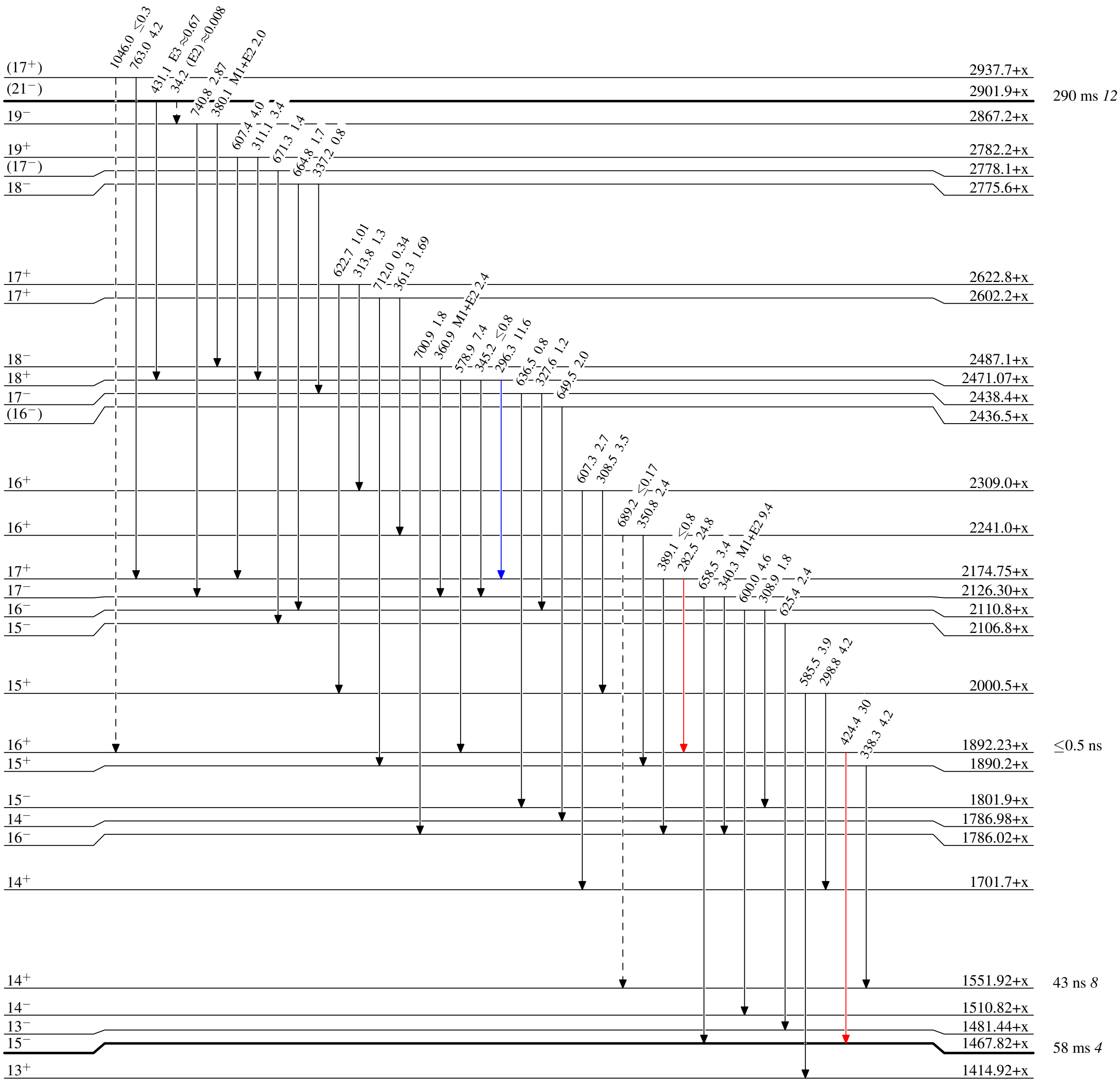
^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13

Level Scheme (continued)

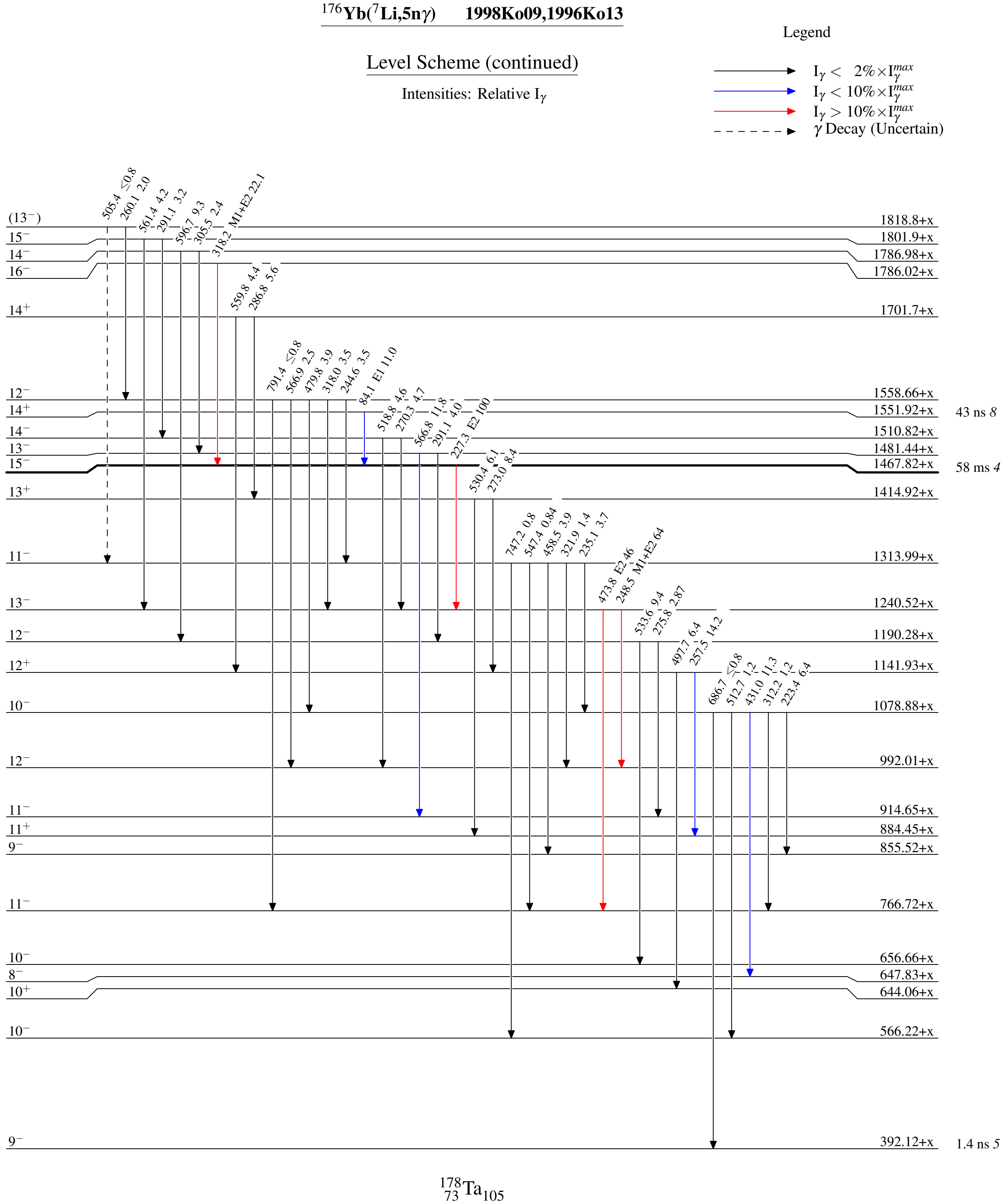
Intensities: Relative I_γ

Legend

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



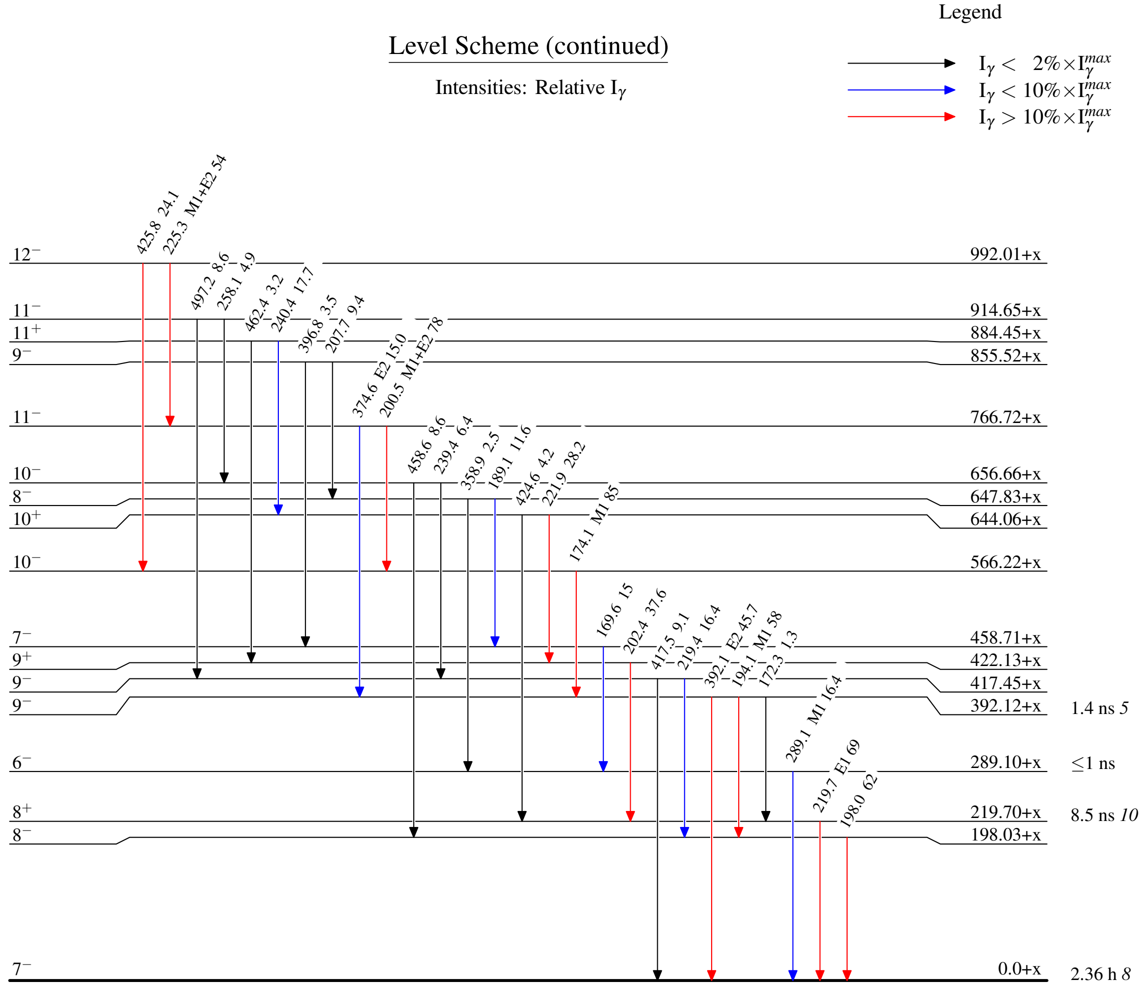
$^{178}_{73}Ta_{105}$


^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13
Level Scheme (continued)
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
(13⁻) 1818.8+x
15⁻ 1801.9+x
14⁻ 1786.98+x
16⁻ 1786.02+x
14⁺ 1701.7+x
12⁻ 1558.66+x
14⁺ 1551.92+x 43 ns 8
14⁻ 1510.82+x
13⁻ 1481.44+x
15⁻ 1467.82+x 58 ms 4
13⁺ 1414.92+x
11⁻ 1313.99+x
13⁻ 1240.52+x
12⁻ 1190.28+x
12⁺ 1141.93+x
10⁻ 1078.88+x
12⁻ 992.01+x
11⁻ 914.65+x
11⁺ 884.45+x
9⁻ 855.52+x
11⁻ 766.72+x
10⁻ 656.66+x
8⁻ 647.83+x
10⁺ 644.06+x
10⁻ 566.22+x
9⁻ 392.12+x 1.4 ns 5
505.4 ≤0.8
260.1 2.0
561.4 4.2
291.1 3.2
596.7 9.3
305.5 2.4
318.2 M1+E2 22.1
559.8 4.4
286.8 5.6
791.4 ≤0.8
566.9 2.5
479.8 3.9
318.0 3.5
244.6 3.5
84.1 E1 11.0
518.8 4.6
270.3 4.7
566.8 11.8
291.1 4.0
227.3 E2 100
530.4 6.1
273.0 8.4
747.2 0.8
547.4 0.84
458.5 3.9
321.9 1.4
235.1 3.7
473.8 E2 46
248.5 M1+E2 64
533.6 9.4
275.8 2.87
497.7 6.4
257.5 14.2
686.7 ≤0.8
512.7 1.2
431.0 11.3
312.2 1.2
223.4 6.4
$^{178}_{73}Ta_{105}$

$^{176}Yb(^7Li,5n\gamma)$ 1998Ko09,1996Ko13

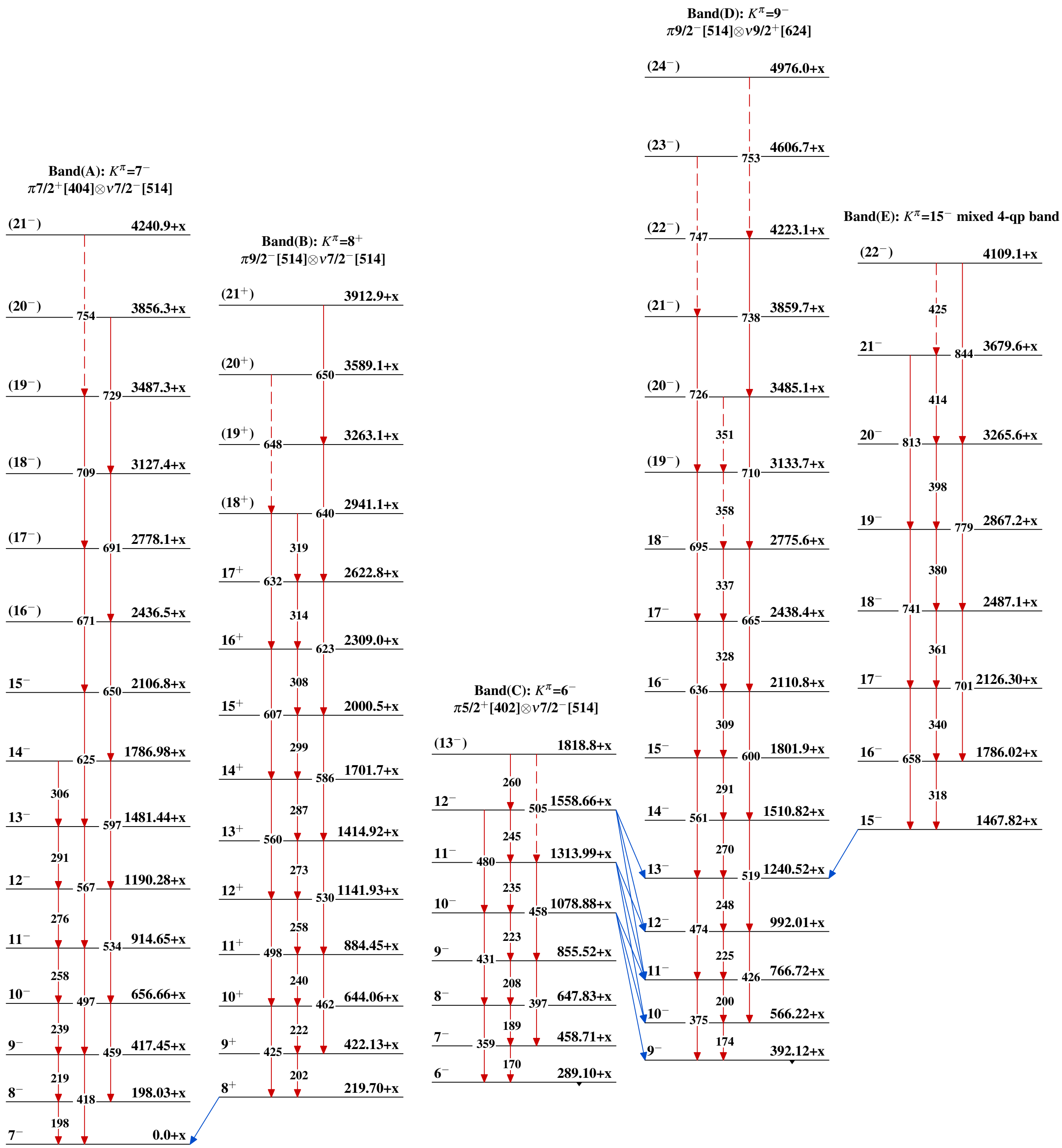
Level Scheme (continued)

Intensities: Relative I_γ

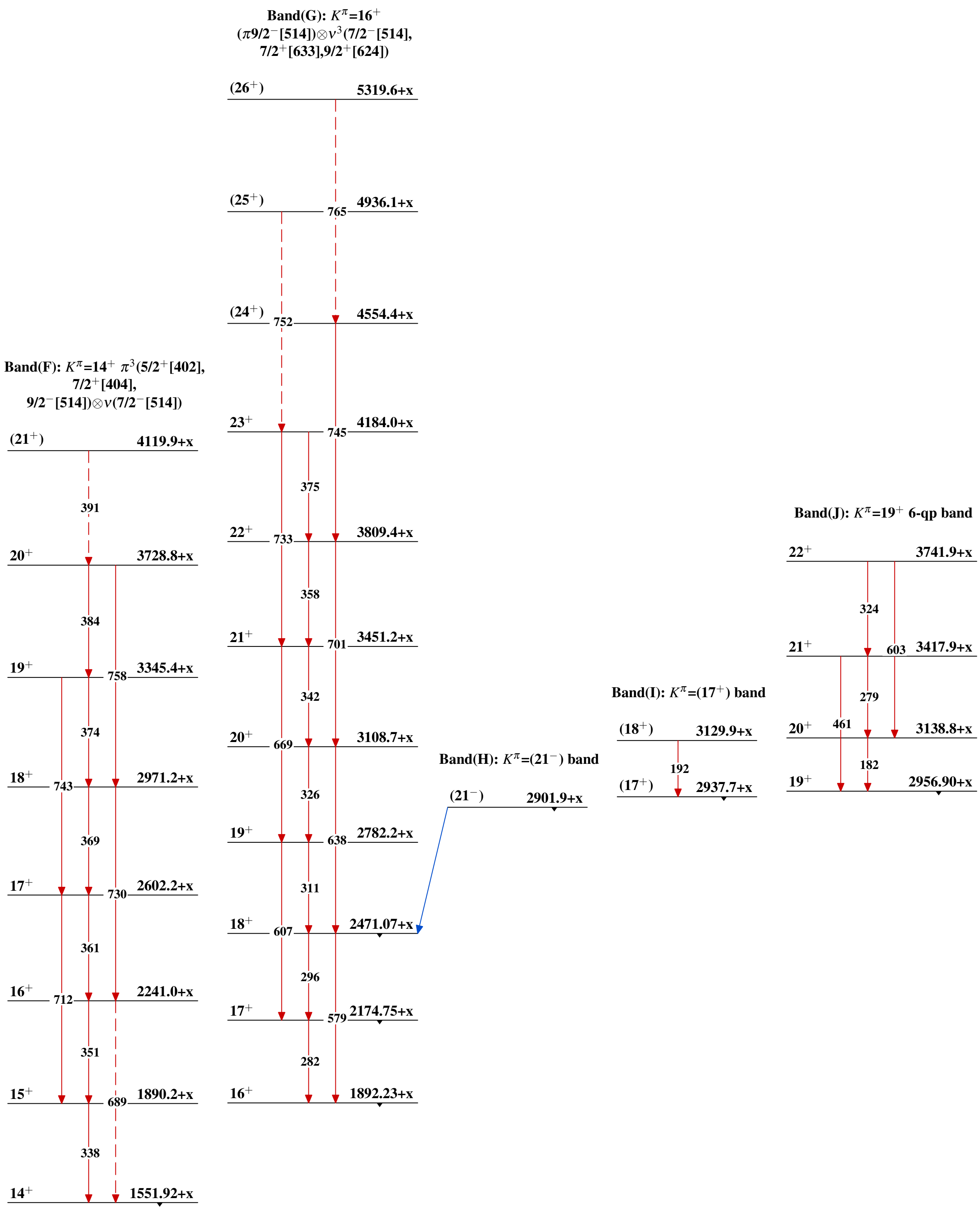


$^{178}_{73}Ta_{105}$

$^{176}Yb(^{7}Li,5n\gamma)$ 1998Ko09,1996Ko13

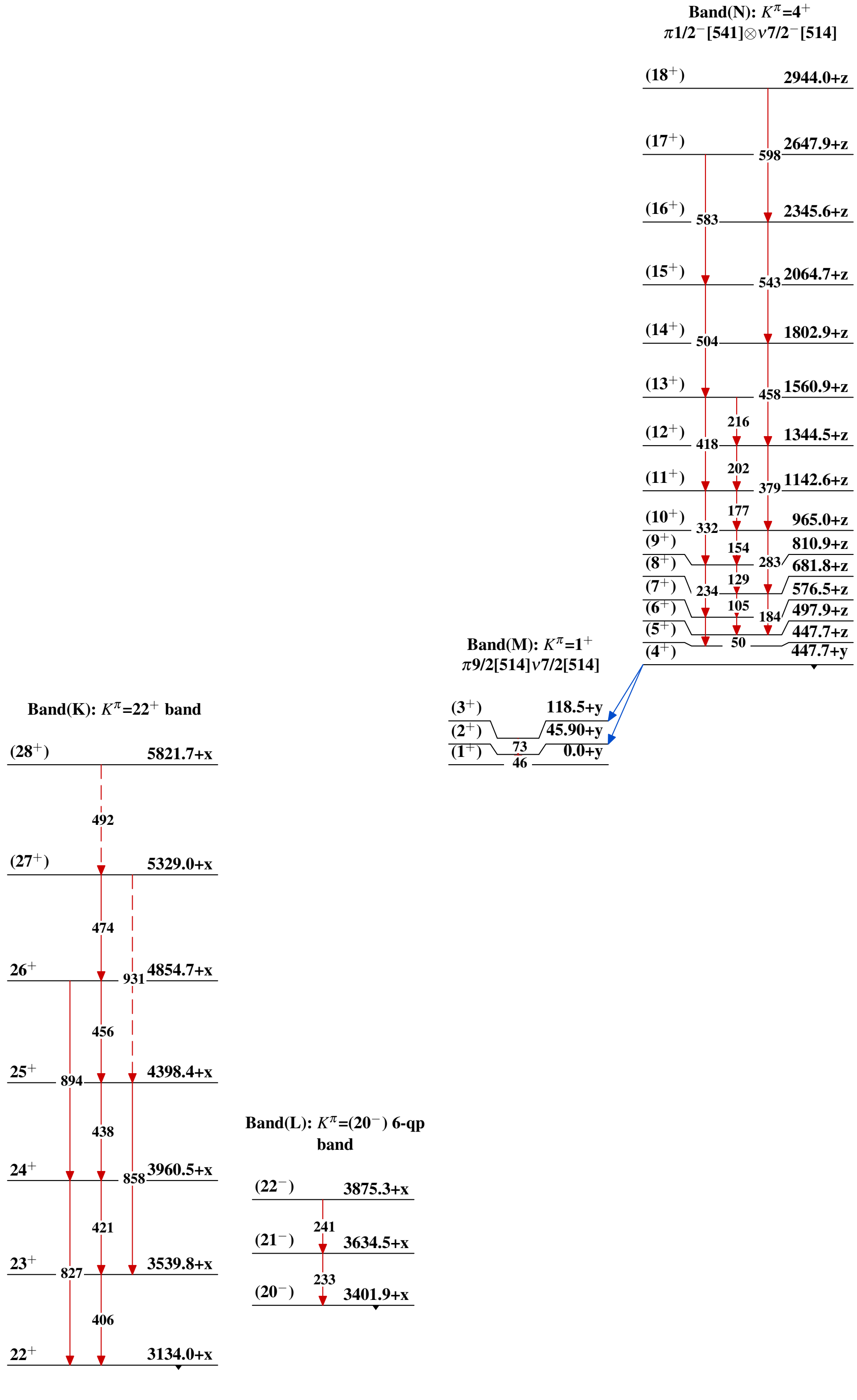


^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)



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

^{176}Yb(^{7}Li,5nγ) 1998Ko09,1996Ko13 (continued)



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