Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Juutinen, D. J. Hartley	NDS 150, 1 (2018)	1-Feb-2018

Q(β^-)=−4521 *32*; S(n)=7963 *31*; S(p)=1507 *33*; Q(α)=5557 *37* 2017Wa10
Additional information 1.

^{188}Tl Levels

Cross Reference (XREF) Flags

- A ^{188}Pb ε decay (25.5 s)
- B ^{192}Bi α decay (39.6 s)
- C ^{192}Bi α decay (34.6 s)
- D (HI,xnγ)

E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
0.0	(2$^-$)	71 s *2*	A C	%ε+%β^+=100 J$^\pi$: Systematics of neighboring odd-odd Tl nuclides (A=190-204). Possible ε feeding of low-spin states (J≤4) in ^{188}Hg supports this assignment. $T_{1/2}$: From 824.5βe$^-$(t), 0$^+$ to 0$^+$ transition in ^{188}Hg (1984Co17, 1978CoYZ and 1976Ha25). configuration: $\pi s_{1/2}\otimes\nu p_{3/2}$.
35 *31*	7$^+$	71.5 s *15*	B D	%ε+%β^+=100 μ=+0.483 *8*; Q=+0.129 *4* Additional information 2. $\Delta\langle r^2\rangle(^{205}Tl-^{188}Tl)$=−0.78 fm^2 *9* (1992Me07). Other hyperfine structure measurements: 1990Di09, 1992Bu17, 1992Sc25. μ,Q: Collinear fast beam laser spectroscopy (1992Me07). Q value is also adopted in 2016St14. E(level): From E((10$^-$),^{192}Bi)=140 keV *30* (2017Au03) and Eα=6348 keV *5* to the 7$^+$ isomeric state and Eα=6245 keV *5* to the (2$^-$) ground state in ^{192}Bi α decay (39.6 s). J$^\pi$: J from laser spectroscopy (1992Me07); π from μ and systematics in odd-odd thallium isotopes. The experimental μ(exp)=+0.483 *8* compares well with value of 0.471 deduced using the additivity rule (1992Me07). $T_{1/2}$: Weighted average of 73 s *2* using 772.4$\beta\gamma$(t), 6$^+$ to 4$^+$ transition in ^{188}Hg and 70 s *2* using 504.3$\beta\gamma$(t), 6$^+$ to 4$^+$ transition in ^{188}Hg (1984Co17,1978CoYZ and 1976Ha25). Other: 84 s *30* (1970Va27). configuration: $\pi s_{1/2}\otimes\nu i_{13/2}$.
138.1 *8*	6$^+$	<0.4 ns	B	J$^\pi$: 103.1γ M1 to 7$^+$ in ^{192}Bi α decay (39.6 s) (1991Va04). $T_{1/2}$: $\alpha\gamma$(t) in ^{192}Bi α decay (39.6 s) (1991Va04). configuration: $\pi s_{1/2}\otimes\nu i_{13/2}$.
184.6 *3*	(3$^+$)	34 ns	A C	J$^\pi$: 184.6γ E1 to (2$^-$); favored decay from ^{192}Bi α decay (J$^\pi$=(3$^+$)). Note that (1$^-$) is tentatively proposed by 1981To02 in ^{192}Bi α decay. configuration: $\pi h_{9/2}\otimes\nu p_{3/2}$.
303.80 *20*	9$^-$	41 ms *4*	B D	%IT=100 J$^\pi$: 268.8γ M2 to 7$^+$ in (HI,xnγ) (1981Kr20). $T_{1/2}$: From γ(t) in (HI,xnγ) (1981Kr20). configuration: $\pi h_{9/2}\otimes\nu i_{13/2}$.
337.4‡ *5*	10$^-$	<0.4 ns	B D	J$^\pi$: M1 33.6γ to 9$^-$. Favoured α decay from (10$^-$) in ^{192}Bi to this state. $T_{1/2}$: $\alpha\gamma$(t) in ^{192}Bi α decay (39.6 s) (1991Va04). configuration: $\pi h_{9/2}\otimes\nu i_{13/2}$.
610.2# *5*	11$^-$		D	J$^\pi$: 272.5γ M1(+E2) to 10$^-$; band assignment.
758.2 *3*			A	
912.2‡ *5*	12$^-$		D	J$^\pi$: 301.9γ M1(+E2) to 11$^-$, 574.7γ E2 to 10$^-$; band assignment.

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Adopted Levels, Gammas (continued)

^{188}Tl Levels (continued)

E(level)[†]	Jπ	XREF	Comments
1061.5[@] *5*	(12⁻)	D	Jπ: 451.3γ (M1) to 11⁻, 724.5γ (E2) to 10⁻.
1283.9[#] *6*	13⁻	D	Jπ: 371.6γ M1(+E2) to 12⁻, 673.3γ E2 to 11⁻; band assignment.
1309.0[@] *6*	(13⁻)	D	Jπ: 248.0γ M1(+E2) to (12⁻).
1623.7[‡] *6*	14⁻	D	Jπ: 339.8γ M1(+E2) to 13⁻, 711.6γ E2 to 12⁻; band assignment.
1623.9[@] *6*		D	
1683.8 *7*	(14)	D	Jπ: 374.8γ D to (13⁻).
1852.7[@] *7*		D	
2010.7[#] *6*	(15⁻)	D	Jπ: 386.6γ to 14⁻, 726.3γ to 13⁻; band assignment.
2303.5[‡] *6*	(16⁻)	D	Jπ: 292.3γ to (15⁻), 681.1γ to 14⁻; band assignment.

[†] From least-squares fit to Eγ and relative to E(7⁺)=35 keV *31*, unless otherwise stated.
[‡] Band(A): $\pi h_{9/2}\otimes\nu i_{13/2}$ oblate band, α=0.
[#] Band(a): $\pi h_{9/2}\otimes\nu i_{13/2}$ oblate band, α=1.
[@] Seq.(B): γ cascade.

γ(^{188}Tl)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[@]	α[&]	Comments
138.1	6⁺	103.1[‡] *8*	100[‡]	35	7⁺	M1	7.88 *21*	B(M1)(W.u.)>0.0055 α(K)=6.43 *17*; α(L)=1.11 *3*; α(M)=0.259 *7* α(N)=0.0654 *18*; α(O)=0.0127 *4*; α(P)=0.00120 *4* Mult.: α(K)exp=7.8 *32* from ^{192}Bi α decay (39.6 s) (1991Va04).
184.6	(3⁺)	184.6[#] *3*	100[#]	0.0	(2⁻)	E1	0.0927	B(E1)(W.u.)=8.8×10⁻⁷ α(K)=0.0754 *11*; α(L)=0.01329 *20*; α(M)=0.00311 *5* α(N)=0.000775 *12*; α(O)=0.0001446 *22*; α(P)=1.104×10⁻⁵ *16* Mult.: α(K)exp=0.057 *12* from ^{192}Bi α decay (34.6 s) (1991Va04).
303.80	9⁻	268.8 *2*	100	35	7⁺	M2	2.13	B(M2)(W.u.)=5.2×10⁻⁶ *6* α(K)=1.601 *23*; α(L)=0.400 *6*; α(M)=0.0985 *14* α(N)=0.0251 *4*; α(O)=0.00482 *7*; α(P)=0.000422 *6* Mult.: α(K)exp=1.5 *2* (from K x ray) in (HI,xnγ) (1981Kr20).
337.4	10⁻	33.6[‡] *4*	100[‡]	303.80	9⁻	M1	38.5 *15*	B(M1)(W.u.)>0.035 α(L)=29.5 *12*; α(M)=6.9 *3* α(N)=1.74 *7*; α(O)=0.338 *13*; α(P)=0.0319 *13* E_γ: from αγ coin in ^{192}Bi α decay (39.6 s) (1991Va04,1988Hu03). Mult.: α(L)exp=40 *10* from ^{192}Bi α decay (39.6 s) (1991Va04).
610.2	11⁻	272.5 *3*	100	337.4	10⁻	M1(+E2)		Mult.: R=0.74 *7*.
758.2		758.2 *3*	100	0.0	(2⁻)			E_γ,I_γ: From ^{188}Pb ε decay (25.5 s).
912.2	12⁻	301.9 *3*	100 *19*	610.2	11⁻	M1(+E2)		Mult.: R=0.72 *10*.
		574.7 *3*	38 *8*	337.4	10⁻	E2		Mult.: R=1.00 *20*.
1061.5	(12⁻)	451.3 *3*	100 *20*	610.2	11⁻	(M1+E2)		Mult.: R=1.12 *11*.
		724.5 *3*	75 *16*	337.4	10⁻	(E2)		Mult.: R=1.34 *9*.

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Tl)$ (continued)

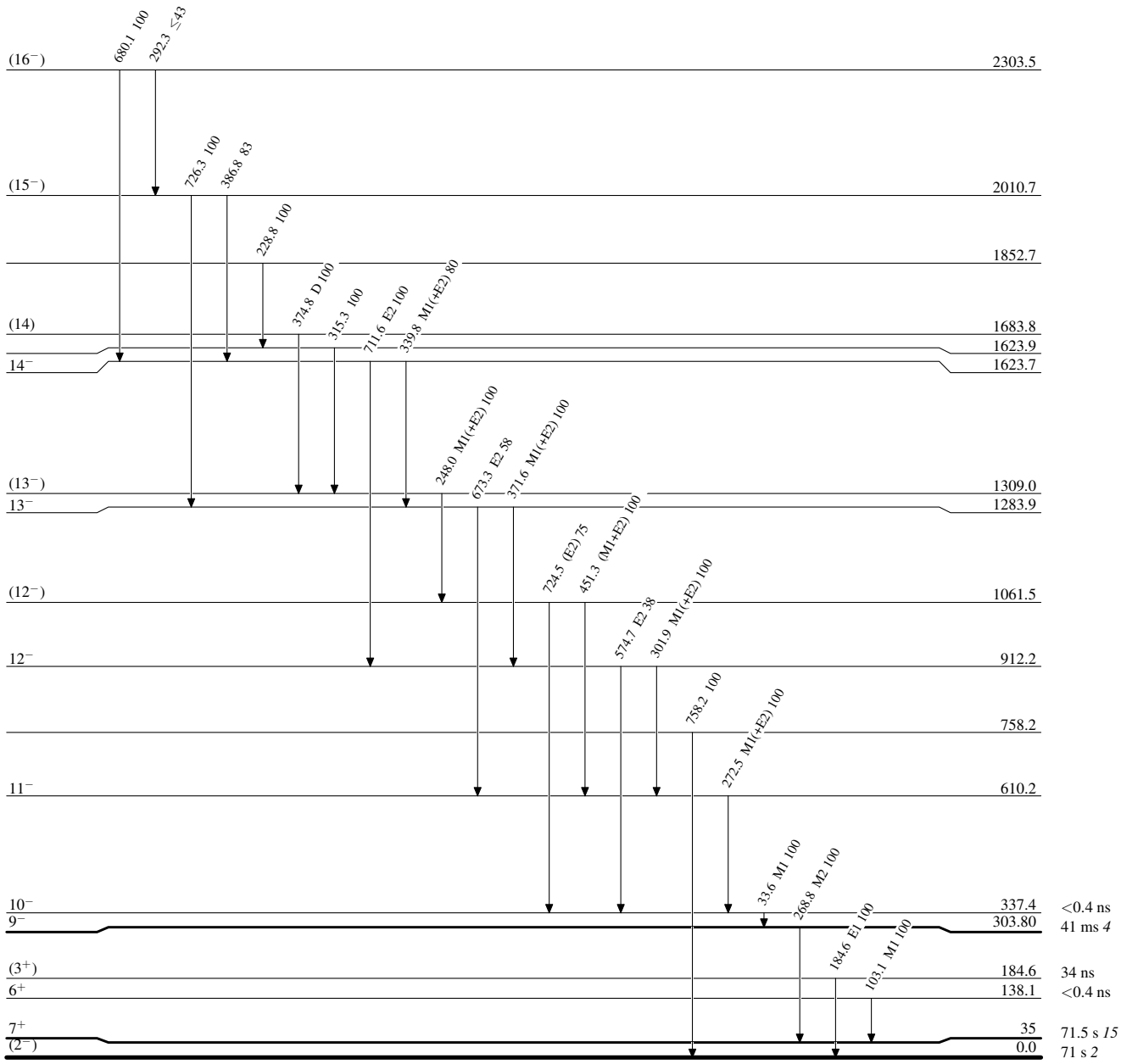
E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. @	Comments
1283.9	13^-	371.6 *3*	100 *21*	912.2	12^-	M1(+E2)	Mult.: R=0.73 *12*.
		673.3 *3*	58 *13*	610.2	11^-	E2	Mult.: R=1.14 *16*.
1309.0	(13^-)	248.0 *3*	100	1061.5	(12^-)	M1(+E2)	Mult.: R=0.56 *17*.
1623.7	14^-	339.8 *3*	80 *16*	1283.9	13^-	M1(+E2)	Mult.: R=0.71 *15*.
		711.6 *3*	100 *20*	912.2	12^-	E2	Mult.: R=1.26 *18*.
1623.9		315.3 *3*	100	1309.0	(13^-)		
1683.8	(14)	374.8 *3*	100	1309.0	(13^-)	D	Mult.: R=0.59 *20*.
1852.7		228.8 *3*	100	1623.9			
2010.7	(15^-)	386.8 *3*	83 *17*	1623.7	14^-		
		726.3 *3*	100 *20*	1283.9	13^-		
2303.5	(16^-)	292.3 *3*	≤43	2010.7	(15^-)		
		680.1 *3*	100 *20*	1623.7	14^-		

† From (HI,xnγ) (2006Zh22), unless otherwise stated.
‡ From ^{192}Bi α decay (39.6 s).
# From ^{192}Bi α decay (34.6 s).
@ From angular distribution ratios R=$I_\gamma(35°)/I_\gamma(90°)$ in (HI,xnγ) (2006Zh22) and the apparent band structures, unless otherwise stated. Values of 0.7 and 1.3 are expected for stretched (ΔJ=1) dipole and quadrupole (ΔJ=2) transitions, respectively.
& Additional information 3.

Adopted Levels, Gammas

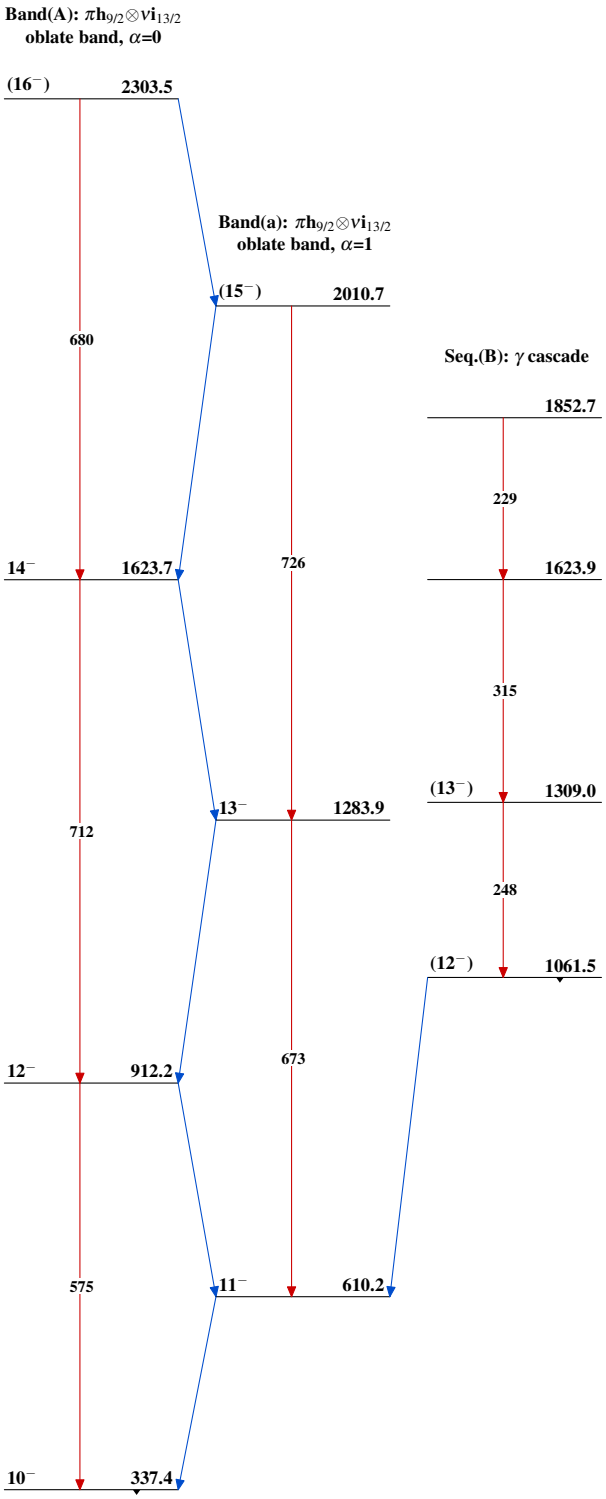
Level Scheme

Intensities: Relative photon branching from each level



$^{188}_{81}Tl_{107}$

Adopted Levels, Gammas



$^{188}_{81}Tl_{107}$