

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Lalkovski		NDS 112,707 (2011)	1-Aug-2010

Q(β^-)=1418 6; S(n)=6852 6; S(p)=7377 22; Q(α)=-315 7 [2012Wa38](#)
 Note: Current evaluation has used the following Q record 1418 5 6852 5 7377 21 [2003Au03](#).

²⁰⁷Tl Levels

Cross Reference (XREF) Flags

A	²¹¹ Bi α decay	F	²⁰⁵ Tl(t,p)	K	²⁰⁸ Pb(p,2p), ²⁰⁸ Pb(pol p,2p)
B	²⁰⁷ Hg β^- decay	G	²⁰⁸ Pb(¹¹ B, ¹² C)	L	²⁰⁸ Pb(γ ,p)
C	²⁰⁷ Tl IT decay (1.33 s)	H	²⁰⁷ Pb(μ^- , γ)	M	²⁰⁸ Pb(α , α' p)
D	²⁰⁸ Pb(d, ³ He),(pol d, ³ He)	I	²⁰⁸ Pb(¹⁷ O, ¹⁸ F)	N	²⁰⁸ Pb(¹³⁶ Xe,X γ)
E	²⁰⁸ Pb(t, α),(pol t, α)	J	²⁰⁸ Pb(e,e'p)		

E(level) [†]	J ^{π}	T _{1/2}	XREF	Comments
0	1/2 ⁺	4.77 min 3	ABCDEFGHIJKLMN	$\% \beta^- = 100$ $\mu = +1.876$ 5 (1985Ne06 , 2005St24) μ : from collinear fast beam laser spectroscopy in 1985Ne06 . $\Delta \langle r^2 \rangle (^{208}\text{Tl} - ^{207}\text{Tl}) = 0.099$ fm ² 15 (1992La03). J ^{π} : L=0 in ²⁰⁵ Tl(t,p) and ²⁰⁸ Pb(d, ³ He),(pol d, ³ He). T _{1/2} : Weighted average of 4.76 min 2 (1931Cu01), 4.77 min 5 (1940Fa04), 4.79 min 2 (1953Sa11) and 4.77 min 3 (1967Tr01). The quoted uncertainty is 2 σ to account for systematics uncertainties not reported by the authors. Others: T _{1/2} (²⁰⁷ Tl ⁷¹⁺)=25.3 min 24 for fully stripped ions from T _{1/2} (²⁰⁷ Tl ⁷¹⁺)/T _{1/2} (²⁰⁷ Tl-neutral)=5.3 5 in 2005Oh08 . configuration: $\pi(3s_{1/2})^{-1}$ (1992Gr19). XREF: F(355). J ^{π} : 351.059 γ M1+E2 to 1/2 ⁺ ; L=2 in ²⁰⁸ Pb(d, ³ He),(pol d, ³ He). T _{1/2} : From α -ce(t) (1970Ko34 , 1971Ko37) in ²¹¹ Bi α decay. Others: 53 ns 2 in ²⁰⁷ Pb(μ^- , γ) differs from the adopted value, but is characteristic for the μ -capture process (1981Bu14 , 1981Bu02). configuration: $\pi(2d_{3/2})^{-1}$ (1992Gr19). $\%IT = 100$ XREF: E(1341)G(1340)I(1520)J(1350). J ^{π} : L=5 in ²⁰⁸ Pb(d, ³ He),(pol d, ³ He) and a systematics of the 11/2 ⁻ states in the mass region. T _{1/2} : From γ (t) in ²⁰⁷ Tl IT decay (1.33 s) (1965Ec02). configuration: 96% $\pi(1h_{11/2})^{-1}$ and 4% $(\pi(d_{5/2})^{-1}) \times 3^-$ (2000Re12). XREF: E(1674)F(1693)G(1674)J(1680). J ^{π} : L=2 in ²⁰⁸ Pb(d, ³ He),(pol d, ³ He); 1682.7 γ to 1/2 ⁺ ; 1331.7 γ to 3/2 ⁺ . configuration: 84% $\pi(2d_{5/2})^{-1}$ and 16% $(\pi(h_{11/2})^{-1}) \otimes 3^-$ (2000Re12). XREF: F(2689). J ^{π} : 993 γ to 5/2 ⁺ and 2675.2 γ to 1/2 ⁺ ; L=(2) in (pol d, ³ He). XREF: F(2721). XREF: F(2921). J ^{π} : 1563.9 γ to 11/2 ⁻ , 2560.5 γ to 3/2 ⁺ and observed direct β -feeding from (9/2 ⁺) g.s. of ²⁰⁷ Hg. XREF: d(2994)F(3000). E(level): 2994 possibly unresolved line in ²⁰⁸ Pb(pol d, ³ He) (1992Gr19).
351.06 5	3/2 ⁺	30 ps 7	ABCDEFGHIJKLMN	
1348.18 16	11/2 ⁻	1.33 s 11	ABCDE G IJKLMN	
1682.58 19	5/2 ⁺		B DEFG JKLMN	
2675.69 24	(5/2 ⁺)		B D F	
2708.92 25			B F	
2911.83 23	(7/2 ⁻ ,9/2)		B F	
2985.23 23	(9/2 ⁺)		B d F	

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Adopted Levels, Gammas (continued) ^{207}Tl Levels (continued)

E(level) [†]	J ^π	XREF	Comments
3104.43 23	(9/2) ⁺	B d F	J ^π : 1637.1γ to 11/2 ⁻ , 2634.1γ to 3/2 ⁺ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ; L=4 in (pol d, ^3He). XREF: d(2994)F(3000).
3143.1 4	(7/2 ⁻ , 9/2, 11/2)	B F	E(level): 2994 possibly unresolved line in ^{208}Pb (pol d, ^3He) (1992Gr19). J ^π : 1756.3γ to 11/2 ⁻ and 2753.3γ to 3/2 ⁺ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ; L=4 in (pol d, ^3He). XREF: F(3158).
3210 5		D F	J ^π : 1794.9γ to 11/2 ⁻ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ;
3272.56 24	(7/2, 9/2 ⁺)	B	J ^π : 1590.3γ to 5/2 ⁺ , 563.8γ to (5/2 ⁺) and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ;
3295.5 3	(7/2 ⁻ , 9/2)	B F	XREF: F(3311).
3336.03 23	(7/2 ⁻ , 9/2)	B F	J ^π : 1794.9γ to 11/2 ⁻ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ; XREF: F(3351).
3357.7 4	(7/2 ⁻ , 9/2, 11/2)	B	J ^π : 1987.4γ to 11/2 ⁻ , 2985.4γ to 3/2 ⁺ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ;
3474 [‡] 6	7/2 ⁺	DEF J LM	J ^π : 2009.5γ to 11/2 ⁻ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ; XREF: F(3460).
3558 [‡] 6		EF	J ^π : L=4 in ^{208}Pb (d, ^3He), (pol d, ^3He); L=(4) in ^{208}Pb (t, α), (pol t, α).
3591.9? 3	(7/2, 9/2 ⁺)	B	XREF: F(3588).
3791 [‡] 6		E	J ^π : 1909.2γ to 5/2 ⁺ and observed direct β-feeding from (9/2 ⁺) g.s. of ^{207}Hg ;
3813.09 19			N
3856 [‡] 6		E	
3904 [‡] 6		E	
3958 [‡] 6		E	
3987 5	7/2 ⁺ , 9/2 ⁺	DE	J ^π : L=4 in ^{208}Pb (d, ^3He), (pol d, ^3He).
4078 [‡] 6		E	
4103 [#] 5		DE	XREF: E(4123).
4289 [#]	(5/2 ⁺)	D	J ^π : L=(2) in ^{208}Pb (d, ^3He), (pol d, ^3He).
4293.0 3		E	N
4337 [@] 10	1/2 ⁺	F	E(level): 4352 in ^{205}Tl (t, p) (1969Ha11) is overestimated by 15 keV. J ^π : From L=0 in ^{205}Tl (t, p).
4418.0 3			N
4432 [‡] 6		DE	J ^π : L=(4,5) in ^{208}Pb (d, ^3He), (pol d, ^3He). configuration: $\pi(h_{11/2})^{-1}$ or $\pi(g_{7/2})^{-1}$ (1992Gr19).
4503 [‡] 6		E	
4521 [@] 10	1/2 ⁺	F	E(level): 4536 in ^{205}Tl (t, p) (1969Ha11) is overestimated by 15 keV. J ^π : From L=0 in ^{205}Tl (t, p).
4589 [‡] 6	(3/2 ⁺ , 5/2 ⁺)	DEF	XREF: F(4574). J ^π : From L=(2) ^{208}Pb (d, ^3He), (pol d, ^3He). configuration: $\pi(d_{5/2})^{-1}$ (1992Gr19).
4696 [‡] 6	5/2 ⁺	DE	J ^π : L=2 in ^{208}Pb (d, ^3He), (pol d, ^3He). configuration: $\pi(d_{5/2})^{-1}$ (1992Gr19).
4737 [‡] 6		E	
4888 [‡] 6	7/2 ⁺	DE	J ^π : L=4 in ^{208}Pb (d, ^3He), (pol d, ^3He). configuration: $\pi(g_{7/2})^{-1}$ (1992Gr19).
4920 [‡] 6		E	
4982 [‡] 6	(7/2 ⁺ , 9/2 ⁺)	DE	J ^π : L=(4) in ^{208}Pb (d, ^3He), (pol d, ^3He).

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Adopted Levels, Gammas (continued) ^{207}Tl Levels (continued)

<u>E(level)[†]</u>	<u>J^π</u>	<u>XREF</u>	<u>Comments</u>
5037 [‡] 6	(5/2 ⁺)	DE	configuration: $\pi(g_{7/2})^{-1}$ (1992Gr19). J ^π : From $^{208}\text{Pb}(d,^3\text{He}),(\text{pol } d,^3\text{He})$.
5800 [#]	(7/2 ⁺ , 9/2 ⁺)	D	J ^π : L=4 in $^{208}\text{Pb}(d,^3\text{He}),(\text{pol } d,^3\text{He})$.
6200 [#]		D	
7400 [#]		D	J ^π : L(d, ³ He)=2+5.
7750 [#]		D	
8050 [#]	(7/2 ⁺ , 9/2 ⁺)	D	J ^π : L=4 in $^{208}\text{Pb}(d,^3\text{He}),(\text{pol } d,^3\text{He})$.

[†] From a least-squares fit to E_γ, unless otherwise stated.

[‡] From $^{208}\text{Pb}(t,\alpha),(\text{pol } t,\alpha)$.

[#] From $^{208}\text{Pb}(d,^3\text{He}),(\text{pol } d,^3\text{He})$.

@ From $^{205}\text{Tl}(t,p)$.

Adopted Levels, Gammas (continued)

E _i (level)	J _i ^π	<u>γ(207Tl)</u>							Comments
		E _γ [†]	I _γ [†]	E _f	J _f ^π	Mult.	δ	α [#]	
351.06	3/2 ⁺	351.07 5	100	0	1/2 ⁺	M1+E2	+0.271 4	0.243 4	B(M1)(W.u.)=0.013 3; B(E2)(W.u.)=2.7 7 E _γ : From ²¹¹ Bi α decay. Mult.: from α(K)exp=0.204 4 in 1966Go13, 0.195 15 (1966Go13), 0.18 (1965Va10), 0.175 17 (1964Co22), 0.20 1 (1960Pe05). Also: α(L)exp=0.033 5 (1960Pe05). δ: Based on angular correlations and γ-ray polarization measurements in 1966Go13.
1348.18	11/2 ⁻	997.1 3	100	351.06	3/2 ⁺	[M4]		0.1460 21	B(M4)(W.u.)=3.2 3 Mult.: Based on the J ^π difference.
		1348.1 3	3.85	0	1/2 ⁺	[E5]		0.0266 4	B(E5)(W.u.)=5.0 13 B(E5)(W.u.)=5.0 5
1682.58	5/2 ⁺	1331.7 3	100	351.06	3/2 ⁺	[M1+E2]		0.0058 22	
		1682.7 3	15.56	0	1/2 ⁺	[E2]		0.00251 4	
2675.69	(5/2 ⁺)	993 1	100	1682.58	5/2 ⁺				
		2675.2 3	20	0	1/2 ⁺				
2708.92		2358.0 3	100	351.06	3/2 ⁺				
2911.83	(7/2 ⁻ ,9/2)	1563.9 3	100	1348.18	11/2 ⁻				
		2560.5 3	5.33	351.06	3/2 ⁺				
2985.23	(9/2) ⁺	1637.1 3	100	1348.18	11/2 ⁻				
		2634.1 3	11.86	351.06	3/2 ⁺				
3104.43	(9/2) ⁺	119.1 ^{‡@} 3		2985.23	(9/2) ⁺				
		1756.3 3	100	1348.18	11/2 ⁻				
		2753.3 3	4.38	351.06	3/2 ⁺				
3143.1	(7/2 ⁻ ,9/2,11/2)	157.7 ^{‡@} 3		2985.23	(9/2) ⁺				
		231.1 ^{‡@} 3		2911.83	(7/2 ⁻ ,9/2)				
		1794.9 3		1348.18	11/2 ⁻				
3272.56	(7/2,9/2 ⁺)	563.8 3	45	2708.92					
		596.4 3	20	2675.69	(5/2 ⁺)				
		1590.3 3	100	1682.58	5/2 ⁺				
3295.5	(7/2 ⁻ ,9/2)	152.6 ^{‡@} 3		3143.1	(7/2 ⁻ ,9/2,11/2)				
		191.2 ^{‡@} 3		3104.43	(9/2) ⁺				
		310.3 ^{‡@} 3	31.58	2985.23	(9/2) ⁺				
		1947.5 ^{‡@} 3	100	1348.18	11/2 ⁻				
3336.03	(7/2 ⁻ ,9/2)	192.6 ^{‡@} 3		3143.1	(7/2 ⁻ ,9/2,11/2)				
		231.2 ^{‡@} 3		3104.43	(9/2) ⁺				
		1987.4 3	100	1348.18	11/2 ⁻				
		2985.4 3	0.8	351.06	3/2 ⁺				
3357.7	(7/2 ⁻ ,9/2,11/2)	253.8 ^{‡@} 3	16.67	3104.43	(9/2) ⁺				

Adopted Levels, Gammas (continued)

$\gamma(^{207}\text{Tl})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Comments
3357.7	(7/2 ⁻ ,9/2,11/2)	446.3 ^{‡@} 3	54.17	2911.83	(7/2 ⁻ ,9/2)	
		2009.5 3	100	1348.18	11/2 ⁻	
3591.9?	(7/2,9/2 ⁺)	1909.2 [@] 3	100	1682.58	5/2 ⁺	
3813.09		2464.9 1	100.00	1348.18	11/2 ⁻	E_γ, I_γ : From $^{208}\text{Pb}(^{136}\text{Xe}, X\gamma)$.
4293.0		479.9 2	100.00	3813.09		E_γ, I_γ : From $^{208}\text{Pb}(^{136}\text{Xe}, X\gamma)$.
4418.0		604.9 2	100.00	3813.09		E_γ, I_γ : From $^{208}\text{Pb}(^{136}\text{Xe}, X\gamma)$.

[†] From ^{207}Hg β^- decay, unless otherwise noted.

[‡] From the energy level difference in ^{207}Hg β^- decay.

[#] 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: Type not specified

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

