Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 108,1583 (2007)	1-Jun-2007

Q(β^-)=4998.9 *18*; S(n)=3787 *6*; S(p)=7.55×10^3 *3*; Q(α)=1.48×10^3 *syst* 2012Wa38
Note: Current evaluation has used the following Q record 4999.0 17 *3787* 6 7.82×10^3 *15* 1580 syst 2003Au03.
The uncertainty in the systematics Q(α) value is 200 keV.

^{208}Tl Levels

Cross Reference (XREF) Flags

A	^{212}Bi α decay (60.55 min)	D	^{212}Bi α decay (25.0 min)
B	^{208}Pb(t,^{3}He)	E	^{208}Hg β^- decay
C	^{208}Pb(n,p),(^{7}Li,^{7}Be),(^{13}C,^{13}N)	F	^{208}Pb(π^-,π^0)

E(level)	J$^\pi$ †	T$_{1/2}$	XREF	Comments
0.0	5$^+$	3.053 min *4*	AB DE	%β^-=100 μ=0.292 *13* (1992La03,2005St24) Δ<r^2>(^{208}Tl–^{207}Tl)=0.099 fm^2 *15* (1992La03). J$^\pi$: log *ft*=5.68 to 4$^-$ and 5.61 to 5$^-$ limits J(g.s.) to 4 or 5. $\alpha\gamma(\theta)$ is consistent with J(40 level),J(g.s.)=4,5. Not consistent with 3,4; 4,4; 5,4; 5,5; 6,5. The 40γ is M1. π from μ. T$_{1/2}$: from 1971Ac02 (rounded off from 3.0527 min *33*). Others: 1957Ba05 (3.100 min *15*), 1967La20 (3.055 min *6*), 1970Mu21 (3.17 min *5*). configuration: μ is larger than expected for a pure configuration=$\nu 2g_{9/2}\pi 3s^{-1}_{1/2}$ 5$^+$ state. 1992La03 point out that a 25% admixture of configuration=$\nu 2g_{9/2}\pi 2d^{-1}_{3/2}$ would explain the reduction in μ; however, this admixture leads to disagreement with the ^{208}Tl-^{207}Tl rms radius change.
39.858 *4*	4$^+$	6.5 ps *8*	AB DE	J$^\pi$: see g.s. T$_{1/2}$: from ^{212}Bi α decay.
328.04 *5*	5$^+$	>0.1 ps	AB D	J$^\pi$: M1+E2 γ's to 4$^+$, 5$^+$. $\alpha\gamma(\theta)$. T$_{1/2}$: from absence of Doppler broadening in (α)(ce(K) 288γ).
473.4 *4*	(4$^+$)		AB E	J$^\pi$: (M1) γ's to 4$^+$ and 5$^+$. Fed following β^- decay of ^{208}Hg with J^π=0$^+$.
492.84 *4*	(3)$^+$		AB E	J$^\pi$: M1 γ to 4$^+$. $\alpha\gamma(\theta)$ allows 3,5. The J=5 member of the expected multiplet is assigned to the 328 level.
617			E	
620.4 *3*	(6$^+$)		AB D	J$^\pi$: γ's to 5$^+$ and 4$^+$. $\alpha\gamma(\theta)$. Expected configuration.
698 *45*			B	
760			A E	
789 *14*			B	
8×10^2 *3*	(1$^-$)		C	Γ=2400 keV *600* J$^\pi$: probable giant dipole resonance.
803			A E	
1135 *15*			B	
1199 *57*			B	
1245 *49*			B	
1322 *14*			B	
1362			E	
1410 *15*			B	
1474 *15*			B	
1525 *18*			B	
1637 *18*			B	
1652			E	
1696 *37*			B	
1728			E	

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Adopted Levels, Gammas (continued)

^{208}Tl Levels (continued)

E(level)	J^{π}[†]	XREF	Comments
1775 *27*		B	
1851 *18*		B	
1912 *49*		B	
1.97×10^3 *14*		B	
2013 *64*		B	
2093 *25*		B	
2197 *14*		B	
2632 *13*		B	
2.7×10^3 *2*	(1^-)	C	Γ=4200 keV *600* J^{π}: probable spin dipole resonance.
2720 *13*		B	
2794 *25*		B	
2861 *24*		B	
2917 *49*		B	
3053 *15*		B	
3194 *15*		B	
3255 *19*		B	
3325 *26*		B	
3400 *15*		B	
3482 *15*		B	
≈4000		C	Γ≈4000 keV
4285 *12*		B	
5.1×10^3 *2*	$(0)^-$	C	Γ=2800 keV *100* J^{π}: possible spin isovector dipole resonance.
≈5800	(2^+)	C	J^{π}: giant quadrupole resonance predicted at ≈7100 (1983Au01,1983Au03,1983Au07).
7.0×10^3 *28*	$(0)^+$	C	Γ=11600 keV *7100* J^{π}: probable giant monopole resonance.
8.3×10^3 *2*	$(2^+,3^+)$	C	Γ=4000 keV *800* J^{π}: probable spin quadrupole resonance.
13.6×10^3 *2*	$(1)^+$	C	Γ=9000 keV *600* J^{π}: 1989Mo19 suggest interpretation as spin isovector monopole resonance (sivmr). The excitation energy is consistent with RPA calculations, and the angular distribution is consistent with DWIA calculations for such a resonance; however, other possibilities, such as L=2, $J^{\pi}=1^+$ cannot Be unambiguously ruled out. In (π^-,π^0), 1986Er09 report E=7000 *3000* with Γ=12000 *7000* for the sivmr.
16.5×10^3 *20*		C	Γ=3100 keV *500* J^{π}: proposed by 1993Be19 as the spin isovector monopole resonance; however, 1995Lh02 show that $\sigma(\theta)$ is not consistent with DWBA calculations for L=0, but instead is fit reasonably well by L=2.
20.4×10^3 *20*		C	Γ=8200 keV *1600* J^{π}: possible spin dipole resonance (1997Ra32).

[†] From the shell model, one expects a 4^+, 5^+ doublet with configuration=$\nu 2g_{9/2}\pi 3s_{1/2}^{-1}$ as ground state and low-lying excited level followed by the 3^+, 4^+, 5^+, 6^+ multiplet with configuration=$\nu 2g_{9/2}\pi 2d_{3/2}^{-1}$ at ≈400−keV excitation. Both configurations are expected to Be fed in ^{212}Bi α decay. Within the framework of this expected multiplet picture, given $J^{\pi}=5^+$ for the 328 level, the 474, 493, and 620 levels, which have the strongest α feedings, may have $J^{\pi}=4^+$, 3^+, and 6^+, respectively. These assignments are consistent with α-decay systematics (1980Sc26). See 1992Ar05 for details on $\alpha\gamma(\theta)$.

Adopted Levels, Gammas (continued)

$\gamma(^{208}Tl)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[†]	α[#]	Comments
39.858	4^+	39.858 *4*	100	0.0	5^+	M1	24.4	B(M1)(W.u.)=2.1 *3*
328.04	5^+	288.20 *4*	100.0 *9*	39.858	4^+	M1	0.455	B(M1)(W.u.)<4.7
		328.03 *4*	37.2 *18*	0.0	5^+	M1	0.320	B(M1)(W.u.)<1.3
473.4	(4^+)	433.7 *5*	34 *7*	39.858	4^+	(M1)	0.151	
		473.0 *7*	100 *7*	0.0	5^+	(M1)	0.120	
492.84	$(3)^+$	164.0[@]		328.04	5^+			E_γ: reported in β^- decay with $I\gamma/I\gamma(433\gamma)$=0.48, but this transition is not seen in α decay. From the E(level) difference one expects $E\gamma$=164.8.
		452.98 *5*	100.0 *9*	39.858	4^+	M1	0.135	
		493.3[@] *7*	<1	0.0	5^+			
617		143.6		473.4	(4^+)			
		288.8		328.04	5^+			
620.4	(6^+)	576[@]		39.858	4^+			
		620[@]		0.0	5^+			
760		142.0		617				
		266.9		492.84	$(3)^+$			
		285.4		473.4	(4^+)			
803		43.0		760				
		310.4		492.84	$(3)^+$			
1362		559.1		803				
		602.2		760				
1652		290.0		1362				
		849.2		803				
		892.3		760				
		1159.0		492.84	$(3)^+$			
1728		365.8		1362				
		925.0		803				
		968.0		760				
		1235.0		492.84	$(3)^+$			

[†] From 60.55-min ^{212}Bi α decay for levels up to 620.4. $E\gamma$ for higher levels are from β^- decay.

[‡] Relative photon branching from each level. Data are from 60.55-min ^{212}Bi α decay. Additional data are available from β^- decay, but are discrepant with those from α decay and are not adopted.

[#] 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.

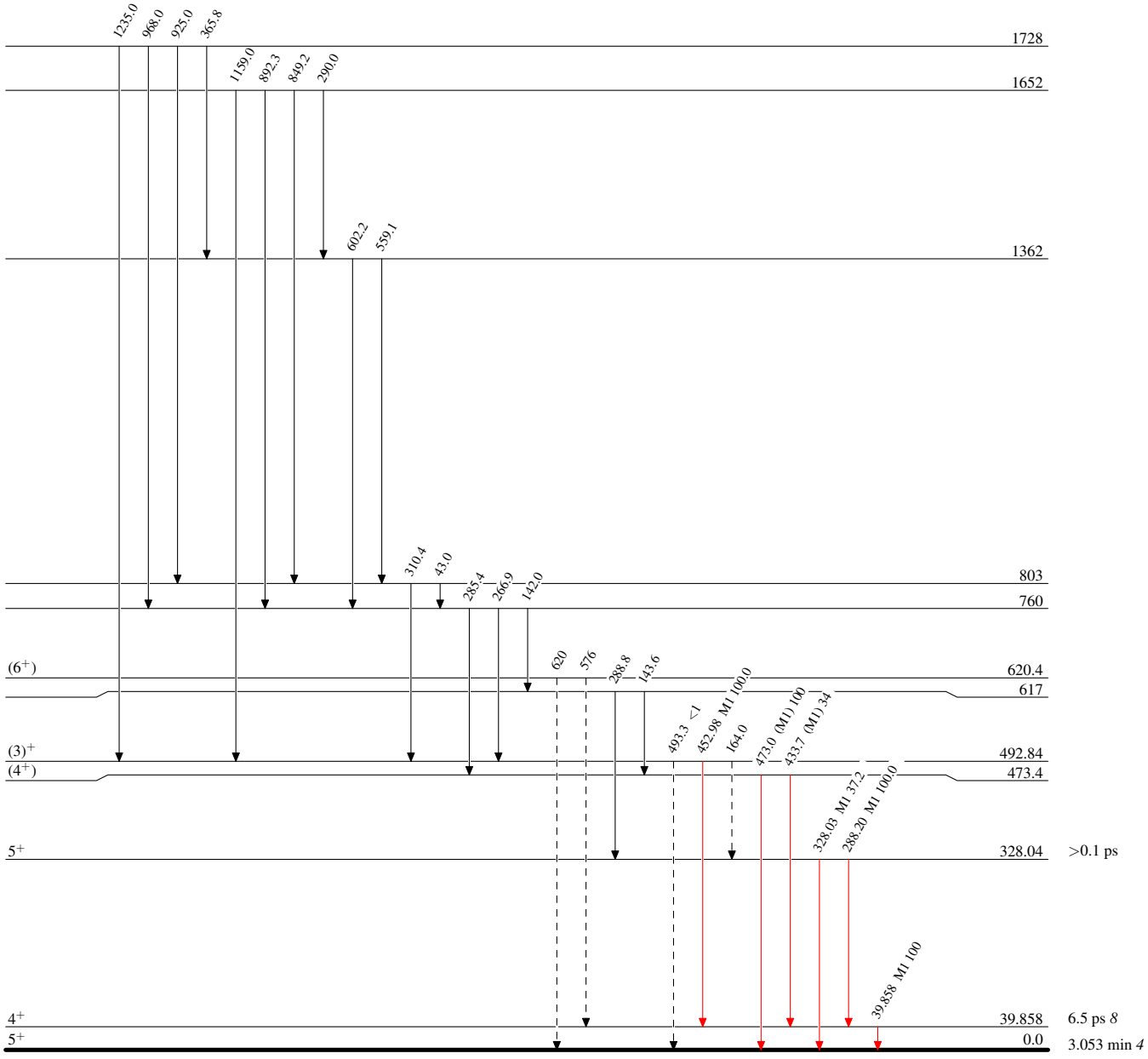
Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

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)



$^{208}_{81}Tl_{127}$