^{193}Pb ε decay (5.8 min) 1976Ha25

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 143, 1 (2017)	31-Mar-2017

Parent: ^{193}Pb: E=0.0+x; J$^{\pi}$=(13/2^{+}); T$_{1/2}$=5.8 min *2*; Q(ε)=5280 *50*; %ε+%β^{+} decay=100.0
^{193}Pb-E: Level energy 130 keV *80* in 2017Au03 from systematics.
1976Ha25: sources from bombardment of natural tungsten by ^{16}O, mass separation; measured Eγ, Iγ (Ge(Li)), γγ coin.
Others: 1974Ne16, 1961An03.
Sum of decay energies of this dataset is 5157 keV *195* cf. 5280 keV *5* obtained from ^{28}Ne β^{-} decay Q(g.s.) and branching.

^{193}Tl Levels

The decay scheme shown is from 1976Ha25 and is based on γγ coincidences. The authors state that the results should be considered preliminary. The proposed level scheme agrees with the scheme obtained from (HI,xnγ).

1976Ha25 state that the intensity of the 365.0γ (100 on the Iγ scale) is that of the 5.8 min activity (^{193}Pb 23/2^{+} state) and from that deduce that 70% of the ε+β^{+} decay goes directly to the 2.11 min, 365+x level. (they do not state whether this intensity is the measured intensity, or intensity corrected for transient equilibrium conditions). However, a 70% ε+β^{+} branch to the 365+x level would give log $f^{1u}t$=7.6 (expected log $f^{1u}t$≥8.5). This could be explained by: 1) an anomalous log $f^{1u}t$ value or 2) the ε+β^{+} transition is not 1U (either J$^{\pi}$(^{193}Pb (5.8 min)≠(13/2^{+}) or J$^{\pi}$(^{193}Tl (2.11 min)≠9/2^{-})). None of these explanations is really acceptable. Another possible explanation for such high Iγ(365) is that the ^{193}Pb 3/2^{-} level has T$_{1/2}$≈5.8 min (this activity has not been seen) and that the source contained both activities. With similar T$_{1/2}$ it would be difficult to distinguish between the two decays.

E(level)	J$^{\pi}$ †	T$_{1/2}$	Comments
0.0	1/2$^{(+)}$	21.6 min *8*	
365.0	3/2$^{(+)}$		
365.0+x‡	(9/2^{-})	2.11 min *15*	%IT≤75, from ^{193}Tl IT decay (2.11 min) (1976GoZP). T$_{1/2}$: from ^{193}Tl IT decay (2.11 min) (1963Di10).
757.2+x‡	(11/2^{-})		
1081.5+x‡	(13/2^{-})		
1163.7+x			Level not confirmed by (HI,xnγ) data.
1423.4+x			
1493.2+x	(13/2^{-})		J$^{\pi}$: From Adopted Levels.
1513.0+x‡	(15/2^{-})		
1870.7+x			
1960.0+x	(15/2^{-})		J$^{\pi}$: From Adopted Levels.

† From Adopted Levels.
‡ Band(A): 9/2(505) Band.

ε,β^{+} radiations

All log *ft* information was calculated with Q(ε)=5120 *120*, E(365+x, ^{193}Tl)=365 and E(5.8 min, ^{193}Pb)=100.

E(decay)	E(level)	Iβ^{+} †	Iε†	Log *ft*	I(ε+β^{+})†	Comments
(1.7×10^{3}‡ *17*)	1960.0+x	0.26	1.74	6.8	2	av Eβ=1025 *64*; εK=0.703 *18*; εL=0.126 *4*; εM+=0.0408 *12*
(1.7×10^{3}‡ *17*)	1870.7+x	0.29	1.71	6.8	2	av Eβ=1065 *65*; εK=0.692 *19*; εL=0.124 *4*; εM+=0.0401 *12*
(1.9×10^{3}‡ *19*)	1513.0+x	2.2	8.8	6.2	11	av Eβ=1224 *65*; εK=0.644 *21*; εL=0.115 *4*; εM+=0.0371 *13*

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^{193}Pb ε decay (5.8 min) 1976Ha25 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(1.9×10^3‡ *19*)	1493.2+x	3.1	11.9	6.1	15	av Eβ=1233 *65*; εK=0.641 *21*; εL=0.114 *4*; εM+=0.0370 *13*
(1.9×10^3‡ *19*)	1423.4+x	1.5	5.5	6.5	7	av Eβ=1264 *65*; εK=0.631 *22*; εL=0.112 *4*; εM+=0.0363 *13*
(2.1×10^3‡ *21*)	1163.7+x	2.4	6.6	6.5	9	av Eβ=1381 *65*; εK=0.592 *22*; εL=0.105 *4*; εM+=0.0340 *13*
(2.1×10^3‡ *21*)	1081.5+x	8.5	21.5	6.0	30	av Eβ=1418 *65*; εK=0.580 *22*; εL=0.103 *4*; εM+=0.0333 *13*
(2.3×10^3‡ *23*)	757.2+x	8.3	15.7	6.2	24	av Eβ=1564 *66*; εK=0.531 *22*; εL=0.094 *4*; εM+=0.0304 *13*
(2.5×10^3‡ *25*)	365.0+x	<2.2	<7.8	>8.5^{1u}	<10	av Eβ=1695 *63*; εK=0.632 *16*; εL=0.115 *4*; εM+=0.0374 *11* I(ε+β$^+$): from log $f^{1u}t$>8.5 for a 13/2$^+$ to 9/2$^-$ transition.

† Absolute intensity per 100 decays.
‡ Estimated for a range of levels.

$\gamma(^{193}Tl)$

Iγ normalization: From ΣI(γ+ce)(to 365+x level)=95 *5*. From log $f^{1u}t$>8.5, I(ε+β$^+$)(to 365+x level) < 10%.

E$_\gamma$	I$_\gamma$#	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.†	δ†	α‡	Comments
(x)		365.0+x	(9/2$^-$)	365.0	3/2$^{(+)}$	[E3]			E$_\gamma$: Eγ<13 keV from ^{193}Tl IT decay (2.11 min).
324.3	2.5	1081.5+x	(13/2$^-$)	757.2+x	(11/2$^-$)	M1+E2	0.6 *4*	0.26 *6*	α(K)=0.21 *5*; α(L)=0.039 *5*; α(M)=0.0093 *9* α(N)=0.00234 *22*; α(O)=0.00045 *5*; α(P)=3.9×10^{-5} *8*
365.0		365.0	3/2$^{(+)}$	0.0	1/2$^{(+)}$	M1+E2	1.7 +*5*−*4*	0.106 *20*	α(K)=0.079 *17*; α(L)=0.0209 *17*; α(M)=0.0051 *4* α(N)=0.00129 *10*; α(O)=0.000239 *20*; α(P)=1.7×10^{-5} *3* I$_\gamma$: γ follows an isomeric transition with T$_{1/2}$=2.11 min and %IT≤75%. The equilibrium status of the source is not known. Therefore, Iγ of this γ cannot be compared with Iγ of the other γ's in the decay scheme. 1976Ha25 give Iγ=100. Mult.,δ: from ^{193}Tl IT decay (2.11 min).
392.2	20.7	757.2+x	(11/2$^-$)	365.0+x	(9/2$^-$)	M1+E2	−0.59 *14*	0.154 *13*	α(K)=0.124 *11*; α(L)=0.0228 *12*; α(M)=0.0054 *3* α(N)=0.00136 *7*; α(O)=0.000261 *14*; α(P)=2.33×10^{-5} *18*
406.5	2.4	1163.7+x		757.2+x	(11/2$^-$)				406.6γ placed from 1900.2+x level in (HI,xnγ) data.
431.5	0.8	1513.0+x	(15/2$^-$)	1081.5+x	(13/2$^-$)	M1(+E2)		0.094 *54*	α(K)=0.074 *47*; α(L)=0.0149 *53*; α(M)=0.0036 *12* α(N)=9.0×10^{-4} *29*; α(O)=1.71×10^{-4} *61*; α(P)=1.44×10^{-5} *75*
466.7	<1.2	1960.0+x	(15/2$^-$)	1493.2+x	(13/2$^-$)	M1		0.1194	α(K)=0.0981 *14*; α(L)=0.01636 *23*; α(M)=0.00381 *6*

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^{193}Pb ε decay (5.8 min) 1976Ha25 (continued)

γ(^{193}Tl) (continued)

E_γ	I_γ [#]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [†]	α [‡]	Comments
								α(N)=0.000962 *14*; α(O)=0.000187 *3*; α(P)=1.772×10^{-5} *25*
666.2	2.0	1423.4+x		757.2+x	(11/2$^-$)			
716.5	6.7	1081.5+x	(13/2$^-$)	365.0+x	(9/2$^-$)	E2	0.01248	α(K)=0.00961 *14*; α(L)=0.00218 *3*; α(M)=0.000526 *8* α(N)=0.0001323 *19*; α(O)=2.48×10^{-5} *4*; α(P)=1.93×10^{-6} *3*
736.1	5.1	1493.2+x	(13/2$^-$)	757.2+x	(11/2$^-$)	E1	0.00425	α(K)=0.00354 *5*; α(L)=0.000545 *8*; α(M)=0.0001257 *18* α(N)=3.16×10^{-5} *5*; α(O)=6.08×10^{-6} *9*; α(P)=5.45×10^{-7} *8*
755.8	2.6	1513.0+x	(15/2$^-$)	757.2+x	(11/2$^-$)	E2	0.01115	α(K)=0.00866 *13*; α(L)=0.00190 *3*; α(M)=0.000457 *7* α(N)=0.0001149 *16*; α(O)=2.16×10^{-5} *3*; α(P)=1.709×10^{-6} *24*
1113.5	0.6	1870.7+x		757.2+x	(11/2$^-$)			

† From adopted γ′s, unless otherwise noted.
‡ Additional information 1.
# For absolute intensity per 100 decays, multiply by 3.3.

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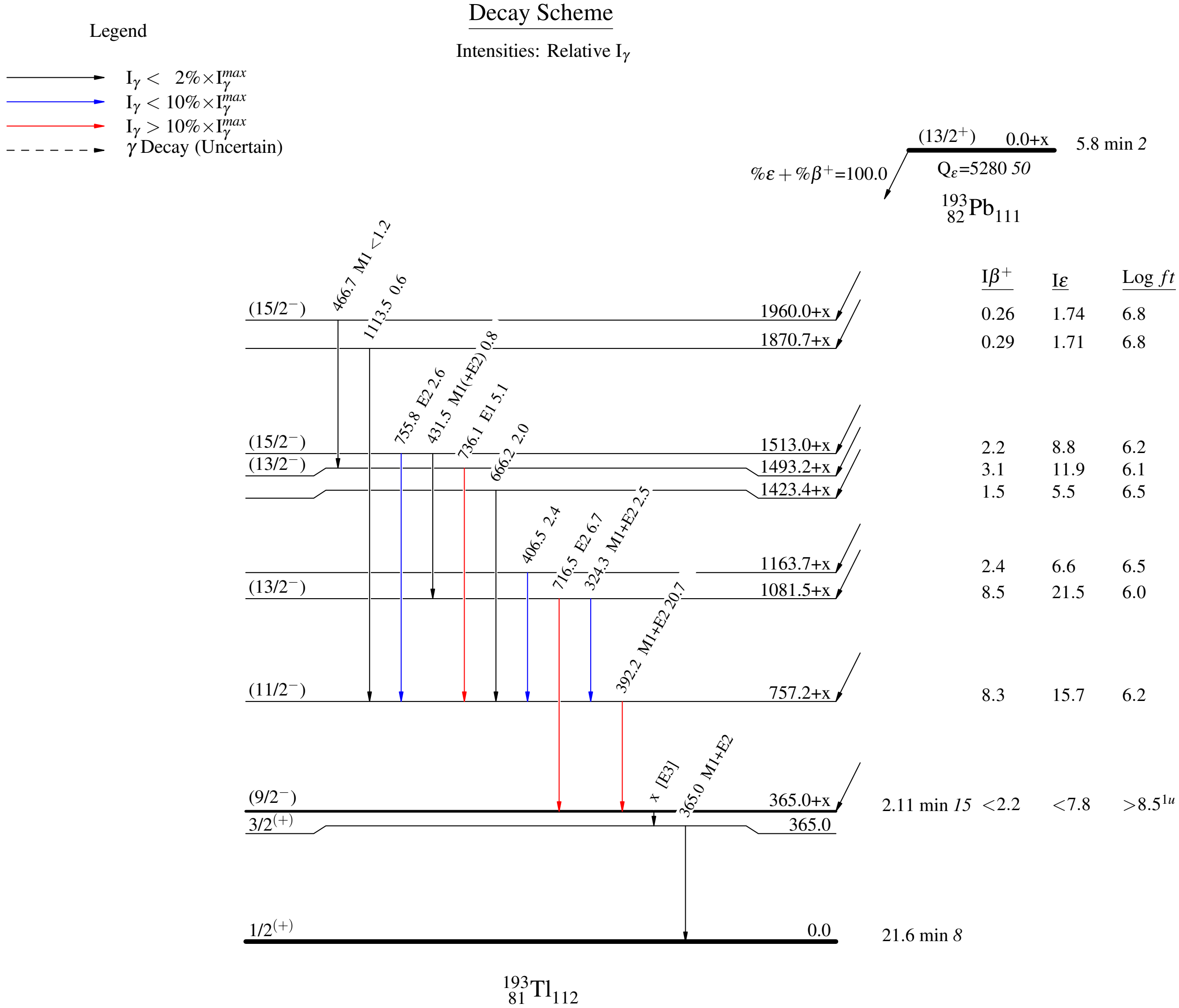
Decay Scheme

Intensities: Relative I_γ



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