^{200}Pb ε decay 1970Do11

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 192,1 (2023)	1-Aug-2023

Parent: ^{200}Pb: E=0.0; J^π=0^+; $T_{1/2}$=21.5 h *4*; Q(ε)=796 *12*; %ε decay=100

1970Do11: Source: ^{200}Pb produced in ^{203}Tl(p,4n), E(p)=37 MeV; Target: enriched to 29.5% ^{203}Tl; Detectors: two Ge(Li) detectors in coin. and two NaI(Tl) in anti-coin. with Ge(Li); Measured: γ, $\gamma\gamma$ coin, Eγ, Iγ; Deduced: level scheme, J^π.

Others: 1963Wi04, 1959Jo21, 1957As64.

^{200}Tl Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0	2^-	26.1 h *1*	
147.634 *21*	0^-	7.10 ns *15*	$T_{1/2}$: From 1959Jo21; Others: 7.3 ns *3* (1960Ba05) and 8 ns *2* (1957As64).
257.183 *22*	1^-		
289.24 *5*	$(2)^-$		
289.92 *3*	1^-		
450.56 *4*	1^-		
525.54 *3*	1^-		
605.45 *4*	1^-		

† From a least-squares fit to Eγ.
‡ From Adopted Levels, unless otherwise stated.

ε radiations

E(decay)	E(level)	Iε[†]	Log *ft*	Comments
(191 *12*)	605.45	1.23 *10*	6.49 *10*	εK=0.605 *25*; εL=0.289 *18*; εM+=0.106 *8*
(271 *12*)	525.54	14.3 *5*	5.86 *6*	εK=0.694 *9*; εL=0.227 *6*; εM+=0.0796 *25*
(345 *12*)	450.56	5.09 *18*	6.58 *5*	εK=0.729 *5*; εL=0.202 *3*; εM+=0.0695 *13*
(506 *12*)	289.92	9.0 *10*	6.73 *6*	εK=0.7619 *16*; εL=0.1781 *12*; εM+=0.0600 *5*
(507 *12*)	289.24	0.6 *5*	7.8[1u] *4*	εK=0.679 *5*; εL=0.236 *4*; εM+=0.0846 *15*
(539 *12*)	257.183	2.2 *7*	7.41 *14*	εK=0.7658 *14*; εL=0.1753 *10*; εM+=0.0589 *4*
(648 *12*)	147.634	68 *3*	6.10 *3*	εK=0.7755 *9*; εL=0.1684 *7*; εM+=0.05612 *25*
(796[‡] *12*)	0	<1.0	>8.4[1u]	εK=0.7416 *15*; εL=0.1924 *11*; εM+=0.0661 *5* Iε: From log *ft* syst.

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

γ(^{200}Tl)

Iγ normalization: From Σ(I(γ+ce)) to g.s.=100%, by assuming that there is no direct feeding to the ground state (J^π=2^-).
I(K x ray)/I(450.5γ)=31.6 *35* in 1970Do11.

E_γ[‡]	I_γ[‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[†]	Comments
32.74 *3*	0.83 *13*	289.92	1^-	257.183	1^-	M1	41.6 *6*	%Iγ=0.028 *4* α(L)=31.8 *5*; α(M)=7.45 *11* α(N)=1.881 *27*; α(O)=0.365 *5*; α(P)=0.0345 *5* E_γ: From 1963Wi04. I_γ: From α(L1)=28.6 *4* from BRICC for Mult.=M1 and Ice(L1)=6.3 *10* in 1963Wi04, and normalization factor

Continued on next page (footnotes at end of table)

^{200}Pb ε decay 1970Do11 (continued)

γ(^{200}Tl) (continued)

E_γ [‡]	I_γ [‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	α [†]	Comments
								of 3.77, determined from α(K)(147.63γ)=0.333 (BRICC), Ice(K,147.63γ)=100 (1963Wi04) and Iγ(147.63γ)=1133 (1970Do11). Mult.: α(L2)exp=3.0 *7*, α(M1)exp=8.2 *22*, α(M2)exp=1.6 *7*, α(M3)exp=1.4 *9*; L1/L2/M1/M2/M3(exp)= 6.3 *10*/0.66 *10*/1.8 *4*/0.35 *4*/0.3 *2* (1963Wi04).
109.54 *4*	14.5 *20*	257.183	1⁻	147.634	0⁻	M1	6.62 *9*	%Iγ=0.49 *7* α(K)=5.41 *8*; α(L)=0.930 *13*; α(M)=0.2174 *31* α(N)=0.0549 *8*; α(O)=0.01066 *15*; α(P)=0.001006 *14* Mult.: α(K)exp=5.7 *10*, α(L1)exp=1.09 *24*, α(L2)exp=0.109 *24*, α(M1)exp=0.23 *9*; K/L1/L2/M1(exp)=22 *2*/4.2 *7*/0.42 *7*/0.9 *3* and K/L(exp)=4.7 *8* (1963Wi04).
142.28 *3*	95 *5*	289.92	1⁻	147.634	0⁻	M1	3.14 *4*	%Iγ=3.19 *19* α(K)=2.57 *4*; α(L)=0.439 *6*; α(M)=0.1026 *14* α(N)=0.0259 *4*; α(O)=0.00503 *7*; α(P)=0.000475 *7* Mult.: α(K)exp=2.74 *22*, α(L12)exp=0.56 *7*, α(M1)exp=0.135 *25*, α(N1)exp=0.044 *12*; K/L(exp)=4.8 *6* and K/L12/M1/N1(exp)=69 *4*/14.2 15/3.4 *6*/1.1 *3* (1963Wi04).
147.63 *3*	1133 *30*	147.634	0⁻	0	2⁻	E2	1.232 *17*	%Iγ=38.1 *4* α(K)=0.333 *5*; α(L)=0.671 *9*; α(M)=0.1757 *25* α(N)=0.0440 *6*; α(O)=0.00762 *11*; α(P)=0.000274 *4* Mult.: α(K)exp=0.30 *3*, α(L12)exp=0.41 *4*, α(L3)exp=0.27 *4*, (α(M2)exp+α(M3)exp)=0.19 *4*; L12/L3=1.58 *7* (1957As64); K/L(exp)=0.44 *4*, L12/L3(exp)=1.5 *2* and L/M(exp)=3.6 *6* (1963Wi04).
155.29 [&] *10*	1.4 *5*	605.45	1⁻	450.56	1⁻	[M1]	2.452 *35*	%Iγ=0.047 *17* α(K)=2.005 *28*; α(L)=0.342 *5*; α(M)=0.0800 *11* α(N)=0.02020 *29*; α(O)=0.00392 *6*; α(P)=0.000371 *5*
161.32 *4*	9.1 *10*	450.56	1⁻	289.24	(2)⁻	M1	2.201 *31*	%Iγ=0.306 *34* α(K)=1.800 *25*; α(L)=0.307 *4*; α(M)=0.0718 *10* α(N)=0.01812 *25*; α(O)=0.00352 *5*; α(P)=0.000333 *5* Mult.: α(K)exp=1.9 *3*.
193.39 *10*	1.0 *4*	450.56	1⁻	257.183	1⁻	[M1]	1.322 *19*	%Iγ=0.034 *13* α(K)=1.081 *15*; α(L)=0.1840 *26*; α(M)=0.0430 *6* α(N)=0.01085 *15*; α(O)=0.002108 *30*; α(P)=0.0001992 *28*
235.62 *4*	129 *4*	525.54	1⁻	289.92	1⁻	M1	0.762 *11*	%Iγ=4.34 *17* α(K)=0.624 *9*; α(L)=0.1058 *15*; α(M)=0.02471 *35* α(N)=0.00624 *9*; α(O)=0.001212 *17*; α(P)=0.0001146 *16* Mult.: α(K)exp=0.78 *5*, α(L12)exp=0.135 *10*,

Continued on next page (footnotes at end of table)

^{200}Pb ε decay 1970Do11 (continued)

$\gamma(^{200}Tl)$ (continued)

E_γ‡	I_γ‡@	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	δ	α†	Comments
									α(M1)exp=0.039 *5*; K/L(exp)=5.8 *5*, L/M(exp)=3.4 *4*, K/L12/M1(exp)=26.7 *13*/4.6 *3*/1.35 *15* (1963Wi04).
257.19 *3*	134 *4*	257.183	1⁻	0	2⁻	M1+E2	1.22 *12*	0.347 *22*	%Iγ=4.51 *17* α(K)=0.252 *20*; α(L)=0.0716 *14*; α(M)=0.01761 *29* α(N)=0.00443 *7*; α(O)=0.000817 *16*; α(P)=5.68×10^{-5} *29* Mult.: α(K)exp=0.26 *2*, α(L12)exp=0.079 *9*, α(L3)exp=0.014 *6*, α(N1)exp=0.0070 *14*; K/L(exp)=3.1 *5*, L12/L3(exp)=5.5 *23* (1963Wi04). δ: From α(K)exp and K/L(exp) using briccmixing program.
268.36 *3*	119 *5*	525.54	1⁻	257.183	1⁻	M1		0.532 *7*	%Iγ=4.00 *19* α(K)=0.436 *6*; α(L)=0.0738 *10*; α(M)=0.01721 *24* α(N)=0.00435 *6*; α(O)=0.000844 *12*; α(P)=7.98×10^{-5} *11* Mult.: α(K)exp=0.58 *5*, α(L12)exp=0.098 *13*, α(M1)exp=0.021 *6*; K/L(exp)=5.8 *9*, K/L12/M1(exp)=18.4 *15*/3.1 *4*/0.65 *20* (1963Wi04).
289.24 *15*	32 *10*	289.24	(2)⁻	0	2⁻	M1		0.433 *6*	%Iγ=1.08 *33* α(K)=0.355 *5*; α(L)=0.0600 *8*; α(M)=0.01400 *20* α(N)=0.00353 *5*; α(O)=0.000687 *10*; α(P)=6.49×10^{-5} *9* Mult.: α(K)exp=0.44 *15*.
289.92 *10*	52 *10*	289.92	1⁻	0	2⁻	M1		0.431 *6*	%Iγ=1.75 *33* α(K)=0.353 *5*; α(L)=0.0596 *8*; α(M)=0.01391 *20* α(N)=0.00351 *5*; α(O)=0.000682 *10*; α(P)=6.45×10^{-5} *9* Mult.: α(K)exp=0.39 *9*.
302.93 *5*	5.0 *10*	450.56	1⁻	147.634	0⁻	(M1)		0.382 *5*	%Iγ=0.168 *34* α(K)=0.313 *4*; α(L)=0.0528 *7*; α(M)=0.01232 *17* α(N)=0.00311 *4*; α(O)=0.000604 *8*; α(P)=5.72×10^{-5} *8* Mult.: α(K)exp=0.53 *13*, α(L12)exp=0.09 *3*; K/L(exp)=5.8 *13*, K/L12(exp)=0.70 *10*/0.12 *3* (1963Wi04).
315.60 *8*	6.7 *10*	605.45	1⁻	289.92	1⁻	(M1)		0.342 *5*	%Iγ=0.225 *34* α(K)=0.280 *4*; α(L)=0.0472 *7*; α(M)=0.01101 *15* α(N)=0.00278 *4*; α(O)=0.000540 *8*; α(P)=5.11×10^{-5} *7* Mult.: α(K)exp=0.38 *8*, α(L12)exp=0.11 *3*; K/L(exp)=3.4 *10*, K/L12(exp)=0.68 *10*/0.20 *5* (1963Wi04).

Continued on next page (footnotes at end of table)

^{200}Pb ε decay 1970Do11 (continued)

$\gamma(^{200}Tl)$ (continued)

E_γ [‡]	I_γ [‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	α [†]	Comments
348.23 *8*	4.8 *15*	605.45	1⁻	257.183	1⁻	[M1,E2]	0.17 *9*	%Iγ=0.16 *5* α(K)=0.13 *8*; α(L)=0.028 *8*; α(M)=0.0068 *16* α(N)=0.0017 *4*; α(O)=3.2×10^{-4} *9*; α(P)=2.6×10^{-5} *13*
377.92 *5*	0.8 *3*	525.54	1⁻	147.634	0⁻	[M1]	0.2098 *29*	%Iγ=0.027 *10* α(K)=0.1721 *24*; α(L)=0.0289 *4*; α(M)=0.00674 *9* α(N)=0.001700 *24*; α(O)=0.000330 *5*; α(P)=3.13×10^{-5} *4*
450.56 *5*	100	450.56	1⁻	0	2⁻	M1	0.1311 *18*	%Iγ=3.36 *8* α(K)=0.1077 *15*; α(L)=0.01798 *25*; α(M)=0.00419 *6* α(N)=0.001058 *15*; α(O)=0.0002055 *29*; α(P)=1.948×10^{-5} *27* Mult.: α(K)exp=0.166 *19*, α(L12)exp=0.029 *3*, α(M)exp=0.0060 *8*; K/L(exp)=5.8 *9*, L/M(exp)=4.7 *8*, K/L12/M(exp)=4.4 *5*/0.76 *8*/0.16 *2* (1963Wi04).
457.80 *7*	3.5 *6*	605.45	1⁻	147.634	0⁻	[M1]	0.1257 *18*	%Iγ=0.118 *20* α(K)=0.1032 *14*; α(L)=0.01723 *24*; α(M)=0.00401 *6* α(N)=0.001013 *14*; α(O)=0.0001969 *28*; α(P)=1.866×10^{-5} *26* Mult.: α(K)exp=0.43 *9*, but the value is inconsistent with that required for a M1 transition.
525.54 *6*	12.6 *10*	525.54	1⁻	0	2⁻	[M1]	0.0872 *12*	%Iγ=0.424 *35* α(K)=0.0717 *10*; α(L)=0.01192 *17*; α(M)=0.00278 *4* α(N)=0.000701 *10*; α(O)=0.0001362 *19*; α(P)=1.291×10^{-5} *18*
605.44 *6*	16.9 *12*	605.45	1⁻	0	2⁻	M1	0.0602 *8*	%Iγ=0.57 *4* α(K)=0.0495 *7*; α(L)=0.00819 *11*; α(M)=0.001907 *27* α(N)=0.000481 *7*; α(O)=9.36×10^{-5} *13*; α(P)=8.88×10^{-6} *12* Mult.: α(K)exp=0.054 *10*, α(L)exp=0.0089 *13*; K/L(exp)=6.0 *12*, K/L12(exp)=0.24 *4*/0.040 *5* (1963Wi04).

† Additional information 1.
‡ From 1970Do11, unless otherwise stated.
# Deduced from the measured α(K)exp, α(L)exp and α(M)exp values, and sub-shell ratios using Ice data of 1963Wi04 and Iγ data of 1970Do11, Values were normalized using α(K)(147.63γ,E2)=0.333 from BRICC.
@ For absolute intensity per 100 decays, multiply by 0.0336 *8*.
& Placement of transition in the level scheme is uncertain.

^{200}Pb ε decay 1970Do11

Decay Scheme

Intensities: I_γ per 100 parent decays