^{158}Tb ε decay 1986Go25,1985Th01,1970Pa01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 141, 1 (2017)	1-Feb-2017

Parent: ^{158}Tb: E=0; $J^{\pi}=3^-$; $T_{1/2}$=180 y *11*; Q(ε)=1219.0 *10*; %ε+%β^+ decay=83.4 *7*

^{158}Tb-%ε+%β^+ decay: from Σ I_γ(1.0+α) to ground state of ^{158}Gd following ε decay and to ground state of ^{158}Dy following β^- decay.

Sources of ^{158}Tb have been made by ^{158}Gd(p,n) and ^{156}Dy(n,γ)^{157}Dy(ε)^{157}Tb(n,γ) reactions.

E_γ reported by 1965Sc10, 1968Sc04, 1970Pa01, 1985Th01, and 1986Go25; I_γ by 1965Sc10, 1968Sc04, 1970Pa01, and 1986Go25; ce data by 1965Sc10 and 1970Pa01; γγ(θ) data by 1965Sc10 and 1968Sc04; and γγ coincidences by 1968Sc04, 1970Pa01, and 1986Go25. The results of 1986Go25 are also reported in 1987Br33.

Model calculations related to electron capture rates: 1994Re18.

α: Additional information 1.

^{158}Gd Levels

See ^{158}Gd Adopted Levels for band assignments.

E(level)†	J^{π}‡	$T_{1/2}$#	Comments
0.0	0^+	stable	
79.5131 *10*	2^+	2.52 ns *5*	$T_{1/2}$: Weighted average of 2.47 ns *10* (1966Fu03), 2.52 ns *8* (1968Ku03), and 2.58 ns *15* and 2.61 ns *15* (1968Sc04).
261.4572 *14*	4^+	0.148 ns *2*	$T_{1/2}$: Weighted average of 0.162 ns *13* (1968Ku03), 0.20 ns *7* (1968Sc04), and 0.148 ns *2* (1988Al33).
977.136 *10*	1^-		
1023.705 *4*	2^-		
1041.6423 *24*	3^-		
1159.009 *20*	4^-		
1187.145 *4*	2^+		

† From least-squares fit to γ energies.

‡ From ^{158}Gd Adopted Levels.

From ^{158}Tb ε decay only, see ^{158}Gd Adopted Levels for summary of all measurements.

ε,β^+ radiations

E(decay)	E(level)	Iε†	Log *ft*	Comments
(31.9 *10*)	1187.145	4.70 *17*	8.03 *5*	εL=0.681 *5*; εM+=0.319 *5* E(decay): 1983Ra25 reported a low-energy K-capture branch to this level. Subsequently, several additional measurements have been made and all are in agreement that K-capture to this level does not occur. These results are reported in 1985Vo13, 1985Vo09, 1985Vo03, 1985Lo08, 1985Dy04, 1985Br10, 1985Al02, and 1984Bu14.
(60.0 *10*)	1159.009	0.117 *12*	10.36 *6*	εK=0.154 *22*; εL=0.620 *16*; εM+=0.226 *7*
(177.4 *10*)	1041.6423	36.2 *13*	9.41 *4*	εK=0.7498 *8*; εL=0.1909 *6*; εM+=0.05931 *20*
(195.3 *10*)	1023.705	53.2 *17*	9.35 *3*	εK=0.7616 *6*; εL=0.1822 *5*; εM+=0.05621 *16*
(241.9 *10*)	977.136	0.383 *18*	11.72 *4*	εK=0.7819 *4*; εL=0.16724 *25*; εM+=0.05091 *9*
(957.5 *10*)	261.4572	3.9 *6*	12.04 *8*	εK=0.8308; εL=0.1310; εM+=0.03826
(1139.5 *10*)	79.5131	1.6	12.6	εK=0.8329; εL=0.1294; εM+=0.03771 ε/β^+=2.5×10^5. Iε: Uncertainty is +5.−1.6.

† For absolute intensity per 100 decays, multiply by 0.834 *7*.

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γ(^{158}Gd)

Iγ normalization: from Σ $I_\gamma(1.0+\alpha)$ to ground state following ε decay.

E_γ †	I_γ ‡#a	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	α	Comments
79.513 *1*	26.5 *8*	79.5131	2^+	0.0	0^+	E2	5.93	α(K)=2.02 *3*; α(L)=3.02 *5*; α(M)=0.714 *10*; α(N)=0.1591 *23*; α(O)=0.0207 *3* α(P)=9.93×10^{-5} *14*; α(N+..)=0.180 *3* %Iγ=11.76 *17*.
181.944 *1*	22.6 *7*	261.4572	4^+	79.5131	2^+	E2	0.305	α(K)=0.206 *3*; α(L)=0.0769 *11*; α(M)=0.01779 *25*; α(N)=0.00400 *6*; α(O)=0.000545 *8* α(P)=1.157×10^{-5} *17*; α(N+..)=0.00455 *7* %Iγ=10.0 *5*.
210.7[b] *5*	0.022 *12*	1187.145	2^+	977.136	1^-	[E1]	0.0396	α(K)=0.0335 *6*; α(L)=0.00474 *8*; α(M)=0.001024 *16*; α(N)=0.000233 *4*; α(O)=3.51×10^{-5} *6* α(P)=2.06×10^{-6} *4*; α(N+..)=0.000270 *5* %Iγ=0.010 *6*. E_γ,I_γ: From 1970Pa01; 1986Go25 state that this γ does not exist.
780.183 *3*	21.8 *4*	1041.6423	3^-	261.4572	4^+	E1	0.00183 *3*	α(K)=0.001571 *22*; α(L)=0.000207 *3*; α(M)=4.46×10^{-5} *7*; α(N)=1.023×10^{-5} *15* α(O)=1.580×10^{-6} *23*; α(P)=1.050×10^{-7} *15*; α(N+..)=1.191×10^{-5} *17* %Iγ=9.7 *4*. δ: δ(M2/E1) < 0.02.
897.549& *20*	0.22& *2*	1159.009	4^-	261.4572	4^+	[E1]	0.001394 *20*	α=0.001394 *20*; α(K)=0.001195 *17*; α(L)=0.0001567 *22*; α(M)=3.37×10^{-5} *5* α(N)=7.73×10^{-6} *11*; α(O)=1.196×10^{-6} *17*; α(P)=8.01×10^{-8} *12*; α(N+..)=9.00×10^{-6} %Iγ=0.098 *10*.
897.622& *13*	0.33& *2*	977.136	1^-	79.5131	2^+	[E1]	0.001394 *20*	α=0.001394 *20*; α(K)=0.001195 *17*; α(L)=0.0001567 *22*; α(M)=3.37×10^{-5} *5* α(N)=7.73×10^{-6} *11*; α(O)=1.196×10^{-6} *17*; α(P)=8.01×10^{-8} *12*; α(N+..)=9.00×10^{-6} %Iγ=0.146 *10*.
925.56 *10*	0.101 *11*	1187.145	2^+	261.4572	4^+	(E2)	0.00324 *5*	α(K)=0.00273 *4*; α(L)=0.000401 *6*; α(M)=8.74×10^{-5} *13*; α(N)=2.00×10^{-5} *3*; α(O)=3.06×10^{-6} *5* α(P)=1.89×10^{-7} *3*; α(N+..)=2.33×10^{-5} *4* %Iγ=0.045 *5*.
944.189 *3*	100	1023.705	2^-	79.5131	2^+	E1	0.001266 *18*	α=0.001266 *18*; α(K)=0.001085 *16*; α(L)=0.0001420 *20*; α(M)=3.05×10^{-5} *5* α(N)=7.00×10^{-6} *10*; α(O)=1.084×10^{-6} *16*; α(P)=7.28×10^{-8} *11*; α(N+..)=8.16×10^{-6} %Iγ=44.4 *15*. δ: δ(M2/E1) < 0.26.

Continued on next page (footnotes at end of table)

^{158}Tb ε decay 1986Go25,1985Th01,1970Pa01 (continued)

γ(^{158}Gd) (continued)

E_γ [†]	I_γ [‡#a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ	α	Comments
962.126 *3*	46.2 *9*	1041.6423	3^-	79.5131	2^+	E1		0.001221 *17*	α=0.001221 *17*; α(K)=0.001047 *15*; α(L)=0.0001369 *20*; α(M)=2.94×10^{-5} *5* α(N)=6.75×10^{-6} *10*; α(O)=1.046×10^{-6} *15*; α(P)=7.03×10^{-8} *10*; α(N+..)=7.87×10^{-6} %Iγ=20.5 *8*. δ: δ(M2/E1) < 0.28.
977.131 *13*	0.398 *11*	977.136	1^-	0.0	0^+	E1		0.001186 *17*	α=0.001186 *17*; α(K)=0.001017 *15*; α(L)=0.0001329 *19*; α(M)=2.85×10^{-5} *4* α(N)=6.55×10^{-6} *10*; α(O)=1.015×10^{-6} *15*; α(P)=6.83×10^{-8} *10*; α(N+..)=7.64×10^{-6} %Iγ=0.177 *8*.
1107.626 *4*	4.89 *9*	1187.145	2^+	79.5131	2^+	E2+M1	−9.0 *15*	0.00225 *4*	α(K)=0.00190 *3*; α(L)=0.000270 *4*; α(M)=5.85×10^{-5} *9*; α(N)=1.343×10^{-5} *20*; α(O)=2.06×10^{-6} *3* α(P)=1.319×10^{-7} *19*; α(N+..)=1.602×10^{-5} *23* %Iγ=2.17 *9*.
1187.143 *5*	3.84 *7*	1187.145	2^+	0.0	0^+	E2		0.00194 *3*	α(K)=0.001643 *23*; α(L)=0.000231 *4*; α(M)=5.00×10^{-5} *7*; α(N)=1.147×10^{-5} *16* α(O)=1.766×10^{-6} *25*; α(P)=1.140×10^{-7} *16*; α(N+..)=1.760×10^{-5} *25* %Iγ=1.70 *7*.

† From 1986Go25; others: 1970Pa01 and 1985Th01 which agree.
‡ From 1986Go25; others: 1965Sc10, 1968Sc04, 1970Pa01.
# I(XK)=179 *3* (1986Go25).
@ Multipolarities and δ limits (in comments) are from ^{158}Gd Adopted γ radiations.
& Decomposition of 897 doublet done by 1986Go25.
a For absolute intensity per 100 decays, multiply by 0.444 *15*.
b Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays