^{147}Tb ε decay (1.64 h) 1997Wa04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	N. Nica and B. Singh	NDS 181, 1 (2022)	9-Mar-2022

Parent: ^{147}Tb: E=0.0; J$^{\pi}$=(1/2^{+}); $T_{1/2}$=1.64 h *3*; Q(ε)=4614 *8*; %ε+%β^{+} decay=100.0

^{147}Tb-Q(ε): From 2021Wa16.

1997Wa04: source obtained by spallation of Ta with 660 MeV protons at JINR Dubna, followed by radiochemistry and mass separation at YASNAPP. Used two Ge(Li), HPGe, Si(Li) (with micro-orange magnetic filter). Measured Eγ, Iγ, I(ce), $\gamma\gamma$ (time coin window of 50 ns); also measured Q(g.s.) by β-decay energy using positron spectrum end-point energy and total γ-ray absorption methods.

Others: 2004Iz02, 2003Iz01, 2000Iz01, 1998Iz01, 1996GoZZ (ce), 1995AdZZ (Gamow-Teller resonance, strength function, total absorption spectrometer), 1993SaZY (γ, $\gamma\gamma$), 1991Ke11 (γ, Eβ, Q(ε)), 1991MeZX (Eγ, Iγ, $\gamma\gamma$), 1983Pr04 ($\gamma(\theta)$, $T_{1/2}$), 1974Bu24 ($\gamma\gamma(\theta)$, ceγ(t)), 1974Ne01 (Eγ, Iγ, $\gamma\gamma$), 1972VyZZ (Eγ, Iγ, I(ce)), 1971Af03 (Eγ, Iγ, $T_{1/2}$, I(ce)), 1969Ch32 (Eγ, Iγ, $T_{1/2}$).

2004Iz02 note that their TAGS (total absorption γ-ray spectrometer) measurement is in good agreement with the data of 1997Wa04 indicating that the decay scheme of 1997Wa04 is fairly complete. They also indicate Gamow-Teller resonance at ≈4 MeV.

Level scheme is from 1997Wa04.

^{147}Gd Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0.0	7/2^{-}	38.06 h *12*	%ε+%β^{+}=100 $T_{1/2}$,%ε+%β^{+}: adopted values.
1152.6	3/2^{-}	≤0.2[#] ns	
1292.5	1/2^{+}	≤0.2[#] ns	
1412.2	3/2^{+}	≤0.35[#] ns	
1627.9	5/2^{+}		
1699.5	3/2^{+}		
1759.9	1/2^{+}		
1847.1	1/2^{-}		
1947.6	5/2^{-}		
2233.2	(5/2)$^{-}$		
2329.0	(5/2,7/2)		
2438.0	(3/2,5/2)$^{-}$		
2611.7	(1/2,3/2)$^{+}$		J$^{\pi}$: 1997Wa04 assign π=− but M1 γ to 1/2^{+}, 1292 level.
2736.4	5/2^{-}		
2808.3			
2862.2	5/2^{+}		J$^{\pi}$: 1997Wa04 assign π=− but E1 γ to 3/2^{-}, 1152 level.
2871.7			
2878.0	(1/2,3/2)$^{+}$		
2947.4	(3/2,5/2)$^{+}$		
3119.0	(3/2,5/2)		
3121.7			
3124.5	(3/2,5/2)$^{-}$		
3171.5	(1/2,3/2)$^{+}$		
3319.9			
3325.9			
3574.2			
3715.5	(1/2,3/2)$^{-}$		
3833.4	(1/2^{+})		
3853.3	(3/2)		
3891.7	(1/2^{+},3/2^{-})		
3927.2			
3967.8			
3998.8			

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^{147}Tb ε decay (1.64 h) 1997Wa04 (continued)

^{147}Gd Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
4051.9	(1/2,3/2)	4132.4	(1/2,3/2)	4201.3	(1/2)	4299.7	(1/2)
4073.6		4144.5	(1/2⁻)	4249.7	(1/2,3/2)	4369.9	(1/2,3/2)
4117.6?		4176.7	(1/2,3/2)	4280.4	(1/2,3/2)	4431.4?	(1/2)

† No uncertainties are available for the E_γ input. The E(level) values are from a least-squares fit to the E_γ data with the assumption that the uncertainties are the same for all the E_γ's.
‡ From 1997Wa04 (see Adopted Levels dataset for adopted J^π values).
# From ceγ(t) (1974Bu24).

ε,β⁺ radiations

E(decay)	E(level)	Iβ⁺ †	Iε†	Log *ft*	I(ε+β⁺)†	Comments
(244 *8*)	4369.9		0.055 *19*	6.59 *16*	0.055 *19*	εK=0.783 *3*; εL=0.1667 *20*; εM+=0.0507 *7*
(314 *8*)	4299.7		0.47 *4*	5.92 *5*	0.47 *4*	εK=0.7990 *15*; εL=0.1545 *11*; εM+=0.0464 *4*
(334 *8*)	4280.4		0.37 *4*	6.08 *6*	0.37 *4*	εK=0.8021 *13*; εL=0.1522 *9*; εM+=0.0456 *4*
(364 *8*)	4249.7		0.37 *5*	6.17 *7*	0.37 *5*	εK=0.8062 *10*; εL=0.1492 *8*; εM+=0.0446 *3*
(413 *8*)	4201.3		1.10 *5*	5.82 *3*	1.10 *5*	εK=0.8113 *8*; εL=0.1454 *6*; εM+=0.04326 *19*
(437 *8*)	4176.7		0.57 *4*	6.16 *4*	0.57 *4*	εK=0.8134 *7*; εL=0.1439 *5*; εM+=0.04273 *17*
(470 *8*)	4144.5		1.66 *8*	5.76 *3*	1.66 *8*	εK=0.8157 *6*; εL=0.1422 *4*; εM+=0.04212 *15*
(482 *8*)	4132.4		0.65 *6*	6.19 *5*	0.65 *6*	εK=0.8165 *6*; εL=0.1416 *4*; εM+=0.04192 *14*
(540 *8*)	4073.6		0.57 *5*	6.36 *5*	0.57 *5*	εK=0.8198 *4*; εL=0.1391 *3*; εM+=0.04108 *11*
(562 *8*)	4051.9		0.84 *4*	6.23 *3*	0.84 *4*	εK=0.8208 *4*; εL=0.1384 *3*; εM+=0.04082 *10*
(615 *8*)	3998.8		0.32 *4*	6.73 *6*	0.32 *4*	εK=0.8230 *3*; εL=0.13678 *23*; εM+=0.04026 *8*
(646 *8*)	3967.8		0.447 *21*	6.634 *25*	0.447 *21*	εK=0.8240 *3*; εL=0.13598 *20*; εM+=0.03998 *7*
(687 *8*)	3927.2		0.26 *5*	6.93 *9*	0.26 *5*	εK=0.8253 *3*; εL=0.13505 *18*; εM+=0.03966 *6*
(722 *8*)	3891.7		0.40 *4*	6.79 *5*	0.40 *4*	εK=0.8263 *2*; εL=0.13432 *16*; εM+=0.03941 *6*
(761 *8*)	3853.3		0.91 *7*	6.48 *4*	0.91 *7*	εK=0.8272 *2*; εL=0.13362 *14*; εM+=0.03917 *5*
(781 *8*)	3833.4		4.59 *17*	5.797 *21*	4.59 *17*	εK=0.8277 *2*; εL=0.1333 *2*; εM+=0.03906 *5*
(899 *8*)	3715.5		1.92 *13*	6.30 *4*	1.92 *13*	εK=0.8299 *2*; εL=0.1316 *1*; εM+=0.03849 *4*
(1040 *8*)	3574.2		0.68 *19*	6.89 *13*	0.68 *19*	εK=0.8318 *1*; εL=0.13018 *8*; εM+=0.03799 *3*
(1288 *8*)	3325.9		0.71 *5*	7.06 *4*	0.71 *5*	εK=0.8340; εL=0.12841 *5*; εM+=0.03738 *2*
(1294 *8*)	3319.9		0.60 *7*	7.14 *6*	0.60 *7*	εK=0.8340; εL=0.12837 *5*; εM+=0.03737 *2*
(1443 *8*)	3171.5	$9.\times10^{-5}$ *3*	0.064 *19*	8.21 *13*	0.064 *19*	av Eβ=202.9 *36*; εK=0.8340; εL=0.12748 *5*; εM+=0.03707 *2*
(1490 *8*)	3124.5	0.00047 *5*	0.210 *19*	7.72 *4*	0.210 *19*	av Eβ=223.7 *38*; εK=0.83363 *9*; εL=0.12718 *6*; εM+=0.03697 *2*
(1492 *8*)	3121.7	0.00050 *14*	0.22 *6*	7.70 *12*	0.22 *6*	av Eβ=224.9 *38*; εK=0.83360 *9*; εL=0.12716 *6*; εM+=0.03696 *2*
(1495 *8*)	3119.0	0.00058 *5*	0.246 *11*	7.655 *22*	0.247 *11*	av Eβ=226.3 *38*; εK=0.8336 *1*; εL=0.12714 *6*; εM+=0.03696 *2*
(1667 *8*)	2947.4	0.0034 *4*	0.44 *4*	7.50 *4*	0.44 *4*	av Eβ=301.7 *36*; εK=0.8299 *3*; εL=0.12582 *8*; εM+=0.03654 *3*
(1736 *8*)	2878.0	0.0173 *12*	1.50 *8*	7.004 *25*	1.52 *8*	av Eβ=332.2 *35*; εK=0.8271 *4*; εL=0.12515 *9*; εM+=0.03634 *3*
(1742 *8*)	2871.7	0.0042 *5*	0.36 *4*	7.63 *5*	0.36 *4*	av Eβ=334.9 *35*; εK=0.8269 *4*; εL=0.12508 *9*; εM+=0.03632 *3*
(1752 *8*)	2862.2	0.0064 *9*	0.51 *7*	7.48 *6*	0.52 *7*	av Eβ=339.1 *35*; εK=0.8264 *4*; εL=0.12498 *9*; εM+=0.03628 *3*
(1806 *8*)	2808.3	0.0077 *7*	0.47 *4*	7.54 *4*	0.48 *4*	av Eβ=362.7 *35*; εK=0.8236 *5*; εL=0.1244 *1*; εM+=0.03610 *3*
(1878 *8*)	2736.4	0.0094 *11*	0.42 *5*	7.63 *6*	0.43 *5*	av Eβ=394.3 *36*; εK=0.8190 *6*; εL=0.1234 *2*; εM+=0.03582 *4*

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^{147}Tb ε decay (1.64 h) 1997Wa04 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(2002 *8*)	2611.7	0.033 *2*	0.92 *6*	7.35 *3*	0.95 *6*	av Eβ=449.0 *36*; εK=0.8084 *8*; εL=0.12151 *14*; εM+=0.03524 *5*
(2176 *8*)	2438.0	0.098 *5*	1.54 *7*	7.193 *21*	1.64 *7*	av Eβ=525.5 *36*; εK=0.7882 *11*; εL=0.11806 *18*; εM+=0.03423 *6*
(2285 *8*)	2329.0	0.032 *6*	0.38 *6*	7.85 *8*	0.41 *7*	av Eβ=573.5 *36*; εK=0.7721 *13*; εL=0.11543 *21*; εM+=0.03345 *6*
(2381 *8*)	2233.2	0.065 *4*	0.59 *4*	7.69 *3*	0.66 *4*	av Eβ=616.0 *36*; εK=0.7558 *15*; εL=0.11282 *23*; εM+=0.03269 *7*
(2666 *8*)	1947.6	0.306 *14*	1.50 *7*	7.384 *22*	1.81 *8*	av Eβ=743.1 *36*; εK=0.6970 *19*; εL=0.1037 *3*; εM+=0.03002 *9*
(2767 *8*)	1847.1	8.5 *3*	34.6 *11*	6.055 *16*	43.1 *13*	av Eβ=788.0 *36*; εK=0.6734 *20*; εL=0.1000 *3*; εM+=0.02896 *9*
(2854 *8*)	1759.9	0.39 *3*	1.34 *9*	7.49 *4*	1.73 *12*	av Eβ=827.1 *36*; εK=0.6519 *20*; εL=0.0967 *3*; εM+=0.02800 *9*
(2915 *8*)	1699.5	0.75 *4*	2.37 *11*	7.265 *23*	3.12 *15*	av Eβ=854.2 *36*; εK=0.6367 *21*; εL=0.0944 *3*; εM+=0.02733 *9*
(2986 *8*)	1627.9	0.52 *3*	1.44 *10*	7.50 *3*	1.96 *13*	av Eβ=886.5 *36*; εK=0.6183 *21*; εL=0.0916 *4*; εM+=0.02652 *10*
(3202 *8*)	1412.2	2.4 *2*	5.0 *5*	7.03 *5*	7.4 *7*	av Eβ=983.8 *37*; εK=0.5618 *21*; εL=0.0831 *4*; εM+=0.02404 *10*
(3322 *8*)	1292.5	3.1 *4*	5.3 *8*	7.03 *7*	8.4 *12*	av Eβ=1038.1 *37*; εK=0.5305 *21*; εL=0.0784 *4*; εM+=0.02268 *9*
(3461 *8*)	1152.6	3 *1*	4 *2*	7.18 *19*	7 *3*	av Eβ=1101.7 *37*; εK=0.4945 *21*; εL=0.0730 *3*; εM+=0.02111 *9*

† Absolute intensity per 100 decays.

γ(^{147}Gd)

Iγ normalization: calculated from γ feeding to g.s. (1997Wa04) based on the assumptions that there is no (ε+β^{+}) feeding to g.s., and that the γ decay to g.s. was measured completely (detection threshold is 0.06% of most intense 1153γ); the total γ intensity to g.s. (relative to 1153γ) quoted by 1997Wa04 is 111% *3* (109.7% *27* from placed γ's, plus less than half of the unplaced γ intensity, or <1.7% (evaluator)), whence the Iγ normalization adopted here.

Unplaced γ's from 1997Wa04.

E_γ [‡]	I_γ [#@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α [†]	Comments
119.73 *3*	7.5 *2*	1412.2	3/2$^+$	1292.5	1/2$^+$	M1+E2	0.38 *+7−8*	1.26 *6*	%Iγ=6.85 *24* α(K)=0.86 *16*; α(L)=0.31 *16*; α(M)=0.070 *39* α(N)=0.0158 *85*; α(O)=0.0022 *11*; α(P)=5.6×10^{-5} *20* Mult.: from α(K)exp=1.01 *6* and α(L)exp=0.18 *1* (1997Wa04); also K/L ratio 3.0 *11* (1971Af03).
139.89 *3*	34.1 *9*	1292.5	1/2$^+$	1152.6	3/2$^-$	E1		0.1181	%Iγ=31.1 *11* α(K)=0.0996 *14*; α(L)=0.01450 *21*; α(M)=0.00314 *5* α(N)=0.000712 *10*; α(O)=0.0001058 *15*; α(P)=5.83×10^{-6} *9* Mult.: from α(K)exp=0.099 *4* and α(L)exp=0.015 *1* (1997Wa04). Additional information 1.
259.6 *1*	<0.4	1412.2	3/2$^+$	1152.6	3/2$^-$				%Iγ<0.365
287.4 *1*	0.19 *6*	1699.5	3/2$^+$	1412.2	3/2$^+$				%Iγ=0.17 *5*
347.65 *3*	2.63 *6*	1759.9	1/2$^+$	1412.2	3/2$^+$	M1		0.0647	%Iγ=2.40 *8* α(K)=0.0549 *8*; α(L)=0.00771 *11*; α(M)=0.001672 *24* α(N)=0.000385 *6*; α(O)=5.98×10^{-5} *9*; α(P)=4.04×10^{-6} *6* Mult.: from α(K)exp=0.053 *4* (1997Wa04).
407.06 *3*	1.95 *7*	1699.5	3/2$^+$	1292.5	1/2$^+$	M1		0.0429	%Iγ=1.78 *8* α(K)=0.0364 *5*; α(L)=0.00509 *8*; α(M)=0.001102 *16* α(N)=0.000254 *4*; α(O)=3.95×10^{-5} *6*; α(P)=2.67×10^{-6} *4* Mult.: from α(K)exp=0.035 *4* (1997Wa04).
434.96 *4*	0.68 *5*	1847.1	1/2$^-$	1412.2	3/2$^+$				%Iγ=0.62 *5*
467.4 *1*	0.14 *7*	1759.9	1/2$^+$	1292.5	1/2$^+$				%Iγ=0.13 *6*
546.96 *3*	2.19 *6*	1699.5	3/2$^+$	1152.6	3/2$^-$	E1		0.00386	%Iγ=2.00 *7* α(K)=0.00330 *5*; α(L)=0.000443 *7*; α(M)=9.53×10^{-5} *14* α(N)=2.18×10^{-5} *3*; α(O)=3.36×10^{-6} *5*; α(P)=2.18×10^{-7} *3* Mult.: from α(K)exp=0.0026 *13* (1997Wa04).
554.65 *3*	5.75 *13*	1847.1	1/2$^-$	1292.5	1/2$^+$	E1		0.00374	%Iγ=5.25 *17* α(K)=0.00320 *5*; α(L)=0.000429 *6*; α(M)=9.24×10^{-5} *13* α(N)=2.12×10^{-5} *3*; α(O)=3.26×10^{-6} *5*; α(P)=2.11×10^{-7} *3* Mult.: from α(K)exp=0.0024 *9* (1997Wa04).
694.54 *3*	41.4 *9*	1847.1	1/2$^-$	1152.6	3/2$^-$	M1		0.01110	%Iγ=37.8 *12* α(K)=0.00944 *14*; α(L)=0.001296 *19*; α(M)=0.000280 *4* α(N)=6.45×10^{-5} *9*; α(O)=1.005×10^{-5} *14*; α(P)=6.87×10^{-7} *10* Mult.: from α(K)exp=0.0102 *5* and α(L)exp=0.0014 *2* (1997Wa04). Additional information 2.

γ(^{147}Gd) (continued)

E_γ[‡]	I_γ[#@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[†]	Comments
1025.8 *1*	0.38 *3*	2438.0	(3/2,5/2)$^-$	1412.2	3/2$^+$			%Iγ=0.347 *29*
1080.5[b] *3*	0.06 *4*	2233.2	(5/2)$^-$	1152.6	3/2$^-$			%Iγ=0.05 *4*
1117.8 *3*	0.43 *4*	2878.0	(1/2,3/2)$^+$	1759.9	1/2$^+$			%Iγ=0.39 *4*
1136.1[b] *3*	0.16 *3*	3574.2		2438.0	(3/2,5/2)$^-$			%Iγ=0.146 *28*
1152.53 *3*	100.0 *25*	1152.6	3/2$^-$	0.0	7/2$^-$	E2	0.00206	%Iγ=91.30 *24* α(K)=0.001743 *25*; α(L)=0.000246 *4*; α(M)=5.33×10^{-5} *8* α(N)=1.223×10^{-5} *18*; α(O)=1.88×10^{-6} *3*; α(P)=1.208×10^{-7} *17*; α(IPF)=1.781×10^{-6} *25* Mult.: from α(L)exp=0.00024 *5* (1997Wa04).
1178.6 *3*	0.11 *2*	2878.0	(1/2,3/2)$^+$	1699.5	3/2$^+$			%Iγ=0.100 *18*
1199.53 *6*	0.66 *3*	2611.7	(1/2,3/2)$^+$	1412.2	3/2$^+$			%Iγ=0.603 *31*
1243.5[&] *4*	0.20[&] *3*	2871.7		1627.9	5/2$^+$			%Iγ=0.183 *28*
1243.5[&b] *4*	[&]	4051.9	(1/2,3/2)	2808.3				
[x]1262.8 *2*	0.17 *3*							%Iγ=0.155 *28*
1285.45 *7*	0.36 *2*	2438.0	(3/2,5/2)$^-$	1152.6	3/2$^-$	M1,(E3)		%Iγ=0.329 *20* Mult.: from α(K)exp=0.0028 *8* (1997Wa04).
1292.51 *7*	1.25 *5*	1292.5	1/2$^+$	0.0	7/2$^-$	E3	0.00327	%Iγ=1.14 *5* α(K)=0.00272 *4*; α(L)=0.000424 *6*; α(M)=9.28×10^{-5} *13* α(N)=2.13×10^{-5} *3*; α(O)=3.25×10^{-6} *5*; α(P)=1.97×10^{-7} *3*; α(IPF)=5.92×10^{-6} *9* Mult.: from α(K)exp=0.0028 *3* (1997Wa04).
1319.2 *1*	0.38 *5*	2611.7	(1/2,3/2)$^+$	1292.5	1/2$^+$	M1	0.00240	%Iγ=0.35 *5* α(K)=0.00203 *3*; α(L)=0.000272 *4*; α(M)=5.87×10^{-5} *9* α(N)=1.353×10^{-5} *19*; α(O)=2.11×10^{-6} *3*; α(P)=1.458×10^{-7} *21*; α(IPF)=2.64×10^{-5} *4* Mult.: from α(K)exp=0.0025 *5* (1997Wa04) for this γ and 1319.8γ (from 2947 level).
1319.8 *3*	0.14 *3*	2947.4	(3/2,5/2)$^+$	1627.9	5/2$^+$	(M1)	0.00240	%Iγ=0.128 *28* α(K)=0.00203 *3*; α(L)=0.000272 *4*; α(M)=5.87×10^{-5} *9* α(N)=1.351×10^{-5} *19*; α(O)=2.11×10^{-6} *3*; α(P)=1.456×10^{-7} *21*; α(IPF)=2.65×10^{-5} *4* Mult.: from α(K)exp=0.0025 *5* (1997Wa04) for this γ and 1319.2γ (from 2612 level).
1324.3[&] *2*	0.18[&] *3*	2736.4	5/2$^-$	1412.2	3/2$^+$	E1	7.69×10^{-4}	%Iγ=0.164 *28* α(K)=0.000587 *9*; α(L)=7.59×10^{-5} *11*; α(M)=1.627×10^{-5} *23* α(N)=3.74×10^{-6} *6*; α(O)=5.81×10^{-7} *9*; α(P)=3.96×10^{-8} *6*; α(IPF)=8.56×10^{-5} *12* Mult.: from α(K)exp=0.0010 *8* (1997Wa04) for this γ and 1324.3γ (from 3172 level).
1324.3[&] *2*	[&]	3171.5	(1/2,3/2)$^+$	1847.1	1/2$^-$			Mult.: from α(K)exp=0.0010 *8* (1997Wa04) for this γ and 1324.3γ (from 2736 level).

$^{147}_{64}$Gd$_{83}$-5

$\gamma(^{147}Gd)$ (continued)

E_γ[‡]	I_γ[#@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[†]	Comments
[x]1368.7 *2*	0.14 *2*							%Iγ=0.128 *18*
1396.4 *4*	0.32 *3*	2808.3		1412.2	3/2+	(M1)	0.00213	%Iγ=0.292 *28* α(K)=0.001776 *25*; α(L)=0.000238 *4*; α(M)=5.14×10^{-5} *8* α(N)=1.183×10^{-5} *17*; α(O)=1.85×10^{-6} *3*; α(P)=1.276×10^{-7} *18*; α(IPF)=4.75×10^{-5} *7* Mult.: from α(K)exp=0.0019 *4* (1997Wa04); tentative because this γ is from complex line (1997Wa04).
1411.8 *3*	0.07 *2*	3171.5	(1/2,3/2)+	1759.9	1/2+			%Iγ=0.064 *18*
1415.4[b] *4*	0.20 *3*	3853.3	(3/2)	2438.0	(3/2,5/2)−	(M1)	0.00207	%Iγ=0.183 *28* α(K)=0.001721 *25*; α(L)=0.000231 *4*; α(M)=4.98×10^{-5} *7* α(N)=1.146×10^{-5} *16*; α(O)=1.79×10^{-6} *3*; α(P)=1.236×10^{-7} *18*; α(IPF)=5.36×10^{-5} *8* Mult.: from α(K)exp=0.0020 *6* (1997Wa04).
1465.75 *7*	0.82 *4*	2878.0	(1/2,3/2)+	1412.2	3/2+	M1	0.00193	%Iγ=0.75 *4* α(K)=0.001588 *23*; α(L)=0.000213 *3*; α(M)=4.59×10^{-5} *7* α(N)=1.056×10^{-5} *15*; α(O)=1.647×10^{-6} *23*; α(P)=1.140×10^{-7} *16*; α(IPF)=7.09×10^{-5} *10* Mult.: from α(K)exp=0.0017 *2* (1997Wa04).
1535.2 *1*	0.34 *2*	2947.4	(3/2,5/2)+	1412.2	3/2+	M1,E2	0.0015 *3*	%Iγ=0.310 *20* α(K)=0.00121 *22*; α(L)=0.00016 *3*; α(M)=3.5×10^{-5} *6* α(N)=8.1×10^{-6} *14*; α(O)=1.26×10^{-6} *22*; α(P)=8.6×10^{-8} *17*; α(IPF)=9.2×10^{-5} *6* Mult.: from α(K)exp=0.0012 *3* (1997Wa04).
1579.2 *1*	0.19 *3*	2871.7		1292.5	1/2+			%Iγ=0.173 *28* E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 1579.3 (Fig. 5a, 1997Wa04), probably a misprint.
1583.7 *2*	0.29 *4*	2736.4	5/2−	1152.6	3/2−	(M1)	1.67×10^{-3}	%Iγ=0.26 *4* α(K)=0.001329 *19*; α(L)=0.0001777 *25*; α(M)=3.83×10^{-5} *6* α(N)=8.81×10^{-6} *13*; α(O)=1.376×10^{-6} *20*; α(P)=9.53×10^{-8} *14*; α(IPF)=0.0001179 *17* Mult.: from α(K)exp=0.0012 *2* (1997Wa04) for this γ and 1585.6γ (from 2947 level).
1585.6 *1*	0.30 *4*	2878.0	(1/2,3/2)+	1292.5	1/2+	(M1)	1.67×10^{-3}	%Iγ=0.27 *4* α(K)=0.001326 *19*; α(L)=0.0001772 *25*; α(M)=3.82×10^{-5} *6* α(N)=8.79×10^{-6} *13*; α(O)=1.372×10^{-6} *20*; α(P)=9.50×10^{-8} *14*; α(IPF)=0.0001188 *17* Mult.: from α(K)exp=0.0012 *2* (1997Wa04) for this γ and 1583.7γ (from 2736 level).
1627.91 *6*	3.14 *12*	1627.9	5/2+	0.0	7/2−	E1	7.81×10^{-4}	%Iγ=2.87 *13* α(K)=0.000414 *6*; α(L)=5.31×10^{-5} *8*; α(M)=1.138×10^{-5} *16*

γ(^{147}Gd) (continued)

E_γ[‡]	I_γ[#@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[†]	Comments
								α(N)=2.61×10^{-6} *4*; α(O)=4.07×10^{-7} *6*; α(P)=2.80×10^{-8} *4*; α(IPF)=0.000300 *5* Mult.: from α(K)exp=0.00037 *4* (1997Wa04).
1655.7 *2*	0.21 *2*	2808.3		1152.6	3/2$^-$			%Iγ=0.192 *19*
1707.1[b] *2*	0.30 *4*	3119.0	(3/2,5/2)	1412.2	3/2$^+$	E1	8.03×10^{-4}	%Iγ=0.27 *4* α(K)=0.000382 *6*; α(L)=4.90×10^{-5} *7*; α(M)=1.050×10^{-5} *15* α(N)=2.41×10^{-6} *4*; α(O)=3.76×10^{-7} *6*; α(P)=2.58×10^{-8} *4*; α(IPF)=0.000359 *5* Mult.: from α(K)exp=0.00040 *12* (1997Wa04) for this γ, 1709.6γ (from 2862 level), and 1709.6γ (from 3122 level).
1709.6[a] *1*	0.57[a] *7*	2862.2	5/2$^+$	1152.6	3/2$^-$	E1	8.04×10^{-4}	%Iγ=0.52 *7* α(K)=0.000382 *6*; α(L)=4.89×10^{-5} *7*; α(M)=1.048×10^{-5} *15* α(N)=2.41×10^{-6} *4*; α(O)=3.75×10^{-7} *6*; α(P)=2.58×10^{-8} *4*; α(IPF)=0.000361 *5* E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 1709.5 (Fig. 5a, 1997Wa04), probably a misprint. Mult.: from α(K)exp=0.00040 *12* (1997Wa04) for this γ, 1709.6γ (from 3122 level), and 1707.1γ (from 3119 level).
1709.6[a] *1*	0.14[a] *4*	3121.7		1412.2	3/2$^+$	E1	8.04×10^{-4}	%Iγ=0.13 *4* α(K)=0.000382 *6*; α(L)=4.89×10^{-5} *7*; α(M)=1.048×10^{-5} *15* α(N)=2.41×10^{-6} *4*; α(O)=3.75×10^{-7} *6*; α(P)=2.58×10^{-8} *4*; α(IPF)=0.000361 *5* Mult.: from α(K)exp=0.00040 *12* (1997Wa04) for this γ, 1709.6γ (from 2862 level), and 1707.1γ (from 3119 level).
1718.5[b] *3*	0.17 *3*	2871.7		1152.6	3/2$^-$			%Iγ=0.155 *28* E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 1718.7 (Fig. 5a, 1997Wa04), probably a misprint.
1727.4 *3*	0.14 *3*	3574.2		1847.1	1/2$^-$			%Iγ=0.128 *28* E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 1127.4 (Fig. 5a, 1997Wa04), probably a misprint.
1907.5 *4*	0.14 *3*	3319.9		1412.2	3/2$^+$			%Iγ=0.128 *28*
[x]1912.6 *4*	0.06 *4*							%Iγ=0.05 *4*
[x]1916.3 *3*	0.20 *3*							%Iγ=0.183 *28*
1947.58 *6*	2.19 *6*	1947.6	5/2$^-$	0.0	7/2$^-$	M1	1.27×10^{-3}	%Iγ=2.00 *7* α(K)=0.000831 *12*; α(L)=0.0001104 *16*; α(M)=2.38×10^{-5} *4* α(N)=5.47×10^{-6} *8*; α(O)=8.55×10^{-7} *12*; α(P)=5.94×10^{-8} *9*; α(IPF)=0.000300 *5* Mult.: from α(K)exp=0.0019 *3* (1997Wa04).
1968.5[b]		4201.3	(1/2)	2233.2	(5/2)$^-$			
1968.6 *3*	0.10 *4*	3121.7		1152.6	3/2$^-$			%Iγ=0.09 *4*
1971.6[b] *5*	0.16 *4*	3124.5	(3/2,5/2)$^-$	1152.6	3/2$^-$			%Iγ=0.15 *4*
1986.2 *1*	0.15 *3*	3833.4	(1/2$^+$)	1847.1	1/2$^-$			%Iγ=0.137 *28*
2006.15 *8*	0.49 *2*	3853.3	(3/2)	1847.1	1/2$^-$			%Iγ=0.447 *21*
[x]2021.5 *3*	0.10 *3*							%Iγ=0.091 *27*
2027.4 *3*	0.37 *3*	3319.9		1292.5	1/2$^+$			%Iγ=0.338 *28*
2033.45 *8*	0.60 *4*	3325.9		1292.5	1/2$^+$			%Iγ=0.55 *4*
[x]2038.4 *2*	0.18 *3*							%Iγ=0.164 *28*

γ(^{147}Gd) (continued)

E_γ[‡]	I_γ[#@]	E_i(level)	J_i^π	E_f	J_f^π	Comments
2044.6 4	0.09 2	3891.7	(1/2$^+$,3/2$^-$)	1847.1	1/2$^-$	%Iγ=0.082 18
2093.5 3	0.13 3	3853.3	(3/2)	1759.9	1/2$^+$	%Iγ=0.119 28
2131.9 3	0.20 2	3891.7	(1/2$^+$,3/2$^-$)	1759.9	1/2$^+$	%Iγ=0.183 19
2165.8 3	0.16 4	3927.2		1759.9	1/2$^+$	%Iγ=0.15 4
2167.5 5	0.15 5	3319.9		1152.6	3/2$^-$	%Iγ=0.14 5
2173.2 4	0.18 3	3325.9		1152.6	3/2$^-$	%Iγ=0.164 28
2193.1[b] 4	0.08 2	3891.7	(1/2$^+$,3/2$^-$)	1699.5	3/2$^+$	%Iγ=0.073 18
2197.1 2	0.21 2	4144.5	(1/2$^-$)	1947.6	5/2$^-$	%Iγ=0.192 19
2205.54 7	0.50 2	3833.4	(1/2$^+$)	1627.9	5/2$^+$	%Iγ=0.457 21
2225.8 3	0.09 2	4073.6		1847.1	1/2$^-$	%Iγ=0.082 18
2233.17 4	0.72 3	2233.2	(5/2)$^-$	0.0	7/2$^-$	%Iγ=0.657 31
^{x}2258.3 2	0.09 3					%Iγ=0.082 27
2263.8 3	0.15 2	3891.7	(1/2$^+$,3/2$^-$)	1627.9	5/2$^+$	%Iγ=0.137 19
^{x}2329.0[a] 1	0.12[a] 6					%Iγ=0.11 5
2329.0[a] 1	0.45[a] 7	2329.0	(5/2,7/2)	0.0	7/2$^-$	%Iγ=0.41 6
2354.2 9	0.12 3	4201.3	(1/2)	1847.1	1/2$^-$	%Iγ=0.110 28
2374.1 1	0.39 4	4073.6		1699.5	3/2$^+$	%Iγ=0.36 4
2418.2[b] 3	0.11 3	4117.6?		1699.5	3/2$^+$	%Iγ=0.100 27
2421.0[a] 4	0.6[a] 2	3574.2		1152.6	3/2$^-$	%Iγ=0.55 18 E_γ: this value in Table 1, 2421.2 in Fig. 5a. E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 2421.2 (Fig. 5a, 1997Wa04), probably a misprint.
2421.0[a] 4	0.48[a] 6	3833.4	(1/2$^+$)	1412.2	3/2$^+$	%Iγ=0.44 6
2422.8 2	0.14 9	3715.5	(1/2,3/2)$^-$	1292.5	1/2$^+$	%Iγ=0.13 8
2432.6[b] 2	0.21 2	4132.4	(1/2,3/2)	1699.5	3/2$^+$	%Iγ=0.192 19
2438.02 6	1.06 4	2438.0	(3/2,5/2)$^-$	0.0	7/2$^-$	%Iγ=0.97 4
2444.4 9	0.30 5	4144.5	(1/2$^-$)	1699.5	3/2$^+$	%Iγ=0.27 5
^{x}2481.6 1	0.26 3					%Iγ=0.237 28
^{x}2486.5 3	0.29 3					%Iγ=0.265 28
2489.6[&b] 2	[&]	4117.6?		1627.9	5/2$^+$	
2489.6[&b] 2	0.22[&] 3	4249.7	(1/2,3/2)	1759.9	1/2$^+$	%Iγ=0.201 28 E_γ: this value in Table 1, 2489.5 in Fig. 5a.
2560.8 2	0.38 6	3853.3	(3/2)	1292.5	1/2$^+$	%Iγ=0.35 6
2562.9 1	1.96 10	3715.5	(1/2,3/2)$^-$	1152.6	3/2$^-$	%Iγ=1.79 10
2580.8 1	0.20 3	4280.4	(1/2,3/2)	1699.5	3/2$^+$	%Iγ=0.183 28
2586.6 1	0.15 3	3998.8		1412.2	3/2$^+$	%Iγ=0.137 28
2610.0 5	0.06 2	4369.9	(1/2,3/2)	1759.9	1/2$^+$	%Iγ=0.055 18
2639.7 4	0.13 2	4051.9	(1/2,3/2)	1412.2	3/2$^+$	%Iγ=0.119 18
^{x}2643.0 2	0.25 3					%Iγ=0.228 28
2661.4 2	0.14 2	4073.6		1412.2	3/2$^+$	%Iγ=0.128 18
2680.77 6	3.90 12	3833.4	(1/2$^+$)	1152.6	3/2$^-$	%Iγ=3.56 14
^{x}2702.1 3	0.12 2					%Iγ=0.110 18

$^{147}_{64}$Gd$_{83}$-8

$\gamma(^{147}Gd)$ (continued)

E_γ[‡]	I_γ[#@]	E_i(level)	J^π_i	E_f	J^π_f	Comments
2706.2 *2*	0.20 *2*	3998.8		1292.5	$1/2^+$	%Iγ=0.183 *19*
[x]2716.5 *3*	0.13 *2*					%Iγ=0.119 *18*
2719.9 *2*	0.11 *2*	4132.4	(1/2,3/2)	1412.2	$3/2^+$	%Iγ=0.100 *18*
2732.3 *1*	0.35 *2*	4144.5	$(1/2^-)$	1412.2	$3/2^+$	%Iγ=0.320 *20*
2738.9[b] *2*	0.14 *2*	3891.7	$(1/2^+,3/2^-)$	1152.6	$3/2^-$	%Iγ=0.128 *18*
2759.45 *8*	0.79 *3*	4051.9	(1/2,3/2)	1292.5	$1/2^+$	%Iγ=0.721 *32*
2764.4 *1*	0.26 *3*	4176.7	(1/2,3/2)	1412.2	$3/2^+$	%Iγ=0.237 *28*
2775.3 *2*	0.12 *2*	3927.2		1152.6	$3/2^-$	%Iγ=0.110 *18*
2789.08 *8*	0.54 *3*	4201.3	(1/2)	1412.2	$3/2^+$	%Iγ=0.493 *30*
2815.19 *8*	0.49 *2*	3967.8		1152.6	$3/2^-$	%Iγ=0.447 *21*
2837.8 *3*	0.26 *4*	4249.7	(1/2,3/2)	1412.2	$3/2^+$	%Iγ=0.24 *4*
2840.1 *2*	0.60 *6*	4132.4	(1/2,3/2)	1292.5	$1/2^+$	%Iγ=0.55 *6*
2852.00 *8*	0.55 *3*	4144.5	$(1/2^-)$	1292.5	$1/2^+$	%Iγ=0.502 *30*
[x]2865.6 *3*	0.08 *2*					%Iγ=0.073 *18*
[x]2896.6 *4*	0.14 *3*					%Iγ=0.128 *28*
2908.8 *1*	0.29 *2*	4201.3	(1/2)	1292.5	$1/2^+$	%Iγ=0.265 *19*
2921.4[b] *2*	0.13 *3*	4073.6		1152.6	$3/2^-$	%Iγ=0.119 *28*
2957.1 *2*	0.14 *3*	4249.7	(1/2,3/2)	1292.5	$1/2^+$	%Iγ=0.128 *28*
[x]2961.5 *2*	0.06 *2*					%Iγ=0.055 *18*
2979.5[b] *2*	0.13 *3*	4132.4	(1/2,3/2)	1152.6	$3/2^-$	%Iγ=0.119 *28*
[x]2991.8 *1*	0.41 *3*					%Iγ=0.374 *29*
2991.8 *1*	0.41 *3*	4144.5	$(1/2^-)$	1152.6	$3/2^-$	%Iγ=0.374 *29*
3007.2 *1*	0.38 *3*	4299.7	(1/2)	1292.5	$1/2^+$	%Iγ=0.347 *29*
3018.8[b] *4*	0.11 *2*	4431.4?	(1/2)	1412.2	$3/2^+$	%Iγ=0.100 *18*
3024.1 *1*	0.36 *2*	4176.7	(1/2,3/2)	1152.6	$3/2^-$	%Iγ=0.329 *20*
3048.6 *1*	0.25 *1*	4201.3	(1/2)	1152.6	$3/2^-$	%Iγ=0.228 *11*
[x]3068.3 *2*	0.10 *2*					%Iγ=0.091 *18*
[x]3082.6 *3*	0.12 *2*					%Iγ=0.110 *18*
3119.0 *2*	0.27 *1*	3119.0	(3/2,5/2)	0.0	$7/2^-$	%Iγ=0.247 *11*
3124.5 *3*	0.23 *2*	3124.5	$(3/2,5/2)^-$	0.0	$7/2^-$	%Iγ=0.210 *19* E_γ: from Table 1 (Gamma transitions in ^{147}Gd, 1997Wa04); it differs from 3124.2 (Fig. 5a, 1997Wa04), probably a misprint.
3128.3 *4*	0.21 *2*	4280.4	(1/2,3/2)	1152.6	$3/2^-$	%Iγ=0.192 *19*
3139.0[b] *3*	0.06 *1*	4431.4?	(1/2)	1292.5	$1/2^+$	%Iγ=0.055 *9*
3147.2 *2*	0.13 *2*	4299.7	(1/2)	1152.6	$3/2^-$	%Iγ=0.119 *18*
[x]3169.0 *4*	0.16 *3*					%Iγ=0.146 *28*
[x]3192.6 *4*	0.06 *2*					%Iγ=0.055 *18*
3217.5[b] *4*	0.08 *2*	4369.9	(1/2,3/2)	1152.6	$3/2^-$	%Iγ=0.073 *18*
[x]3267.5 *3*	0.06 *1*					%Iγ=0.055 *9*
3279.4[b] *2*	0.14 *2*	4431.4?	(1/2)	1152.6	$3/2^-$	%Iγ=0.128 *18*
[x]3304.7 *3*	0.022 *8*					%Iγ=0.020 *7*
[x]3317.9 *2*	0.09 *1*					%Iγ=0.082 *9*

$\gamma(^{147}$Gd) (continued)

† Additional information 3.
‡ From 1997Wa04.
# Relative to 1153γ.
@ For absolute intensity per 100 decays, multiply by 0.913 *21*.
& Multiply placed with undivided intensity.
^{a} Multiply placed with intensity suitably divided.
^{b} Placement of transition in the level scheme is uncertain.
^{x} γ ray not placed in level scheme.

$^{147}_{64}$Gd$_{83}$-10

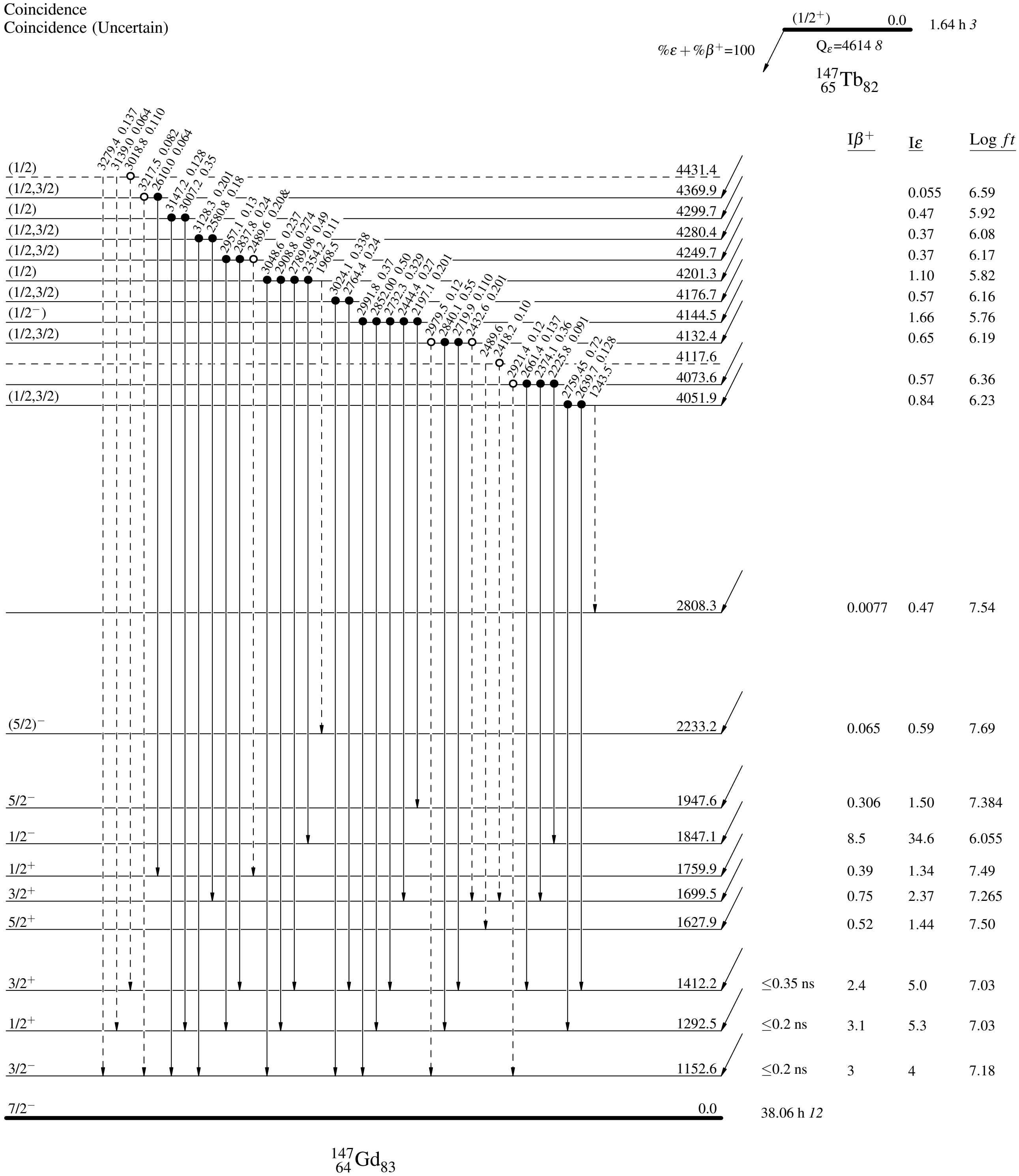
^{147}Tb ε decay (1.64 h) 1997Wa04

Legend

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given

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



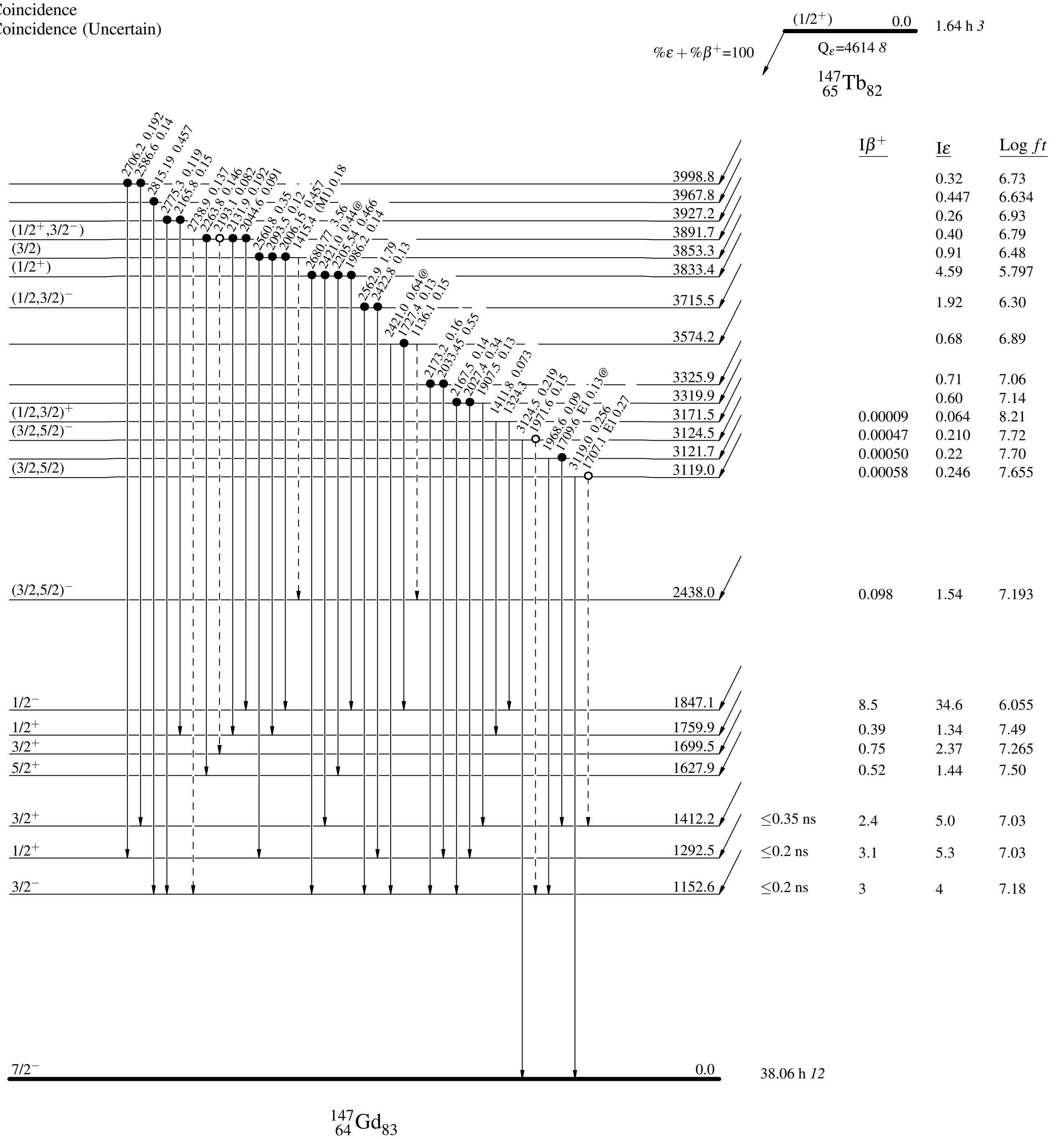
^{147}Tb ε decay (1.64 h) 1997Wa04

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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)
- Coincidence
- Coincidence (Uncertain)



Jπ	Level	T1/2	Iβ+	Iε	Log ft
	3998.8			0.32	6.73
	3967.8			0.447	6.634
	3927.2			0.26	6.93
(1/2+,3/2−)	3891.7			0.40	6.79
(3/2)	3853.3			0.91	6.48
(1/2+)	3833.4			4.59	5.797
(1/2,3/2)−	3715.5			1.92	6.30
	3574.2			0.68	6.89
	3325.9			0.71	7.06
	3319.9			0.60	7.14
(1/2,3/2)+	3171.5		0.00009	0.064	8.21
(3/2,5/2)−	3124.5		0.00047	0.210	7.72
	3121.7		0.00050	0.22	7.70
(3/2,5/2)	3119.0		0.00058	0.246	7.655
(3/2,5/2)−	2438.0		0.098	1.54	7.193
1/2−	1847.1		8.5	34.6	6.055
1/2+	1759.9		0.39	1.34	7.49
3/2+	1699.5		0.75	2.37	7.265
5/2+	1627.9		0.52	1.44	7.50
3/2+	1412.2	≤0.35 ns	2.4	5.0	7.03
1/2+	1292.5	≤0.2 ns	3.1	5.3	7.03
3/2−	1152.6	≤0.2 ns	3	4	7.18
7/2−	0.0	38.06 h 12			

^{147}Tb ε decay (1.64 h) 1997Wa04

Decay Scheme (continued)

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)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided