^{140}Tb ε decay 1991Fi03,2000Xu08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154, 1 (2018)	20-Nov-2018

Parent: ^{140}Tb: E=0.0; $J^\pi=(7^+)$; $T_{1/2}$=2.29 s *15*; Q(ε)=11.3×10^3 *8*; %ε+%$β^+$ decay=100.0

^{140}Tb-E,J^π,$T_{1/2}$: from ^{140}Tb Adopted Levels.

^{140}Tb-Q(ε): from 2017Wa10.

^{140}Tb-%ε+%$β^+$ decay: Observed proton emission with p/ε=0.0026 *13* (1991Fi03); other value: p/ε=0.007 *2* (were observed coin p-K x ray(Gd)) (1988GiZV). E(p)=2.2-6.6 MeV, E(p)(av)=4.2 MeV (1986Wi15).

1991Fi03: 97% enriched ^{92}Mo(HI,xpyn), HI= 312 MeV ^{54}Fe and 244 MeV ^{52}Cr at LBL SuperHILAC with OASIS mass separator and tape transport. Detector array: Si ΔE-E, HPGe, 2 n-type Ge, 1-mm plastic scintillator. Measured coin particle, γ, K X-ray, and $β^+$ in event-by-event mode with tagged time signal ($T_{1/2}$).

2000Xu08: 2.5 mg/cm^2 self-supported 75% enriched ^{106}Cd(^{36}Ar^{11+},pn) at SCF accelerator, Lanzhou; 1 atm He reaction chamber; He jet plus tape transport. Detector array: 2 HPGe(GMX) for <2 MeV γ spectra, HPGe planar for X-rays. Measured γγ(t), Xγ(t).

Level scheme is from 2000Xu08 and is incomplete.

^{140}Gd Levels

E(level)	J^π †	$T_{1/2}$	Comments
0.0‡	0^+	15.8 s *4*	%ε+%$β^+$=100 %ε+%$β^+$: from Adopted Levels. $T_{1/2}$: from 1991Fi03.
328.74‡ *16*	2^+		
713.76# *16*	(2^+)		
836.5‡ *3*	4^+		
1068.75# *20*	(3^+)		
1281.9# *3*	(4^+)		
1464.5‡ *4*	6^+		
1694.2# *3*	(5^+)		
1882.1# *4*	(6^+)		
2140.4‡ *4*	8^+		
2412.2# *4*	(7^+)		

† Adopted values.
‡ Band(A): yrast g.s. band.
# Band(B): K=2^+ γ-vibrational band.

ε,$β^+$ radiations

E(decay)	E(level)	I$β^+$ ‡	Iε‡	Log *ft*†	I(ε+$β^+$)†‡	Comments
(8.9×10^3 *8*)	2412.2	13 *5*	0.6 *3*	5.4 *3*	14 *5*	av Eβ=3.66×10^3 *39*; εK=0.037 *13*; εL=0.0054 *19*; εM+=0.0016 *6*
(9.2×10^3 *8*)	2140.4	17 *6*	0.7 *3*	5.4 *3*	18 *6*	av Eβ=3.80×10^3 *39*; εK=0.034 *12*; εL=0.0049 *17*; εM+=0.0014 *5*
(9.4×10^3 *8*)	1882.1	19 *9*	0.7 *4*	5.4 *3*	20 *9*	av Eβ=3.92×10^3 *39*; εK=0.031 *10*; εL=0.0045 *15*; εM+=0.0013 *5*
(9.6×10^3# *8*)	1694.2	≤2	≤0.07	≥6.4	≤2	av Eβ=4.01×10^3 *39*; εK=0.029 *9*; εL=0.0043 *14*; εM+=0.0012 *4*
(9.8×10^3 *8*)	1464.5	25 *10*	0.8 *4*	5.4 *3*	26 *10*	av Eβ=4.12×10^3 *39*; εK=0.027 *9*; εL=0.0040 *12*; εM+=0.0011 *4*

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^{140}Tb ε decay 1991Fi03,2000Xu08 (continued)

ε,β+ radiations (continued)

† Calculated by evaluator based on I(ε+β+) from GTOL. The level scheme is incomplete.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{140}Gd)

Iγ normalization: From ΣIγ(1+α)(to g.s.)+εp=100.

E_γ	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α#	Comments
328.7 *2*	100	328.74	2^+	0.0	0^+	E2	0.0456	%Iγ=84 *3* α(K)=0.0354 *5*; α(L)=0.00797 *12*; α(M)=0.00180 *3*; α(N+..)=0.000468 *7* α(N)=0.000407 *6*; α(O)=5.83×10^{-5} *9*; α(P)=2.25×10^{-6} *4*
355.0 *2*	16 *6*	1068.75	(3^+)	713.76	(2^+)	(M1+E2)	0.049 *13*	%Iγ=13 *5* α(K)=0.040 *12*; α(L)=0.0067 *6*; α(M)=0.00148 *11*; α(N+..)=0.00039 *4* α(N)=0.00034 *3*; α(O)=5.1×10^{-5} *6*; α(P)=2.8×10^{-6} *10*
385.0 *2*	22 *5*	713.76	(2^+)	328.74	2^+	(M1+E2)	0.039 *11*	%Iγ=19 *4* α(K)=0.032 *10*; α(L)=0.0053 *7*; α(M)=0.00116 *12*; α(N+..)=0.00031 *4* α(N)=0.00026 *3*; α(O)=4.0×10^{-5} *6*; α(P)=2.3×10^{-6} *8*
507.8 *2*	57 *13*	836.5	4^+	328.74	2^+	(E2)	0.01340	%Iγ=48 *24* α(K)=0.01091 *16*; α(L)=0.00194 *3*; α(M)=0.000431 *6*; α(N+..)=0.0001134 *16* α(N)=9.82×10^{-5} *14*; α(O)=1.453×10^{-5} *21*; α(P)=7.33×10^{-7} *11*
568.1 *2*	18 *7*	1281.9	(4^+)	713.76	(2^+)	(E2)	0.01004	%Iγ=15 *5* α(K)=0.00825 *12*; α(L)=0.001403 *20*; α(M)=0.000310 *5*; α(N+..)=8.18×10^{-5} *12* α(N)=7.07×10^{-5} *10*; α(O)=1.054×10^{-5} *15*; α(P)=5.59×10^{-7} *8*
600.2 *2*	24 *10*	1882.1	(6^+)	1281.9	(4^+)	(E2)	0.00876	%Iγ=20 *7* α(K)=0.00722 *11*; α(L)=0.001203 *17*; α(M)=0.000265 *4*; α(N+..)=7.01×10^{-5} *10* α(N)=6.05×10^{-5} *9*; α(O)=9.05×10^{-6} *13*; α(P)=4.91×10^{-7} *7*
625.4 *2*	18 *7*	1694.2	(5^+)	1068.75	(3^+)	(E2)	0.00792	%Iγ=15 *5* α(K)=0.00654 *10*; α(L)=0.001074 *15*; α(M)=0.000236 *4*; α(N+..)=6.25×10^{-5} *9* α(N)=5.40×10^{-5} *8*; α(O)=8.10×10^{-6} *12*; α(P)=4.46×10^{-7} *7*
628.0 *2*	52 *9*	1464.5	6^+	836.5	4^+	(E2)	0.00784	%Iγ=44 *3* α(K)=0.00648 *9*; α(L)=0.001062 *15*; α(M)=0.000234 *4*; α(N+..)=6.18×10^{-5} *9* α(N)=5.34×10^{-5} *8*; α(O)=8.01×10^{-6} *12*; α(P)=4.42×10^{-7} *7*
675.9 *2*	21 *6*	2140.4	8^+	1464.5	6^+	(E2)	0.00657	%Iγ=18 *5* α(K)=0.00546 *8*; α(L)=0.000873 *13*; α(M)=0.000192 *3*; α(N+..)=5.08×10^{-5} *8*

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^{140}Tb ε decay 1991Fi03,2000Xu08 (continued)

γ(^{140}Gd) (continued)

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	Comments
								α(N)=4.38×10^{-5} *7*; α(O)=6.60×10^{-6} *10*; α(P)=3.74×10^{-7} *6*
713.8 *2*	14 *4*	713.76	(2$^+$)	0.0	0$^+$			%Iγ=12 *3*
718.0 *2*	16 *6*	2412.2	(7$^+$)	1694.2	(5$^+$)	(E2)	0.00570	%Iγ=13 *5* α(K)=0.00475 *7*; α(L)=0.000746 *11*; α(M)=0.0001635 *23*; α(N+..)=4.34×10^{-5} *6* α(N)=3.74×10^{-5} *6*; α(O)=5.65×10^{-6} *8*; α(P)=3.26×10^{-7} *5*
740.0 *2*	10 *3*	1068.75	(3$^+$)	328.74	2$^+$	(M1+E2)	0.0074 *21*	%Iγ=8 *24* α(K)=0.0063 *19*; α(L)=0.00090 *21*; α(M)=0.00020 *5*; α(N+..)=5.2×10^{-5} *12* α(N)=4.5×10^{-5} *11*; α(O)=6.9×10^{-6} *17*; α(P)=4.5×10^{-7} *14*

[†] Adopted values.

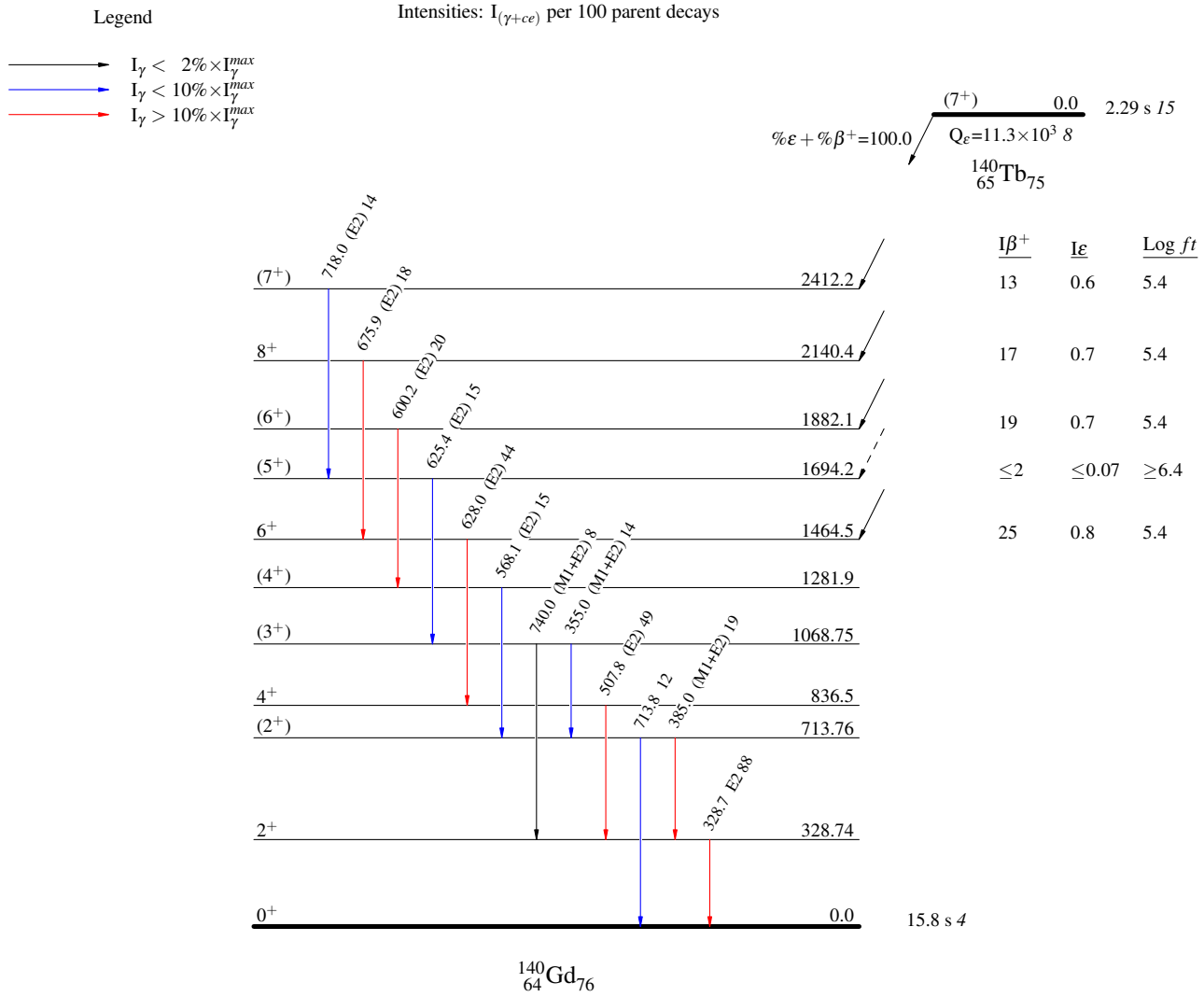
[‡] For absolute intensity per 100 decays, multiply by 0.84 *3*.

[#] 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.

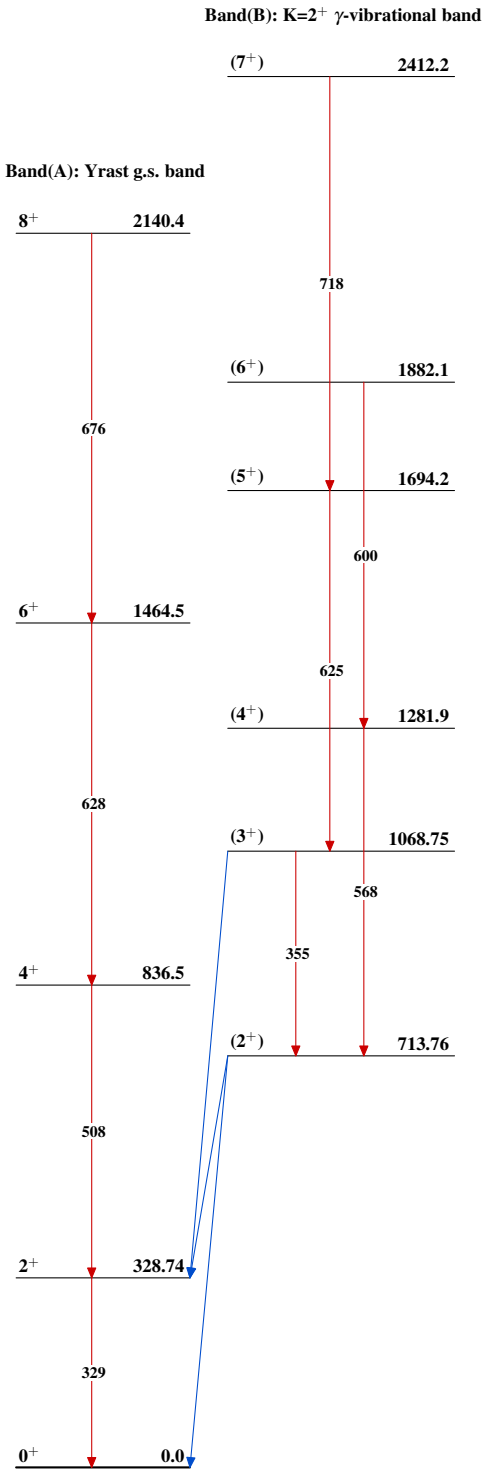
^{140}Tb ε decay 1991Fi03,2000Xu08

Decay Scheme

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



^{140}Tb ε decay 1991Fi03,2000Xu08



$^{140}_{64}Gd_{76}$