^{162}Tm $\varepsilon+\beta^+$ decay (24.3 s) 1974De47

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 195,1 (2024)	19-Sep-2023

Parent: ^{162}Tm: E=x; $J^\pi=5^+$; $T_{1/2}$=24.3 s *17*; Q(ε)=4857 *26*; %ε+%β^+ decay=17.5 *34*

^{162}Tm-E: x=129 *62*, deduced from the upper limit (125 keV) on the energy of the isomeric transition and the fact that it feeds the 2^- level at 66.9 keV in ^{162}Tm. Numeric value is not adopted because its high uncertainty would make senseless the band levels built on this isomeric state (see ^{162}Tm Adopted Levels, Gammas dataset).

^{162}Tm-E: Additional information 1.

^{162}Tm-J^π: Additional information 2.

^{162}Tm-$T_{1/2}$: From 1974De47.

^{162}Tm-Q(ε): From 2021Wa16.

^{162}Tm-%ε+%β^+ decay: The 24-s ^{162}Tm level decays by IT decay and by this $\varepsilon+\beta^+$ decay mode. The total intensity of the IT decay is assumed to proceed through a 66-keV γ which has M1+<40% E2 character (1974De47); and the total intensity of the ε decay is represented by the sum I(γ+ce)(227)+I(γ+ce)(102), replaced by evaluator with its more precise estimate, I(γ+ce)(227)+I(γ+ce)(798)+I(γ+ce)(899)+I(γ+ce)(900). In the Iγ units used here and in 1974De47, the IT decay is 1287 193 units, and the ε decay intensity is 274 *50*. This branching is 274/(1287+274)=0.175 *34*. This differs from the value 0.102 *22* reported by 1974De47.

Additional information 3.

Data are from 1974De47, unless otherwise noted.

The level scheme is incomplete and consequently a definite normalization together with all data derived from it were not explicitly adopted for this decay. However all the values calculated from the presently known data are listed in comments in order to give some insight of the decay scheme and guide future more thorough studies.

^{162}Er Levels

E(level)†	J^π‡	Comments
0.0#	0^+	
102.00# *3*	2^+	
329.53# *5*	4^+	
667.03# *18*	6^+	
900.66@ *6*	2^+	
1001.90@ *7*	3^+	
1128.50@ *25*	4^+	
1712.09& *10*	4^+	Bandhead of a $K^\pi=4^+$ band. log *ft* ≈ 4.6 for the ε transition from the 5^+ level in ^{162}Tm establishes the presence of the neutron orbital 5/2[523] in this state. The dominant configuration is (ν 5/2[523]+ν 3/2[521]). 1994Bu16 propose that this state is a hexadecapole vibration.

† Computed from a least-squares fit to the listed Eγ values.

‡ From ^{162}Er Adopted Levels.

\# Band(A): $K^\pi=0^+$ ground-state band.

@ Band(B): $K^\pi=2^+$ γ-vibrational band.

& Band(C): $K^\pi=4^+$ band. Configuration=(ν 5/2[523])+(ν 3/2[521]).

ε,β^+ radiations

I($\varepsilon+\beta^+$): values computed from γ transition-intensity balances at levels having $J^\pi=4^+,5^+$ or 6^+. Other $\varepsilon+\beta^+$ transitions are not expected and their intensities were set equal to zero. The only substantial imbalance is at the 900-keV, 2^+ level, where the computed I($\varepsilon+\beta^+$)=2.8% *14* of the $\varepsilon+\beta^+$ decays.

Values of I($\varepsilon+\beta^+$) in comments are given as percent of total decays of the 24.3-s ^{162}Tm parent.

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^{162}Tm ε+β$^+$ decay (24.3 s) 1974De47 (continued)

ε,β$^+$ radiations (continued)

E(decay)[†]	E(level)	Comments
3.27×10^3 *7*	1712.09	av Eβ=1017 *31*; εK=0.598 *16*; εL=0.0918 *25*; εM+=0.0273 *8* I(ε+β$^+$)=10 *3*, log *ft*=4.6 *2*.
3.86×10^3 *7*	1128.50	av Eβ=1282 *31*; εK=0.465 *15*; εL=0.0711 *23*; εM+=0.0211 *7* I(ε+β$^+$)=0.2 *12*, log *ft*=7 *3*.
4.09×10^3 *7*	900.66	av Eβ=1387 *31*; εK=0.417 *14*; εL=0.0637 *22*; εM+=0.0189 *7*
4.32×10^3 *7*	667.03	av Eβ=1494 *31*; εK=0.372 *13*; εL=0.0567 *20*; εM+=0.0168 *6* I(ε+β$^+$)=1.7 *6*, log *ft*=5.9 *2*.
4.66×10^3 *7*	329.53	av Eβ=1650 *32*; εK=0.314 *11*; εL=0.0478 *17*; εM+=0.0142 *5* I(ε+β$^+$)=3 *4*, log *ft*>5.1.

[†] Calculated with x=129 *62* for the parent ε-decay level (see above comment at Parent: ^{162}Tm).

γ(^{162}Er)

Iγ normalization: Additional information 5.

Iγ normalization: 0.37 *7* from I(γ+ce)(227)+I(γ+ce)(798)+I(γ+ce)(899)+I(γ+ce)(900)=274 *50* Iγ units=100% of the ε+β$^+$ decay of the ^{162}Tm isomeric parent level (I(γ+ce)(227)+I(γ+ce)(798)+I(γ+ce)(899) subsitutes I(γ+ce)(102) which is less precise). For absolute intensity per 100 decays one can multiply by 0.065 *18*, which however it is not adopted because of the incompleteness of the level scheme.

E_γ	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[&]	Comments
102.00 *3*	40 *20*	102.00	2$^+$	0.0	0$^+$	E2	2.73 *4*	α(K)=1.026 *14*; α(L)=1.305 *18*; α(M)=0.317 *4* α(N)=0.0718 *10*; α(O)=0.00844 *12*; α(P)=4.27×10^{-5} *6*
227.52[a] *3*	77[a] *40*	329.53	4$^+$	102.00	2$^+$	E2	0.1647 *23*	α(K)=0.1115 *16*; α(L)=0.0410 *6*; α(M)=0.00972 *14* α(N)=0.002217 *31*; α(O)=0.000277 *4*; α(P)=5.41×10^{-6} *8*
(227.52[#a])	[a]	1128.50	4$^+$	900.66	2$^+$	[E2]	0.1647 *23*	α(K)=0.1115 *16*; α(L)=0.0410 *6*; α(M)=0.00972 *14* α(N)=0.002217 *31*; α(O)=0.000277 *4*; α(P)=5.41×10^{-6} *8* I_γ: a portion of the intensity of the 227γ from the 329 level may belong to this transition.
337.52 *18*	25 *5*	667.03	6$^+$	329.53	4$^+$	(E2)	0.0486 *7*	α(K)=0.0365 *5*; α(L)=0.00936 *13*; α(M)=0.002178 *31* α(N)=0.000499 *7*; α(O)=6.50×10^{-5} *9*; α(P)=1.917×10^{-6} *27*
^{x}345.4 *6*	10 *3*							
^{x}354.6 *6*	9 *3*							
^{x}453.0 *6*	10 *4*							
(461.5[#] *2*)	0.415[@] *30*	1128.50	4$^+$	667.03	6$^+$	[E2]	0.02027 *28*	α(K)=0.01599 *22*; α(L)=0.00332 *5*; α(M)=0.000761 *11* α(N)=0.0001754 *25*; α(O)=2.355×10^{-5} *33*; α(P)=8.78×10^{-7} *12*
^{x}477.9 *6*	10 *4*							
(571.2[#] *4*)	1.8[@] *13*	900.66	2$^+$	329.53	4$^+$	[E2]	0.01177 *17*	α(K)=0.00950 *13*; α(L)=0.001765 *25*; α(M)=0.000400 *6* α(N)=9.25×10^{-5} *13*; α(O)=1.266×10^{-5} *18*; α(P)=5.31×10^{-7} *7*

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^{162}Tm $\varepsilon+\beta^+$ decay (24.3 s) 1974De47 (continued)

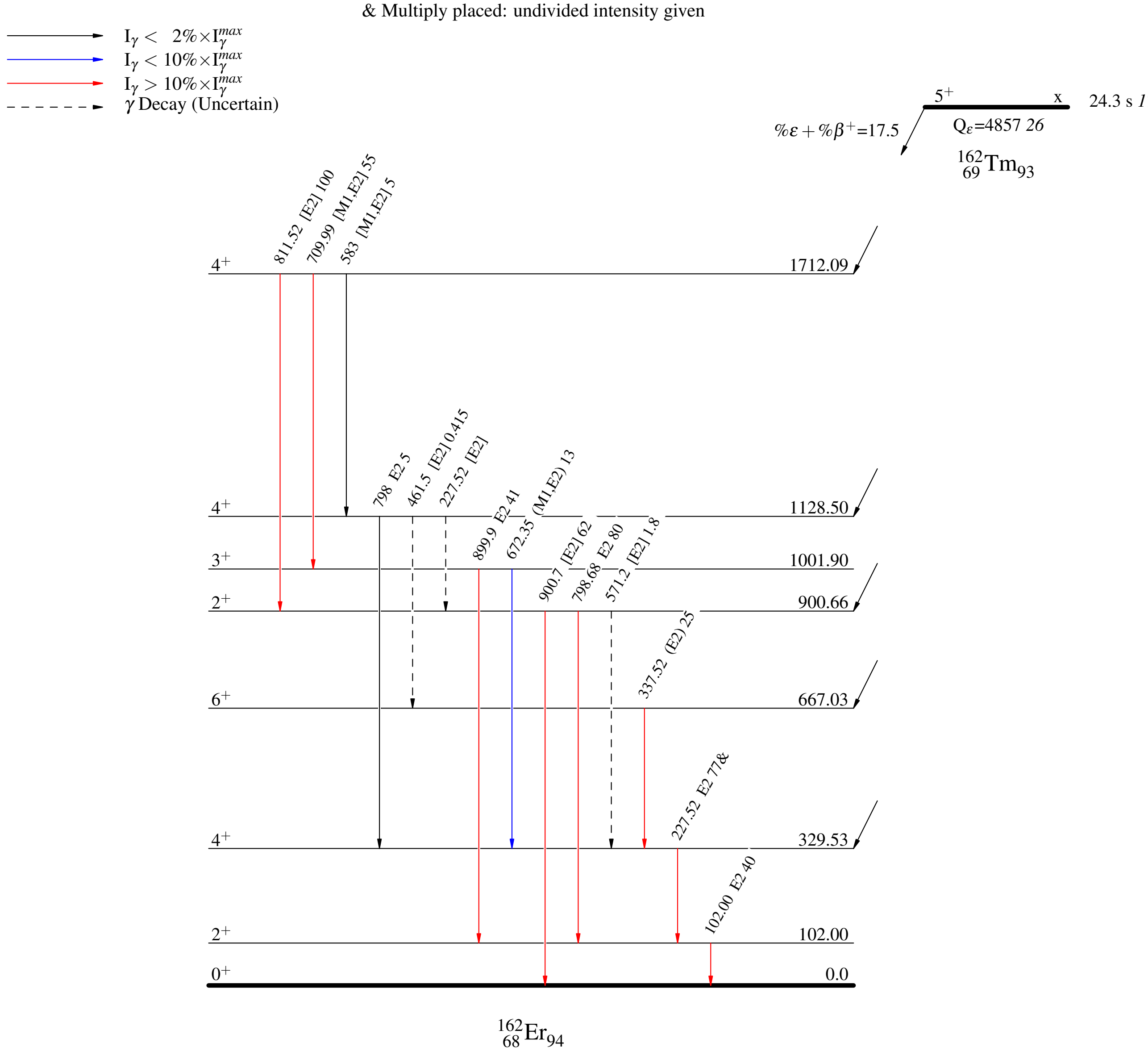
$\gamma(^{162}Er)$ (continued)

E_γ	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[&]	Comments
583 *1*	5 *3*	1712.09	4+	1128.50	4+	[M1,E2]	0.017 *6*	α(K)=0.014 *5*; α(L)=0.0023 *6*; α(M)=5.0×10⁻⁴ *13* α(N)=1.17×10⁻⁴ *30*; α(O)=1.7×10⁻⁵ *5*; α(P)=8.5×10⁻⁷ *35*
672.35 *5*	13 *12*	1001.90	3+	329.53	4+	(M1,E2)	0.012 *4*	α(K)=0.010 *4*; α(L)=0.0016 *4*; α(M)=3.5×10⁻⁴ *9* α(N)=8.1×10⁻⁵ *22*; α(O)=1.15×10⁻⁵ *34*; α(P)=6.0×10⁻⁷ *23*
709.99 *15*	55 *4*	1712.09	4+	1001.90	3+	[M1,E2]	0.011 *4*	α(K)=0.0090 *32*; α(L)=0.0014 *4*; α(M)=3.0×10⁻⁴ *8* α(N)=7.0×10⁻⁵ *19*; α(O)=1.00×10⁻⁵ *29*; α(P)=5.3×10⁻⁷ *20*
[x]713.2 *7*	11 *4*							
798 *1*	5 *1*	1128.50	4+	329.53	4+	E2	0.00542 *8*	α(K)=0.00449 *6*; α(L)=0.000731 *10*; α(M)=0.0001637 *23* α(N)=3.79×10⁻⁵ *5*; α(O)=5.32×10⁻⁶ *8*; α(P)=2.55×10⁻⁷ *4*
798.68 *5*	80 *10*	900.66	2+	102.00	2+	E2	0.00541 *8*	α(K)=0.00448 *6*; α(L)=0.000729 *10*; α(M)=0.0001633 *23* α(N)=3.79×10⁻⁵ *5*; α(O)=5.31×10⁻⁶ *7*; α(P)=2.54×10⁻⁷ *4*
811.52 *10*	100 *7*	1712.09	4+	900.66	2+	[E2]	0.00523 *7*	α(K)=0.00433 *6*; α(L)=0.000701 *10*; α(M)=0.0001570 *22* α(N)=3.64×10⁻⁵ *5*; α(O)=5.11×10⁻⁶ *7*; α(P)=2.457×10⁻⁷ *34*
899.9 *4*	41 *9*	1001.90	3+	102.00	2+	E2	0.00419 *6*	α(K)=0.00348 *5*; α(L)=0.000548 *8*; α(M)=0.0001222 *17* α(N)=2.84×10⁻⁵ *4*; α(O)=4.00×10⁻⁶ *6*; α(P)=1.982×10⁻⁷ *28*
900.7 *4*	62 *13*	900.66	2+	0.0	0+	[E2]	0.00418 *6*	α(K)=0.00348 *5*; α(L)=0.000547 *8*; α(M)=0.0001220 *17* α(N)=2.83×10⁻⁵ *4*; α(O)=3.99×10⁻⁶ *6*; α(P)=1.978×10⁻⁷ *28*

† Pairs of γ's at 798 (Iγ=85 *10*) and 900 keV (Iγ=103 *20*) are unresolved in γ singles, but their intensities were deduced (1974De47) on the basis of coincidence data from the ^{162}Tm ε decay (22 min). The uncertainties were assigned by the evaluator.
‡ From ^{162}Er Adopted γ radiations and based on data of 1963Ab02, 1965Ab05, 1974De47, 1975St12, and 1987BaZB or, if in square brackets, deduced from associated J^π values.
# From ^{162}Er Adopted γ radiations.
@ Estimated by the evaluator from adopted branching ratios and Iγ of highest intensity γ ray of this level.
& Additional information 4.
a Multiply placed with undivided intensity.
x γ ray not placed in level scheme.

^{162}Tm ε decay (24.3 s) 1974De47

Decay Scheme



^{162}Tm ε decay (24.3 s) 1974De47