^{155}Tm ε decay (21.6 s) 1991To08,1977Ag01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Parent: ^{155}Tm: E=0.0; $J^\pi=11/2^-$; $T_{1/2}$=21.6 s *2*; Q(ε)=5583 *12*; %ε+%$β^+$ decay=99.17 *16*

Additional information 1.

1991To08: sources with mass 155 were produced in the ^{95}Mo+^{64}Zn reaction, followed by mass separation and transport to detection systems. Si particle ΔE-E telescope, plastic scintillator, HPGE and Ge detectors. Measured Eα, Eγ, Iγ, γγ, γX, αγ, γ(t).

1977Ag01: source produced by the (p,xn) reaction in natural Er, followed by on-line mass separation. Measured γ and ce spectra and γ-γ coincidences.

The level scheme is probably incomplete and thus no deduced ε+$β^+$ intensities are listed, as they may be larger than the true ones. However, a Iγ normalization value is given, based on the summed γ+ce feeding of the g.s.; and this has been used to compute a %α value for the 21.6 s activity in ^{155}Tm. To the extent that some of the unplaced γ′s feed the g.s., this %α value may be larger that the true one (see the comment on this value in the ^{155}Tm Adopted Levels, Gammas Data Set).

^{155}Er Levels

E(level)†	J^π‡	Comments
0.0	$7/2^-$	
88.16 *11*	$5/2^-$,$7/2^-$,$9/2^-$	
151.98@ *9*	−	
226.79 *17*	$9/2^-$	J^π: probable Gamow-Teller transition from $11/2^-$ in ^{155}Tm establishes configuration=(ν $h_{9/2}$) for this state.
399.58@ *22*		
467.22@ *23*	−	
531.82 *24*	$11/2^-$	
563.3 *3*	$13/2^+$	
606.77 *16*		
760.1# *6*		
959.7# *4*		
1057.0# *8*		
1431.0# *11*		

† From a least-squares fit to γ-ray energies.
‡ From Adopted Values.
# From 1991To08.
@ Population of this level in the decay of 21.6-s ^{155}Tm was inferred by the evaluator from the observation of an excess of γ intensity, in the composite (21.6-s + 45-s activities) spectrum of 1977Ag01 compared with the pure 45-s spectrum of 1991To08, in one or more of the γ transitions known to deexcite this level.

γ(^{155}Er)

Iγ normalization: Computed assuming that the sum of the reported γ+ce feeding of the g.s. is 99.11%. With a Q(ε) value of 5583 keV and no levels reported above ≈1.4 MeV, the level scheme is clearly incomplete. This Iγ normalization value thus represents an upper limit.

In addition to the γ′s listed here, 1977Ag01 report γ′s with energies of 171.6, 323.5, 433.4, 497.0 and, presumably, 507 that are not shown here. Comparison of the Iγ data of 1991To08 (which involve the 45-s ^{155}Tm activity only) with those of 1977Ag01 indicates that these γ′s are not associated with the decay of the activity under consideration here (the 21.6-s activity).

The ce intensities were normalized to those of the γ rays using the value of α(K)exp for the 202.4 γ in ^{155}Dy (from the ^{155}Ho ε decay). This procedure introduces an additional error of 20% in the values of the conversion coefficients (1977Ag01).

E_γ [†‡]	I_γ [‡e]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#&]	δ[#d]	α[c]	Comments
31.5 *1*	5.3 *7*	563.3	13/2$^+$	531.82	11/2$^-$	E1		1.381 *23*	α(L)=1.078 *18*; α(M)=0.242 *4* α(N)=0.0540 *9*; α(O)=0.00641 *11*; α(P)=0.000188 *3* Mult.: from in-beam spectroscopic studies in (HI,xnγ) (1987Be21).
63.8 *1*	1.4[b] *5*	151.98	−	88.16	5/2$^-$,7/2$^-$,9/2$^-$	M1(+E2)	<0.13	10.44 *17*	α(K)=8.64 *14*; α(L)=1.41 *9*; α(M)=0.315 *23* α(N)=0.073 *5*; α(O)=0.0104 *6*; α(P)=0.000538 *9* I_γ: from the Iγ(63.5γ)/Iγ(151.6γ) value of 1991To08 and Iγ(152γ), one computes Iγ(63.8γ)=2.7 *12*. δ: computed by the evaluator from α(M)exp=0.24 *11* (1977Ag01).
88.1 *2*	17 *5*	88.16	5/2$^-$,7/2$^-$,9/2$^-$	0.0	7/2$^-$	M1(+E2)	<0.4	4.14 *8*	α(K)=3.29 *15*; α(L)=0.66 *15*; α(M)=0.15 *4* α(N)=0.035 *8*; α(O)=0.0047 *9*; α(P)=0.000202 *11* δ: computed by the evaluator from α(L)exp=0.5 *3* (1977Ag01).
x94.5 *2*	0.13 *3*								
x98.0 *2*	0.47 *19*								
152.0 *1*	3.9[b] *7*	151.98	−	0.0	7/2$^-$	E2		0.643	α(K)=0.357 *5*; α(L)=0.219 *4*; α(M)=0.0528 *8* α(N)=0.01198 *18*; α(O)=0.001445 *21*; α(P)=1.576×10^{-5} *23*
x196.7[a] *2*	0.27 *8*								
226.8 *2*	100 *23*	226.79	9/2$^-$	0.0	7/2$^-$	M1+E2		0.225 *60*	α(K)=0.176 *64*; α(L)=0.038 *4*; α(M)=0.0088 *10* α(N)=0.00204 *21*; α(O)=0.000273 *9*; α(P)=1.01×10^{-5} *46* α: value calculated for δ=1.
x241.6 *2*	0.9 *3*								
247.6 *2*	2.7[b] *11*	399.58		151.98	−	E2(+M1)		0.1255	α(K)=0.0873 *13*; α(L)=0.0294 *5*; α(M)=0.00695 *10* α(N)=0.001587 *23*; α(O)=0.000200 *3*; α(P)=4.32×10^{-6} *7* α: value for a pure E2 transition.

$^{155}_{68}$Er$_{87}$-2

^{155}Tm ε decay (21.6 s) 1991To08,1977Ag01 (continued)

γ(^{155}Er) (continued)

E_γ[†‡]	I_γ[‡e]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#&]	α[c]	Comments
[x]273.9 *2*	1.1 *2*							I_γ: the authors′ value, 1.1 *22*, has been assumed by the evaluator to be a misprint.
305.0 *2*	1.5 *4*	531.82	11/2$^-$	226.79	9/2$^-$			
[x]311.6 *3*	0.60 *17*							
315.3 *3*	1.1[b] *9*	467.22	$^-$	151.98	$^-$	E2(+M1)	0.0594	α(K)=0.0440 *7*; α(L)=0.01193 *18*; α(M)=0.00278 *4* α(N)=0.000638 *10*; α(O)=8.24×10^{-5} *12*; α(P)=2.29×10^{-6} *4* α: value for a pure E2 transition.
[x]317.2 *3*	0.9 *3*							
[x]327.9 *4*	0.28 *13*							
[x]328.6 *4*	0.20 *10*							
[x]331.4 *4*	0.40 *12*							
379.0 *3*	2.4[b] *7*	467.22	$^-$	88.16	5/2$^-$,7/2$^-$,9/2$^-$	M1(+E2)	0.0717	α(K)=0.0604 *9*; α(L)=0.00881 *13*; α(M)=0.00195 *3* α(N)=0.000455 *7*; α(O)=6.59×10^{-5} *10*; α(P)=3.67×10^{-6} *6* α: value for a pure M1 transition.
380.1 *3*	1.3 *3*	606.77		226.79	9/2$^-$			
[x]385.7[a] *5*	0.5 *2*							
[x]395.7 *4*	0.60 *17*							
[x]396.8 *4*	0.44 *10*							
[x]466.8 *4*	0.33 *10*							
[x]498.7 *4*	0.7 *3*							
[x]501.1 *5*	1.3 *4*							
518.7 *4*	3.3 *7*	606.77		88.16	5/2$^-$,7/2$^-$,9/2$^-$			
[x]521.0[a] *6*	0.50 *20*							
[x]527.5 *4*	1.07 *20*							
532.0 *5*	20 *5*	531.82	11/2$^-$	0.0	7/2$^-$			
533.3 *5*	5.2 *13*	760.1		226.79	9/2$^-$			
[x]549.3 *4*	1.1 *3*							
[x]558.0 *4*	0.50 *10*							
[x]575.7 *3*	2.0 *3*							
[x]583.8 *4*	0.50 *20*							
[x]585.5 *4*	0.9 *3*							
606.7 *2*	11.3 *23*	606.77		0.0	7/2$^-$			
[x]619.7 *3*	1.6 *3*							
732.9[@] *3*	7[@] *1*	959.7		226.79	9/2$^-$			
830.0[@]	2.2[@] *6*	1057.0		226.79	9/2$^-$			
1057.2[@]	13[@] *3*	1057.0		0.0	7/2$^-$			
1204.2[@]	4[@] *1*	1431.0		226.79	9/2$^-$			

[†] The γ′s listed as unplaced are those reported by 1977Ag01. Since the sources used in this study contained both ^{155}Tm activities, some of these γ′s may in fact be associated with the other (the 45-s) ^{155}Tm activity.

$^{155}_{68}Er_{87}$-3

^{155}Tm ε decay (21.6 s) 1991To08,1977Ag01 (continued)

$\gamma(^{155}Er)$ (continued)

‡ Unless otherwise indicated, the values given here are from 1977Ag01.
# Same as in Adopted Levels, Gammas dataset.
@ From 1991To08.
& The listed assignments are derived from a comparison of α(K)exp with theoretical values.
a Assignment of this transition to the ^{155}Tm ε decay is uncertain.
b Value derived from the difference of the Iγ values of 1977Ag01 (composite source) and 1991To08 (45-s activity only). The two intensity scales were normalized to the Iγ(323.5γ) value of 1977Ag01 before carrying out the subtraction.
c Additional information 2.
d Additional information 3.
e For absolute intensity per 100 decays, multiply by 0.38 *6*.
x γ ray not placed in level scheme.

$^{155}_{68}Er_{87}$-4

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Decay Scheme

Intensities: Relative I_γ

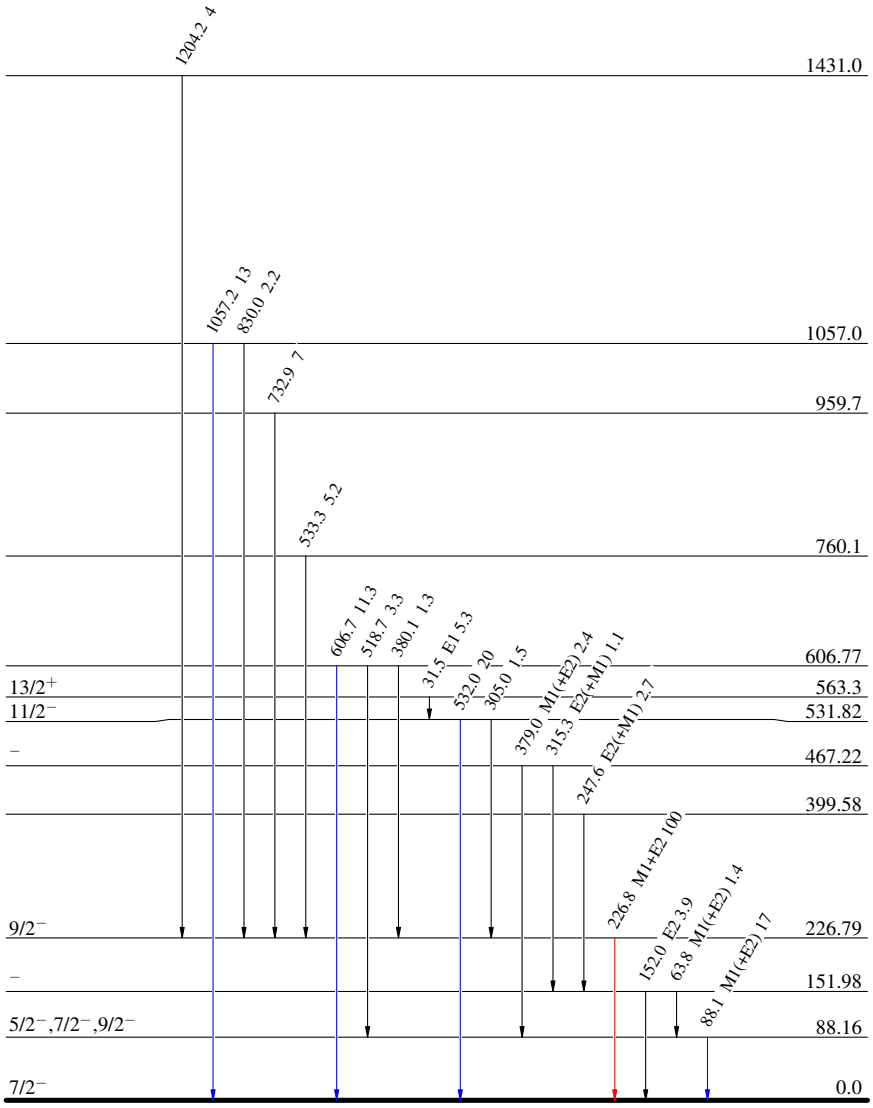
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

11/2⁻ 0.0 21.6 s 2

%ε+%β⁺=99.17 Qε=5583 12

$^{155}_{69}Tm_{86}$



$^{155}_{68}Er_{87}$