^{159}Dy IT decay (122 μs) 1968Bo18,1967Co26

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

Parent: ^{159}Dy: E=352.77 *14*; J^π=11/2$^-$; $T_{1/2}$=122 μs *3*; %IT decay=100.0

Additional information 1.

Isomer produced by ^{159}Tb(d,2n) with pulsed beam (1968Bo18,1965Bo22) with E(d)=12 MeV; by ^{159}Tb(p,n) (1967Co26,1965Bo22) with E(p)=5-18 MeV, and Gd(α,xn) (1965Bo22,1968Io01).

Decay scheme is that of 1968Bo18, plus several γ rays known from ^{159}Ho ε decay to depopulate these levels.

^{159}Dy Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0	3/2$^-$		
57.5 *4*	5/2$^-$		
137.2 *3*	7/2$^-$		
178.4 *3*	5/2$^+$		
209.8 *3*	7/2$^+$		
236.7 *4*	9/2$^-$		
240.2 *3*	9/2$^+$		
353.8	11/2$^-$	122 μs *3*	%IT=100 $T_{1/2}$: From 1967Co20; others: 115 μs *10* (1965Bo22) and 121 μs (1968Io01) all from γ(t) following p or α beam pulse.

† From least-squares fit to γ energies.

‡ From ^{159}Dy Adopted Levels, but same are given by 1968Bo18.

γ(^{159}Dy)

Iγ normalization: weighted average of 1.16 *22*, from requiring that the sum of the I(γ+ce) values of the transitions deexciting the isomeric state be 100%; and 1.19 *20*, from requiring that the sum of the I(γ+ce) values of the transitions feeding the g.s. be 100%. At each excited level below the isomer, the intensity feeding the level and that depopulating it agree to within their uncertainties.

I(K x ray)=175 *30* (1968Bo18). Others: 183 (1965Bo22); and 154 (1967Co26), after scaling the published data to make the intensity scale compatible.

E_γ†	I_γ‡*b*	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α@	$I_{(\gamma+ce)}$*b*	Comments
(30.427& *13*)		240.2	9/2$^+$	209.8	7/2$^+$	M1+E2	0.13 *2*	20 *3*	20.1	α(L)=15.8 *20*; α(M)=3.6 *5*; α(N+..)=0.93 *12* α(N)=0.82 *11*; α(O)=0.110 *13*; α(P)=0.00402 *6*
(31.378& *8*)	0.70 *14*	209.8	7/2$^+$	178.4	5/2$^+$	M1+E2	0.19 *2*	26 *3*		α(L)=19.9 *24*; α(M)=4.6 *6*; α(N+..)=1.17 *14* α(N)=1.04 *13*; α(O)=0.134 *15*; α(P)=0.00361 *6*
(41.182& *4*)	0.5 *2*	178.4	5/2$^+$	137.2	7/2$^-$	E1		0.612		α(L)=0.480 *7*; α(M)=0.1059 *15*; α(N+..)=0.0267 *4* α(N)=0.0236 *4*; α(O)=0.00299 *5*; α(P)=0.0001021 *15*
57	5.5 *10*	57.5	5/2$^-$	0	3/2$^-$	M1+E2	0.19 *2*	12.76 *21*		α(K)=10.04 *16*; α(L)=2.12

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^{159}Dy IT decay (122 μs) **1968Bo18,1967Co26 (continued)**

$\gamma(^{159}Dy)$ (continued)

E_γ [†]	I_γ [‡ b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ [#]	α [@]	$I_{(\gamma+ce)}$ [b]	Comments
										13; α(M)=0.48 *3*; α(N+..)=0.125 *8* α(N)=0.110 *7*; α(O)=0.0151 *8*; α(P)=0.000637 *10* ce(L)=8.9 *15*; ce(M)=6.2 *15* ce(M): value contains a contribution from another ce line (1968Bo18). I_γ: weighted average of: 6.7 *7*, from intensity balance at the 57 level; 4.2 *7*, from ce(L) and εL for the 57-keV transition; and 9.0 *33*, from measured I(K x ray) after subtraction of the contribution from the other γ transitions.
(61.77[&] *11*)		240.2	$9/2^+$	178.4	$5/2^+$	E2		17.9	1.7[a]	ce(K)/(γ+ce)=0.135 *3*; ce(L)/(γ+ce)=0.624 *8*; ce(M)/(γ+ce)=0.150 *3*; ce(N+)/(γ+ce)=0.0375 *9* ce(N)/(γ+ce)=0.0336 *8*; ce(O)/(γ+ce)=0.00396 *9*; ce(P)/(γ+ce)=7.07×10^{-6} *15*
(72.546[&] *4*)	0.56 *12*	209.8	$7/2^+$	137.2	$7/2^-$	E1		0.723		α(K)=0.597 *9*; α(L)=0.0982 *14*; α(M)=0.0216 *3*; α(N+..)=0.00555 *8* α(N)=0.00487 *7*; α(O)=0.000650 *9*; α(P)=2.64×10^{-5} *4*
80.1 *3*	10.5 *11*	137.2	$7/2^-$	57.5	$5/2^-$	M1+E2	0.18 *2*	4.64 *6*		α(K)=3.79 *6*; α(L)=0.661 *23*; α(M)=0.148 *6*; α(N+..)=0.0390 *14* α(N)=0.0339 *13*; α(O)=0.00480 *15*; α(P)=0.000236 *4* ce(K)=31 *7*; ce(L)=6.9 *25*
99.6 *3*	15.4 *11*	236.7	$9/2^-$	137.2	$7/2^-$	E2		2.77		α(K)=1.139 *16*; α(L)=1.255 *18*; α(M)=0.301 *5*; α(N+..)=0.0756 *11* α(N)=0.0674 *10*; α(O)=0.00810 *12*; α(P)=4.72×10^{-5} *7* ce(K)=31.6
(102.98[&] *2*)		240.2	$9/2^+$	137.2	$7/2^-$	[E1]		0.285	0.8	α(K)=0.238 *4*; α(L)=0.0368 *6*; α(M)=0.00807 *12*; α(N+..)=0.00210 *3* α(N)=0.00183 *3*; α(O)=0.000250 *4*; α(P)=1.104×10^{-5} *16*
113	18 *5*	353.8	$11/2^-$	240.2	$9/2^+$	E1		0.223		α(K)=0.186 *3*; α(L)=0.0284 *4*; α(M)=0.00623 *9*; α(N+..)=0.001620 *23* α(N)=0.001417 *20*; α(O)=0.000194 *3*;

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^{159}Dy IT decay (122 μs) 1968Bo18,1967Co26 (continued)

$\gamma(^{159}Dy)$ (continued)

E_γ[†]	I_γ[‡][b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[@]	Comments
								α(P)=8.74×10^{-6} *13* ce(K)=4.5 *11* E_γ: From 1968Bo18; other: 114.5 *5* (1967Co26), but 112.9 and 116.5 not resolved.
117	23 *6*	353.8	11/2$^-$	236.7	9/2$^-$	M1	1.528	α(K)=1.287 *18*; α(L)=0.189 *3*; α(M)=0.0415 *6*; α(N+..)=0.01108 *16* α(N)=0.00960 *14*; α(O)=0.001404 *20*; α(P)=8.02×10^{-5} *12* ce(K)=40 *4* E_γ: From 1968Bo18; other: 114.5 *5* (1967Co26), but 112.9 and 116.5 not resolved.
120.4 *5*	17 *5*	178.4	5/2$^+$	57.5	5/2$^-$	E1	0.185	α(K)=0.1553 *22*; α(L)=0.0235 *4*; α(M)=0.00515 *8*; α(N+..)=0.001341 *19* α(N)=0.001172 *17*; α(O)=0.0001615 *23*; α(P)=7.36×10^{-6} *11* ce(K)=2.5 *20*
137.3 *3*	2.6 *3*	137.2	7/2$^-$	0	3/2$^-$	E2	0.879	α(K)=0.486 *7*; α(L)=0.303 *5*; α(M)=0.0720 *10*; α(N+..)=0.0182 *3* α(N)=0.01618 *23*; α(O)=0.00198 *3*; α(P)=2.12×10^{-5} *3*
151.9 *5*	1.5 *3*	209.8	7/2$^+$	57.5	5/2$^-$	E1	0.1000	α(K)=0.0841 *12*; α(L)=0.01245 *18*; α(M)=0.00272 *4*; α(N+..)=0.000712 *10* α(N)=0.000622 *9*; α(O)=8.66×10^{-5} *13*; α(P)=4.11×10^{-6} *6* ce(K)=0.26 *26*; ce(L)=0.029 *15*
178	2.5 *7*	178.4	5/2$^+$	0	3/2$^-$	E1	0.0665	α(K)=0.0560 *8*; α(L)=0.00820 *12*; α(M)=0.00179 *3*; α(N+..)=0.000470 *7* α(N)=0.000410 *6*; α(O)=5.74×10^{-5} *8*; α(P)=2.80×10^{-6} *4* E_γ: From 1968Bo18; other: 173 *1* (1967Co20). I_γ: Calculated from Iγ(178)/Iγ(120) from ^{159}Ho ε decay.
179.0 *3*	8.3 *10*	236.7	9/2$^-$	57.5	5/2$^-$	E2	0.342	α(K)=0.220 *3*; α(L)=0.0942 *14*; α(M)=0.0222 *4*; α(N+..)=0.00564 *8* α(N)=0.00500 *7*; α(O)=0.000626 *9*; α(P)=1.021×10^{-5} *15* I_γ: Calculated from Iγ(179)/Iγ(99) from ^{159}Ho ε decay. Other: 10.0 *15* from Iγ(177.6+179.0)=12.5 *13* minus Iγ(177.6)=2.5 *7*.
218 *1*	4.8 *3*	353.8	11/2$^-$	137.2	7/2$^-$	E2	0.1786	α(K)=0.1229 *24*; α(L)=0.0424 *10*; α(M)=0.00990 *24*; α(N+..)=0.00253 *6* α(N)=0.00224 *6*; α(O)=0.000286 *7*; α(P)=5.98×10^{-6} *12* ce(K)=0.57

[†] From 1967Co26, except as otherwise noted. Other: 1965Bo22. For more precise values, see ^{159}Dy Adopted γ radiations.
[‡] From 1968Bo18, except as otherwise stated. Others: 1965Bo22 and 1967Co26, which do not give uncertainties. See 1968Bo18 for I(ce) data.
[#] From ^{159}Dy Adopted γ radiations.
[@] Values were computed for the more accurate γ-ray energies from the ^{159}Ho ε decay.
[&] Not seen in isomer decay, but placement established in ^{159}Ho ε decay. Eγ, Iγ, and Iγ(1+α) from Adopted γ data and Iγ(1+α)(30+62+102)=Iγ(1+α)(112.9)=22 *6*.
[a] Note that Iγ(1+α)(62)/Iγ(1+α)(30)=0.11 (1982Vy02) and 0.66 (1971Bo18), so Iγ(1+α)(62) is uncertain.
[b] For absolute intensity per 100 decays, multiply by 1.18 *14*.

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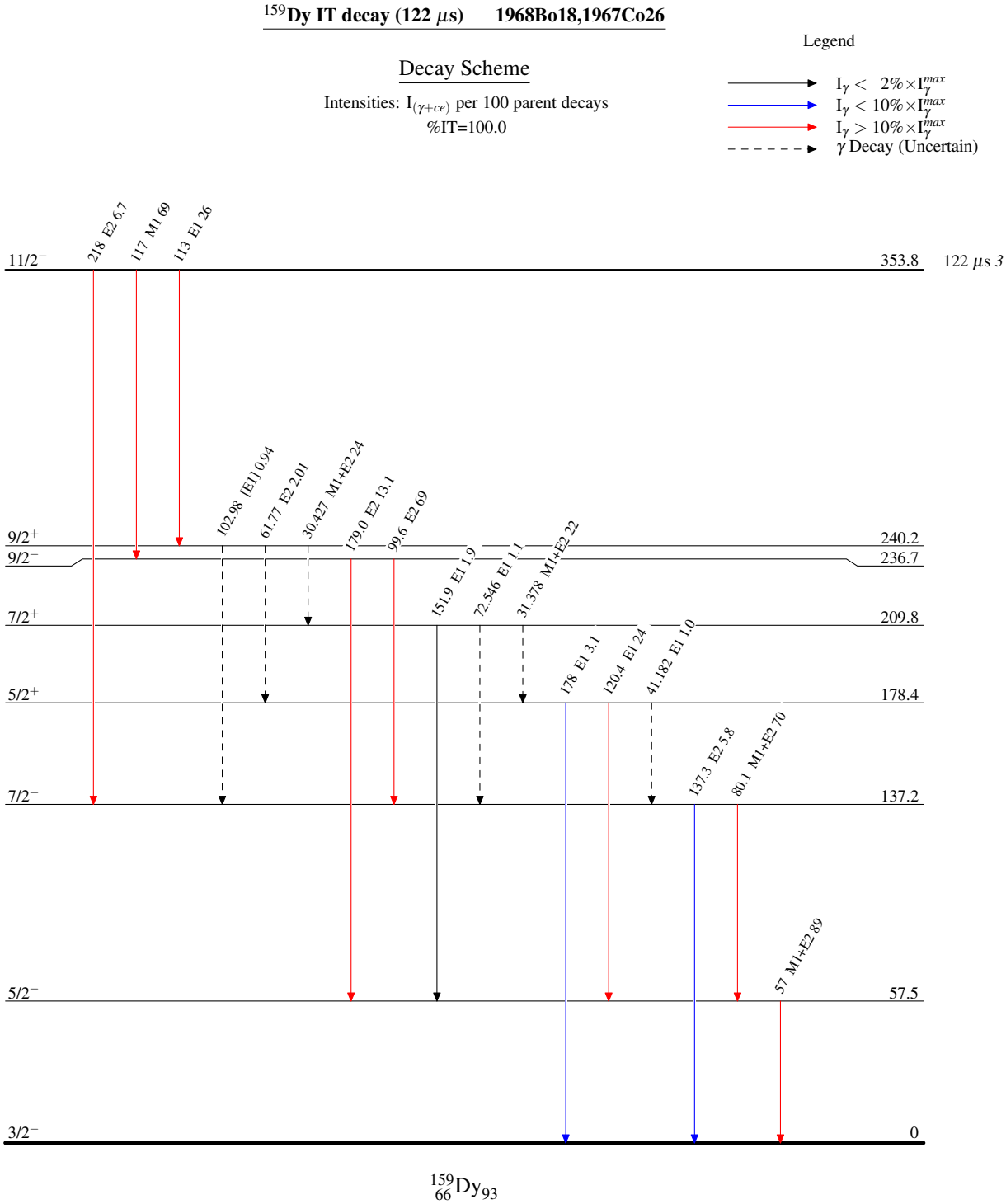
Decay Scheme

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

%IT=100.0



$^{159}_{66}Dy_{93}$