^{157}Dy IT decay (21.6 ms) 1970Bo02,1971KiZQ

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 132, 1 (2016)	4-Dec-2015

Parent: ^{157}Dy: E=199.5 *5*; J^π=11/2$^-$; $T_{1/2}$=21.6 ms *16*; %IT decay=100.0

This isomer has been produced by ^{157}Gd(^{3}He,3n), ^{156}Dy(n,γ), and ^{156}Gd(α,3nγ) reactions. γ's measured with Ge, Si(Li), and NaI detectors and ce measured with magnetic spectrometer.

Experimental methods:

1970Bo02: produced by ^{157}Gd(^{3}He,3n) with pulsed beam with E(^{3}He)=20 MeV on enriched (93.7%) target. γ's measured with Ge and NaI detectors and ce with magnetic spectrometer.

1971KiZQ: produced by ^{156}Dy(n,γ) with pulsed n source on enriched target. γ's measured with Ge, Si(Li), and NaI detectors.

^{157}Dy Levels

Additional information 1.

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0[@]	3/2$^-$		
61.0[@] *4*	5/2$^-$		
148.0[@] *4*	7/2$^-$		
162.2 *5*	9/2$^+$		
199.5[&] *5*	11/2$^-$	21.6 ms *16*	$T_{1/2}$: The measured values of 19.2 ms *5* (1973Kl03), 24 ms *1* (1971KiZQ), and 21 ms *3* (1970Bo02) are inconsistent; their weighted average is 20.2, with an internal uncertainty of 0.4, a reduced-χ^2 of 9.2, and an external uncertainty of 1.4. The evaluator has adopted the mean of the weighted average of 21.2 *13* from the Normalized Residual Method (1992Ja06) and 21.9 *19* from the Rajeval Method (1992Ra08); both of these methods increase the uncertainties of the more discrepant input values.

† From least-squares fit to γ energies. More precise values are available in ^{157}Dy Adopted Levels.

‡ From ^{157}Dy Adopted Levels.

Values are from isomer decay studies only. Measurement methods are: ^{3}He pulse-γ(t) (1970Bo02), γ(t) (1971KiZQ), and α pulse-γ(t) (1973Kl03).

@ Band(A): 3/2[521] band.

& Band(B): 11/2[505] bandhead.

$\gamma(^{157}$Dy)

Iγ normalization: computed to give 100% decays for the average of the intensities (1) out of the 199 level, (2) out of the 148 level, and (3) into the ground state. With this normalization, these three intensities are 104%, 110%, and 89%, respectively.

E_γ[†]	I_γ[‡#b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[a]	Comments
14.2 *1*	0.155 *25*	162.2	9/2$^+$	148.0	7/2$^-$	E1	11.6 *3*	α(L)=9.04 *22*; α(M)=2.07 *5* α(N)=0.443 *11*; α(O)=0.0458 *11*; α(P)=0.001032 *21*
37.3 *1*	1.00 *4*	199.5	11/2$^-$	162.2	9/2$^+$	(E1)	0.807 *13*	α(L)=0.632 *10*; α(M)=0.1399 *23* α(N)=0.0311 *5*; α(O)=0.00388 *7*; α(P)=0.0001283 *20* I_γ: Reported value is 100, but that value is inconsistent by a factor of 100 from other I_γ values.

Continued on next page (footnotes at end of table)

^{157}Dy IT decay (21.6 ms) 1970Bo02,1971KiZQ (continued)

$\gamma(^{157}Dy)$ (continued)

E_γ [†]	I_γ [‡#b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [&]	α [a]	$I_{(\gamma+ce)}$ [b]	Comments
51.5 *15*		199.5	11/2$^-$	148.0	7/2$^-$	(E2)		37 *6*	2.7 *5*	ce(L)/(γ+ce)=0.75 *8*; ce(M)/(γ+ce)=0.18 *4* ce(N)/(γ+ce)=0.040 *9*; ce(O)/(γ+ce)=0.0047 *11*; ce(P)/(γ+ce)=5.0×10^{-6} *8* α(L)=28 *5*; α(M)=6.8 *11* α(N)=1.53 *24*; α(O)=0.18 *3*; α(P)=0.000189 *11* $I_{(\gamma+ce)}$: Deduced from intensity balance at 148 level; i.e., I(γ+ce)(51)=I(γ+ce)(87) + I(γ+ce)(148) − I(γ+ce)(14). The corresponding calculated I_γ(51)=0.071 *17* and the measured value is <0.12 (1971KiZQ).
61.0 *5*	0.30 *3*	61.0	5/2$^-$	0.0	3/2$^-$	M1+E2	0.20 *2*	10.3 *3*		α(K)=8.14 *23*; α(L)=1.68 *11*; α(M)=0.379 *25* α(N)=0.087 *6*; α(O)=0.0120 *7*; α(P)=0.000512 *15*
87.0 *5*	0.91 *6*	148.0	7/2$^-$	61.0	5/2$^-$	M1+E2	0.19 *2*	3.61 *8*		α(K)=2.96 *7*; α(L)=0.509 *19*; α(M)=0.114 *5* α(N)=0.0261 *10*; α(O)=0.00370 *13*; α(P)=0.000183 *5*
148.0 *5*	0.29 *5*	148.0	7/2$^-$	0.0	3/2$^-$	E2		0.661 *13*		α(K)=0.385 *7*; α(L)=0.212 *5*; α(M)=0.0504 *11* α(N)=0.01134 *24*; α(O)=0.00140 *3*; α(P)=1.71×10^{-5} *3*

[†] From 1971KiZQ; other: 1970Bo02.
[‡] Average of data from 1970Bo02 and 1971KiZQ.
[#] From 1970Bo02, I(K x ray)+I_γ(51)=2.7 *11*. Since I_γ(51) is negligible, this value is the measured K x-ray intensity. However, for this decay scheme the calculated I(K x ray) is much larger, namely ≈ 5.2. In contrast, 1971KiZQ indicate that their measured I(K x ray) is consistent with the decay scheme, but they do not give a value.
[@] From ^{157}Dy Adopted γ radiations and based on the ce data of 1970Bo02 and the ce data from the ε decay of ^{157}Ho. 1970Bo02 assign M1 for 61 and 87 γ's from α_L(exp) and E2 for 148 from K/L. 1971KiZQ assign E1 to 14 and 37 γ's from intensity balance at 148 level.
[&] From ^{157}Dy Adopted γ radiations.
[a] Additional information 2.
[b] For absolute intensity per 100 decays, multiply by 23 *2*.

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Decay Scheme

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

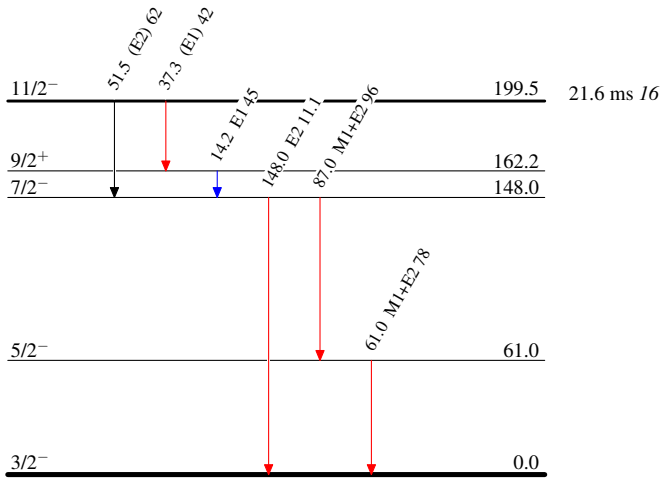
%IT=100.0

Legend

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

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

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



$^{157}_{66}Dy_{91}$

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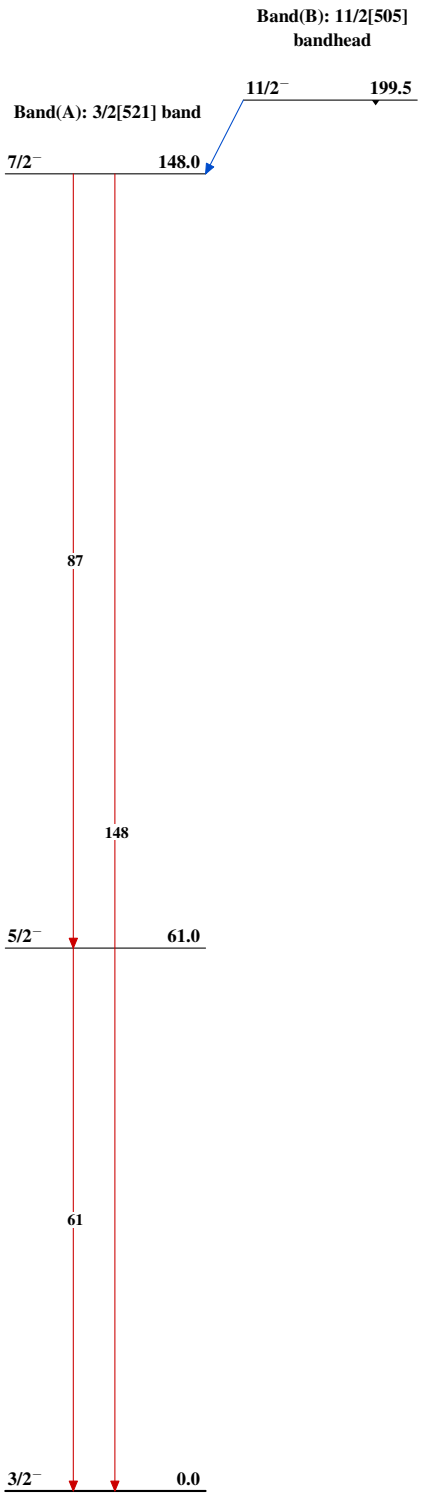

$^{157}_{66}Dy_{91}$