

¹⁵⁹Tb(p,2nγ),(d,3nγ) 1970Je09,1966Gr04,1968Be29

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 141, 1 (2017)	1-Feb-2017

Reactions:

(d,3nγ): E(d)=24 MeV, measured I_γ(t) (1977Dr03); and E(d)=17 MeV (1970Je09).

(p,2nγ): E(p)=16.8 and 21.4 MeV, measured E_γ, I_γ (1970Je09); E(p)=11.8 MeV, measured T_{1/2}(4⁺) (1968Be29); measured E_γ (1967Ge09); E(p)=12 MeV, measured ce and γ spectra, γ-ce coincidences, K/L (1966Gr04); and E(p)=8-12 MeV, measured ce spectra and K/L (1963Ha39).

¹⁵⁸Dy Levels

In ¹⁵⁹Tb(d,3nγ), 1977Dr03 report the 4⁺ level at 317 keV is populated from an isomer with T_{1/2}=16.1 ns +6-4 and the 6⁺ level at 637 keV is populated from an isomer with T_{1/2} > 250 ns. The energies of these isomeric levels have not been reported.

E(level) [†]	J ^π [‡]	T _{1/2} [#]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
0.0 [@]	0 ⁺		1044.02 [@] 9	8 ⁺	1484.8 ^{&}	6 ⁺
98.94 [@] 1	2 ⁺		1044.7 ^{&}	3 ⁺	1519.4 [@]	10 ⁺
317.26 [@] 2	4 ⁺	75 ps 8	1084.5 ^a	2 ⁺	1552 ^a	6 ⁺
637.88 [@] 4	6 ⁺		1164.8 ^{&}	4 ⁺	1676.3 ^{&}	7 ⁺
945.7 ^{&} 15	2 ⁺		1280.3 ^a	4 ⁺	1890.9 ^a	8 ⁺
991.0 ^a	0 ⁺		1315.1 ^{&}	5 ⁺	≈2047.7 [@]	12 ⁺

[†] From 1970Je09. The level energies of 1966Gr04 differ by several keV in a few cases.

[‡] From assignments of 1970Je09; these agree with those in Adopted Levels.

[#] From these reactions only (1968Be29); see ¹⁵⁸Dy Adopted Levels for all measurements.

[@] Band(A): K^π=0⁺ ground-state band.

[&] Band(B): K^π=2⁺ γ-vibrational band.

^a Band(C): K^π=0⁺ β-vibrational band.

γ(¹⁵⁸Dy)

E _γ [†]	I _γ [‡]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult. [#]	Comments
98.94 1	183	98.94	2 ⁺	0.0	0 ⁺	E2 ^{&}	
218.32 2	487	317.26	4 ⁺	98.94	2 ⁺	E2	K/L ratio measurements: ≈ 2.6 (1966Gr04), 3.41 (1963Ha39).
320.62 4	324	637.88	6 ⁺	317.26	4 ⁺	E2	K/L ratio measurements: ≈ 4.2 (1966Gr04), 3.47 (1963Ha39).
406.14 8	178	1044.02	8 ⁺	637.88	6 ⁺	E2 ^{&}	
475.4 3	48	1519.4	10 ⁺	1044.02	8 ⁺	E2 ^{&}	
528.1 3	3	≈2047.7	12 ⁺	1519.4	10 ⁺		
677.0 10		1315.1	5 ⁺	637.88	6 ⁺		
727.5 10		1044.7	3 ⁺	317.26	4 ⁺		
767 [@]		1084.5	2 ⁺	317.26	4 ⁺		
846.9 ^a 10	296 ^a	945.7	2 ⁺	98.94	2 ⁺		
846.9 ^a 10	296 ^a	1164.8	4 ⁺	317.26	4 ⁺		
846.9 ^a 10	296 ^a	1484.8	6 ⁺	637.88	6 ⁺		
846.9 ^a 10	296 ^a	1890.9?	8 ⁺	1044.02	8 ⁺		
891 [@]		991.0	0 ⁺	98.94	2 ⁺		
916 [@]		1552	6 ⁺	637.88	6 ⁺		E _γ : The energies of the two γ's depopulating this level are inconsistent by 8 keV.

Continued on next page (footnotes at end of table)

$^{159}\text{Tb}(\text{p},2\text{n}\gamma),(\text{d},3\text{n}\gamma)$ [1970Je09](#),[1966Gr04](#),[1968Be29](#) (continued) $\gamma(^{158}\text{Dy})$ (continued)

E_γ †	I_γ ‡	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
945.7 ^a 10	120 ^a	945.7	2 ⁺	0.0	0 ⁺	
945.7 ^a 10	120 ^a	1044.7	3 ⁺	98.94	2 ⁺	
963.0	36	1280.3	4 ⁺	317.26	4 ⁺	
986 [@]		1084.5	2 ⁺	98.94	2 ⁺	E_γ : Entry of 998.2 in table 4 of 1970Je09 is assumed to be a typo since the level-energy difference of 1970Je09 is 986.
991 [@]		991.0	0 ⁺	0.0	0 ⁺	E_γ : In 1966Gr04 this γ is placed from 5 ⁺ of γ band and from this level; in Adopted γ 's, the γ from 5 ⁺ of γ band is 998 keV as given by 1970Je09 .
998.2 10	73	1315.1	5 ⁺	317.26	4 ⁺	
1039.8 10	156	1676.3	7 ⁺	637.88	6 ⁺	
1066.5 10	60	1164.8	4 ⁺	98.94	2 ⁺	
1083 [@]		1084.5	2 ⁺	0.0	0 ⁺	
1177 [@]		1280.3	4 ⁺	98.94	2 ⁺	
1229 [@]		1552	6 ⁺	317.26	4 ⁺	
1257 [@]		1890.9?	8 ⁺	637.88	6 ⁺	

† From [1970Je09](#), unless otherwise noted. Several γ 's are multiply placed in both [1970Je09](#) and [1966Gr04](#).

‡ Calculated by evaluator from cross section values which are taken to be $I_\gamma(1+\alpha)$ values for (p,2n γ) reaction at 21 MeV ([1970Je09](#)). Uncertainties in the cross sections are 20% for transitions above 100 keV and 30% for 98.9-keV γ .

From K/L ratios ([1966Gr04](#),[1963Ha39](#)).

@ From [1966Gr04](#).

& From ^{158}Dy Adopted γ 's.

^a Multiply placed with undivided intensity.

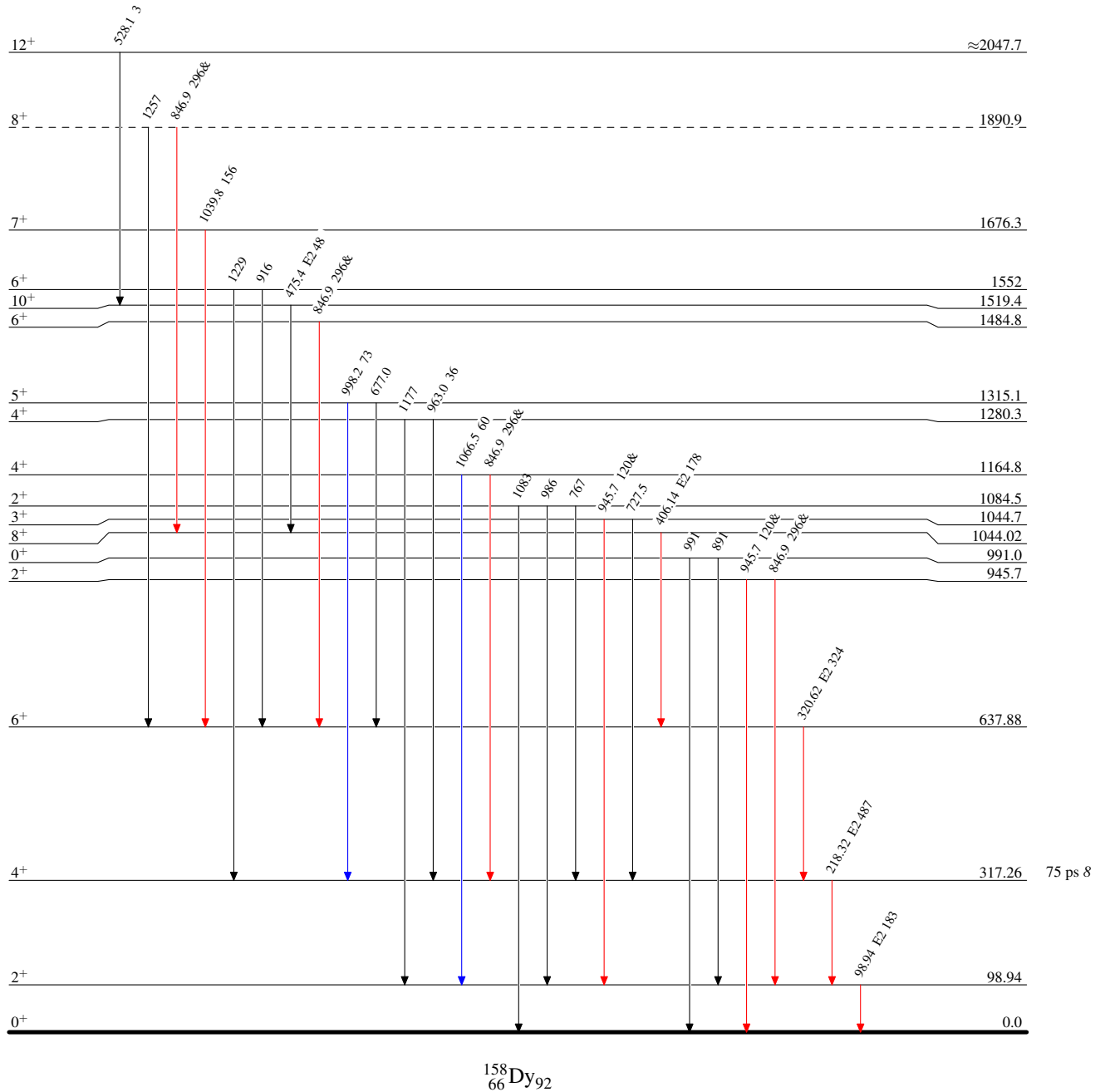
$^{159}\text{Tb}(p,2n\gamma),(d,3n\gamma)$ 1970Je09,1966Gr04,1968Be29

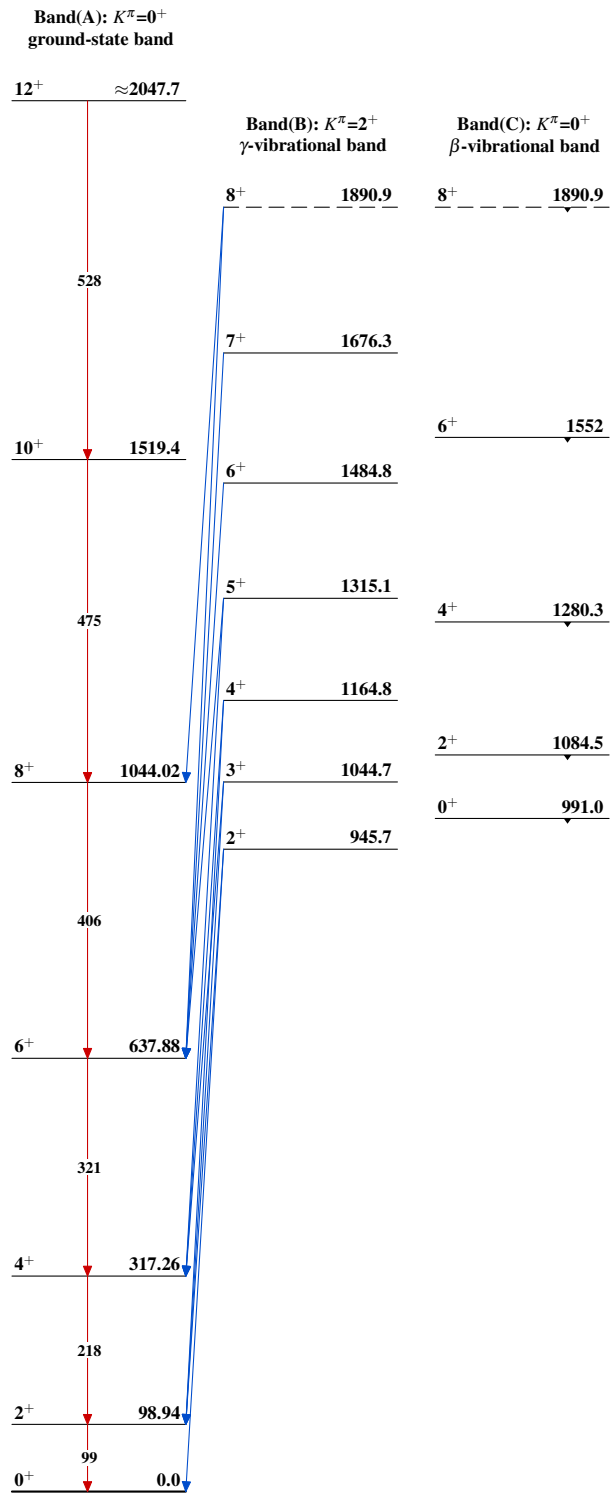
Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend

- \blacktriangleright $I_\gamma < 2\% \times I_\gamma^{\max}$
- $\color{blue}\blacktriangleright$ $I_\gamma < 10\% \times I_\gamma^{\max}$
- $\color{red}\blacktriangleright$ $I_\gamma > 10\% \times I_\gamma^{\max}$



$^{159}\text{Tb}(p,2n\gamma), (d,3n\gamma)$ 1970Je09,1966Gr04,1968Be29 $^{158}_{66}\text{Dy}_{92}$