

Coulomb excitation

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Additional information 1.

¹⁶⁰Dy(x,x'γ).

1999Br43: x=⁵⁸Ni, E=230, 210, and 217 MeV. Measured g-factors for 6⁺, 8⁺, 10⁺, and 12⁺ members of the g.s. band and 2⁺ member of the γ band using the Coulomb-Excitation Transient Field technique.

1981Mc06: x=α, E=13.5 MeV. Measured I_γ, E_γ, γ(θ). Doppler-broadened line shape analysis.

1977Ke06: x=⁵⁶Fe, E=232 MeV; x=⁸⁴Kr, E=348 MeV. Measured E_γ. Deduced T_{1/2}'s by Doppler-broadened line shape analysis.

Supersedes 1974Ke04.

1974Sa03: x=²⁰Ne, E=72 MeV; x=³⁵Cl, E=125 MeV. Measured yield, particle-γ coincidence.

1974Oe01: x=α, E=14.5 MeV; x=¹⁶O, E=60 MeV. Measured I_γ, σ(E), ion-γ coincidence.

1960El07: x=p,d, E=4.5 MeV.

Other: 1974Ke04, 1965Yo04.

¹⁶⁰Dy Levels

E(level)	J ^π	T _{1/2}	Comments
0.0 [‡]	0 ⁺		
86.79 [‡]	2 ⁺	2.26 ns 16	B(E2)↑=4.46 30 (1960El07) T _{1/2} : from B(E2)=4.46 30.
283.79 [‡]	4 ⁺	110 ps 11	T _{1/2} : from B(E2)(2 ⁺ →4 ⁺) and α=0.249 4. B(E2)(2 ⁺ →4 ⁺)=2.50 25 (1974Sa03).
581.03 [‡]	6 ⁺	18.6 ps 10	g=+0.352 17 T _{1/2} : from B(E2)(4 ⁺ →6 ⁺) and α=0.0664 8. B(E2)(4 ⁺ →6 ⁺)=1.78 9 (1974Sa03).
966.1 [#]	2 ⁺	1.31 ps 9	g: From 1999Br43. These authors do not list the '+' sign, but the lower-spin members of the g.s. band have positive g-factors. B(E2)↑=0.116 8; g=0.40 3 B(E2)↑: weighted average of 0.122 6 (1981Mc06) and 0.105 8 (1974Oe01). Other: 0.069 20 (1965Yo04). T _{1/2} : from B(E2) and adopted branching. Other: 1.35 ps 17 (Doppler-broadened line shape (1975In02)).
966.71 [‡]	8 ⁺	3.8 ps 3	g: From 1999Br43, who report g=0.401 27. g=+0.310 22 T _{1/2} : weighted average of: 3.43 ps 25, from 1977Ke06, Doppler-broadened line shape; and 4.11 ps 26, from 1974Sa03, B(E2)(6 ⁺ →8 ⁺). B(E2)(6 ⁺ →8 ⁺)=2.05 13 (1974Sa03).
1049.	3 ⁺		g: Computed by the evaluator from g=0.343 22, as reported by 1999Br43, after correction for the different value of T _{1/2} (3.43 ps 25) used by them. The '+' sign is given, since the lower-spin members of the g.s. band have positive signs.
1155.7 [#]	4 ⁺		
1285.5 [@]	1 ⁻		
1286.7 ^{&}	3 ⁻	0.22 ps 6	T _{1/2} : from Doppler-broadened line shape (1981Mc06). reported B(E3) measurements include 0.119 (1974Oe01) and 0.171 10 (1981Mc06). J ^π : assignment by 1981Mc06 based upon γ(θ) measurement for transition to 2 ⁺ member of g.s. band.
1349.5	2 ⁺	1.20 ps 11	B(E2)↑=0.0184 15 (1981Mc06) J ^π : assignment based upon γ(θ) measurements for transitions to 0 ⁺ and 4 ⁺ members of g.s. band. Substantial E0 component in transition to 2 ⁺ member indicates K=0 assignment.
1398.6 [@]	3 ⁻		T _{1/2} : from B(E2) and adopted branching. B(E3)↑=0.064 (1974Oe01)

Continued on next page (footnotes at end of table)

Coulomb excitation (continued) ^{160}Dy Levels (continued)

E(level)	J^π [†]	$T_{1/2}$	Comments
1407.4&	5 ⁻		
1428.59‡	10 ⁺	1.56 ps 7	$g=+0.31$ 3 $T_{1/2}$: from 1977Ke06. Listed B(E2) value implies $T_{1/2}=1.20$ ps 12. B(E2)(8 ⁺ →10 ⁺)=2.73 27 (1974Sa03). g from 1999Br43, who report $g=0.306$ 31. These authors do not show the positive sign for g , but the lower-spin members of the g.s. band have positive g -factors.
1438.0#	6 ⁺		
1642	3 ⁻		B(E3)↑=0.065 10 (1981Mc06)
1951.4‡	12 ⁺	0.89 ps 4	$g=+0.30$ 6 $T_{1/2}$: from 1977Ke06. Listed B(E2) value implies $T_{1/2}=0.53$ ps 23. B(E2)(10 ⁺ →12 ⁺)=3.2 14 (1974Sa03). g : From 1999Br43, who report $g=0.302$ 60. The positive sign is included, since the g -factors for the lower-spin members of the g.s. band are positive.
2515.2‡	14 ⁺	0.62 ps +7-14	$T_{1/2}$: from 1977Ke06.

[†] From Adopted Levels.

[‡] Band(A): ground-state band.

Band(B): γ -vibrational band.

@ Band(C): $K^\pi=1^-$ band.

& Band(D): $K^\pi=2^-$ octupole-vibrational band.

Coulomb excitation (continued)

E _i (level)	J _i ^π	E _γ	I _γ [†]	γ(¹⁶⁰ Dy)		Mult. #	δ&	α@	Comments
				E _f	J _f ^π				
86.79	2 ⁺	86.79		0.0	0 ⁺	E2		4.63	α(K)=1.565 22; α(L)=2.35 4; α(M)=0.565 8 α(N)=0.1266 18; α(O)=0.01511 22; α(P)=6.50×10 ⁻⁵ 9 E _γ : nominal value, rounded down from the adopted value.
283.79	4 ⁺	197.00 7		86.79	2 ⁺	E2		0.249	α(K)=0.1660 24; α(L)=0.0638 9; α(M)=0.01496 21 α(N)=0.00338 5; α(O)=0.000427 6; α(P)=7.89×10 ⁻⁶ 11 E _γ : from 1974Sa03.
581.03	6 ⁺	297.24 8		283.79	4 ⁺	E2		0.0664	α(K)=0.0496 7; α(L)=0.01297 19; α(M)=0.00299 5 α(N)=0.000679 10; α(O)=8.92×10 ⁻⁵ 13; α(P)=2.58×10 ⁻⁶ 4 E _γ : from 1974Sa03.
966.1	2 ⁺	682.4 879.4	1.9 100	283.79 86.79	4 ⁺ 2 ⁺	M1+E2	-30 +7-20	0.00400	E _γ : from 1981Mc06. α(K)=0.00334 5; α(L)=0.000512 8; α(M)=0.0001130 16 α(N)=2.60×10 ⁻⁵ 4; α(O)=3.72×10 ⁻⁶ 6; α(P)=1.92×10 ⁻⁷ 3 E _γ ,δ: from 1981Mc06.
966.71	8 ⁺	966.2 385.68 10	87.4	0.0 581.03	0 ⁺ 6 ⁺	E2		0.0307	E _γ : from 1981Mc06. α(K)=0.0240 4; α(L)=0.00523 8; α(M)=0.001190 17 α(N)=0.000271 4; α(O)=3.66×10 ⁻⁵ 6; α(P)=1.303×10 ⁻⁶ 19 E _γ : from 1974Sa03.
1155.7	4 ⁺	872.0 5 1068.7 5		283.79 86.79	4 ⁺ 2 ⁺				E _γ : from 1974Oe01.
1285.5	1 ⁻	1198.9 5 1285.3 5		86.79 0.0	2 ⁺ 0 ⁺				E _γ : from 1974Oe01.
1286.7	3 ⁻	1002.9	57	283.79	4 ⁺	E1+M2		0.00136 12	α(K)=0.00116 10; α(L)=0.000156 15; α(M)=3.4×10 ⁻⁵ 4 α(N)=7.8×10 ⁻⁶ 8; α(O)=1.14×10 ⁻⁶ 12; α(P)=6.6×10 ⁻⁸ 7 E _γ : from 1981Mc06.
		1199.9	100	86.79	2 ⁺	E1+M2		0.00099 8	α(K)=0.00083 7; α(L)=0.000110 10; α(M)=2.39×10 ⁻⁵ 21 α(N)=5.5×10 ⁻⁶ 5; α(O)=8.1×10 ⁻⁷ 7; α(P)=4.7×10 ⁻⁸ 4; α(IPF)=2.33×10 ⁻⁵ 4 E _γ : from 1981Mc06.
1349.5	2 ⁺	1065.7	72 [‡] 5	283.79	4 ⁺	E2		0.00267	α(K)=0.00225 4; α(L)=0.000330 5; α(M)=7.25×10 ⁻⁵ 11 α(N)=1.670×10 ⁻⁵ 24; α(O)=2.41×10 ⁻⁶ 4; α(P)=1.298×10 ⁻⁷ 19 E _γ : from 1981Mc06.
		1262.7	100 [‡] 7	86.79	2 ⁺	E0+E2+M1	-1.5 +7-20	0.0023 4	α(K)=0.0019 3; α(L)=0.00027 4; α(M)=5.9×10 ⁻⁵ 9 α(N)=1.35×10 ⁻⁵ 20; α(O)=2.0×10 ⁻⁶ 3; α(P)=1.12×10 ⁻⁷ 19; α(IPF)=1.41×10 ⁻⁵ 7 E _γ ,δ: from 1981Mc06.
		1349.5	97 [‡] 7	0.0	0 ⁺	E2		1.70×10 ⁻³	α(K)=0.001414 20; α(L)=0.000200 3; α(M)=4.36×10 ⁻⁵ 7 α(N)=1.007×10 ⁻⁵ 14; α(O)=1.464×10 ⁻⁶ 21; α(P)=8.17×10 ⁻⁸ 12; α(IPF)=2.97×10 ⁻⁵ 5 E _γ : from 1981Mc06.

Coulomb excitation (continued)

$\gamma(^{160}\text{Dy})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ^\dagger	E_f	J_f^π	Mult.#	$\alpha^@$	Comments
1398.6	3 ⁻	1115.3 1311.7		283.79 86.79	4 ⁺ 2 ⁺			E_γ : from 1974Oe01. E_γ : from 1974Oe01.
1407.4	5 ⁻	826.5 1123.6		581.03 283.79	6 ⁺ 4 ⁺			E_γ : from 1974Oe01. E_γ : from 1974Oe01.
1428.59	10 ⁺	461.88 13		966.71	8 ⁺	E2	0.0187	$\alpha(\text{K})=0.01492$ 21; $\alpha(\text{L})=0.00293$ 5; $\alpha(\text{M})=0.000661$ 10 $\alpha(\text{N})=0.0001512$ 22; $\alpha(\text{O})=2.07 \times 10^{-5}$ 3; $\alpha(\text{P})=8.28 \times 10^{-7}$ 12 E_γ : from 1974Sa03.
1438.0	6 ⁺	857.0 1155.3		581.03 283.79	6 ⁺ 4 ⁺			E_γ : from 1974Oe01. E_γ : from 1974Oe01.
1642	3 ⁻	486 593 676	100 16 48	1155.7 1049. 966.1	4 ⁺ 3 ⁺ 2 ⁺			E_γ : from 1981Mc06. E_γ : from 1981Mc06. E_γ : from 1981Mc06.
1951.4	12 ⁺	522.9 5		1428.59	10 ⁺			E_γ : from 1977Ke06.
2515.2	14 ⁺	563.5 5		1951.4	12 ⁺			E_γ : from 1977Ke06.

† Relative photon branching from each level (1981Mc06).

‡ Listed uncertainty is from a private communication from the first author of 1981Mc06.

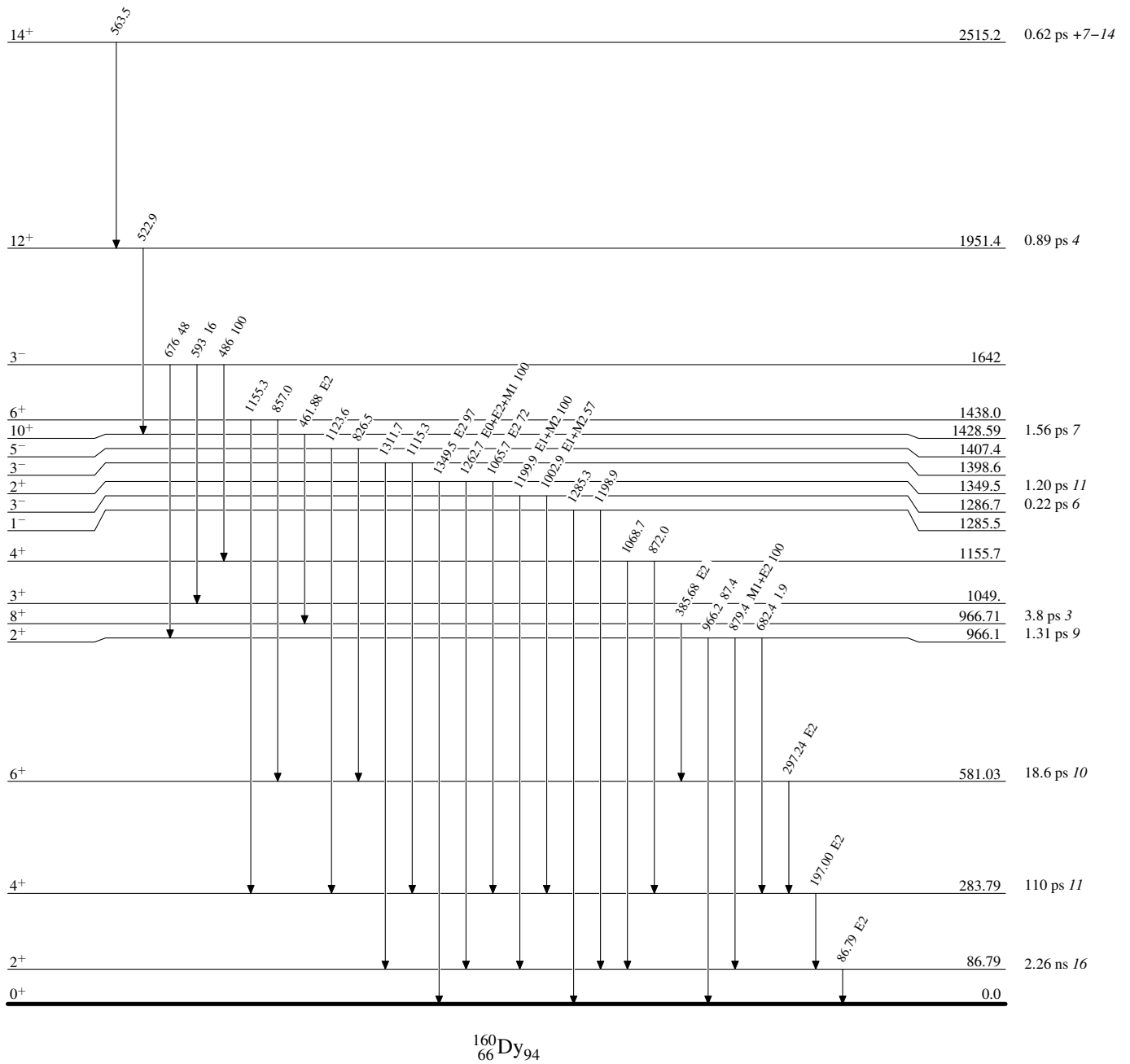
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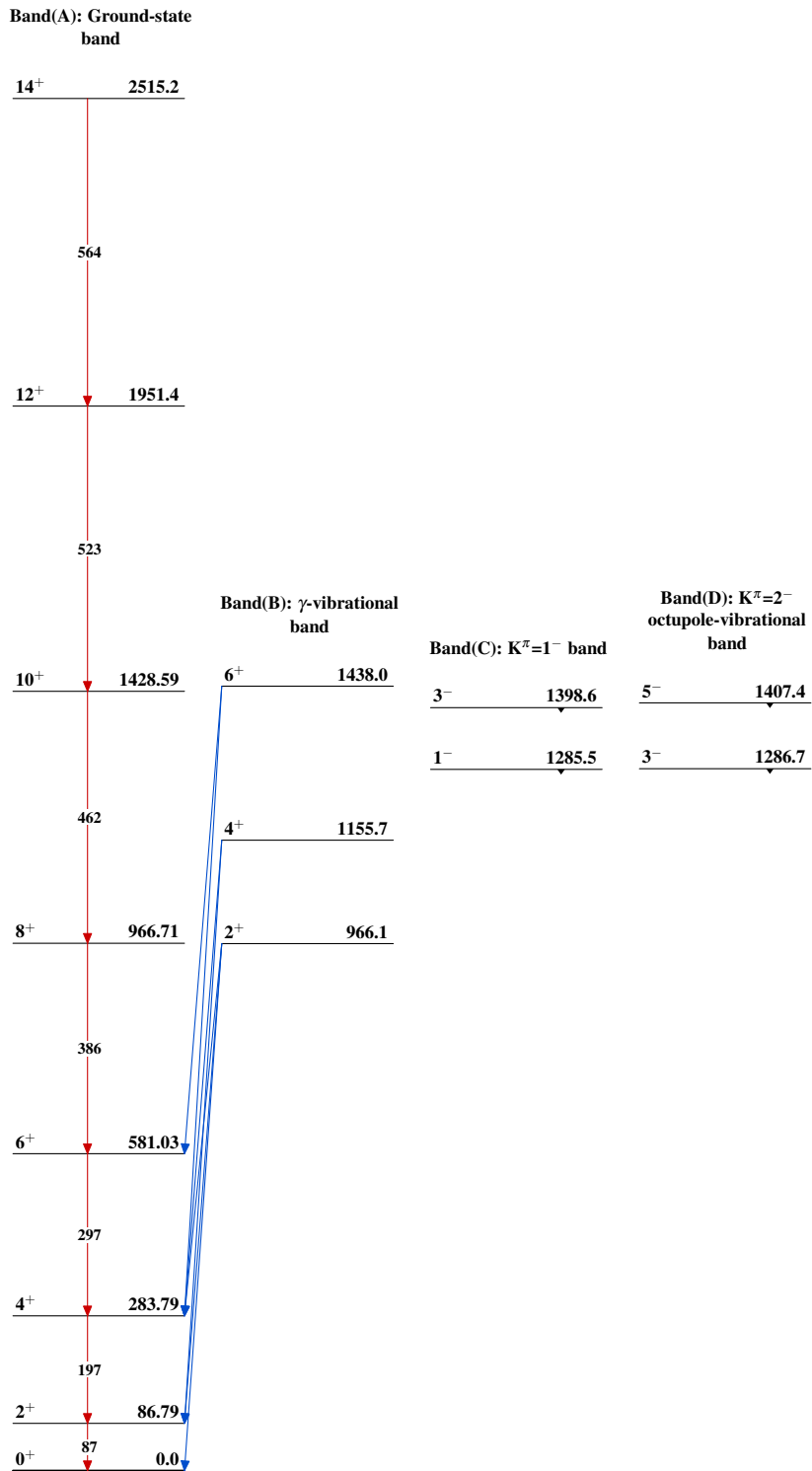
@ [Additional information 2.](#)

& [Additional information 3.](#)

Coulomb excitationLevel Scheme

Intensities: Relative photon branching from each level



Coulomb excitation $^{160}_{66}\text{Dy}_{94}$