

Coulomb excitation

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

The level scheme is from [1993Su16](#).

- [1955He64](#) ($\alpha, \alpha' \gamma$) E=6 MeV.
- [1955Ma77](#) (p,p') E=1.88 MeV.
- [1956Hu49](#) (p,p') E=1.75 MeV.
- [1959Bi10](#) (p,p') E=2.8 MeV.
- [1960El07](#) (p,p'), (d,d') E=4.5 MeV.
- [1960Na13](#) ($\alpha, \alpha' \gamma$) E=14-20 MeV.
- [1961Go09](#) (p,p' γ) E=1.8 and 3.18 MeV.
- [1962Bi05](#) ($\alpha, \alpha' \gamma$) E=3 MeV.
- [1964Al25](#) (¹⁴N, ¹⁴N' γ) E=37 MeV.
- [1964De07](#) (¹⁶O, ¹⁶O' γ) E=34-44 MeV.
- [1965Yo04](#) (¹⁶O, ¹⁶O' γ) E=43.5 MeV.
- [1967St17](#) (p,p' γ) E=3 MeV.
- [1967Wo06](#) (p,p' γ).
- [1969Av01](#) (¹⁶O, ¹⁶O' γ) E=30 MeV.
- [1970Be36](#) (¹⁶O, ¹⁶O' γ) E=36 MeV.
- [1972Er04](#) (α, α') E=11-13 MeV.
- [1974Ba81](#) (α, α') E=11.5-13.5 MeV.
- [1974HaXZ](#) (α, α') E=11.5-15 MeV.
- [1974Sh12](#) (α, α') E=11.75-12.25 MeV.
- [1974Wo01](#) (α, α') E=12 MeV.
- [1976Ha26](#) (α, α') E=11.5-16.95 MeV.
- [1977Ke06](#) (⁵⁶Fe, ⁵⁶Fe') E=232 MeV and (⁸⁴Kr, ⁸⁴Kr') E=348 MeV.
- [1977Ro08](#) (α, α') E=11-17 MeV.
- [1977Ro26](#) (α, α') E=12 MeV.
- [1977Wo03](#) (α, α') E=11-12 MeV.
- [1981Mc06](#) ($\alpha, \alpha' \gamma$) E=13.5 MeV.
- [1983Ha24](#) (³⁴S, ³⁴S' γ) E=125 MeV and (⁶³Cu, ⁶³Cu' γ) E=230 MeV.
- [1991St01](#) (⁵⁸Ni, ⁵⁸Ni' γ) E=160 MeV.
- [1993Su16](#) (³²S, ³²S' γ) E=118 MeV.

¹⁵⁸Gd Levels

Model calculation that may be of interest: [1962Af01](#).

See ¹⁵⁸Gd Adopted Levels for μ values, including results from Coulomb excitation ([1983Ha24](#), [1991St01](#)).

Scheme is from [1993Su16](#), except 1517 level from [1981Mc06](#).

Most of the B(E2) \uparrow values are from [1981Mc06](#) (based on the method given by [1958St32](#)).

E(level)	J π^{\dagger}	T _{1/2}	Comments
0.0	0 ⁺		
79.51	2 ⁺	2.56 ns 5	B(E2) \uparrow =5.02 5 (2001Ra27) T _{1/2} : from Adopted Levels, Gammas dataset.
261.44	4 ⁺	0.13 ns 3	T _{1/2} : From B(E2, 2 ⁺ to 4 ⁺)=2.96 59. E4 matrix element values reported include: 0.34 11 (1972Er04), 0.35 9 (1974Sh12), 0.40 13 (1976Ha26), 0.39 12 (1977Ro26), and 0.34 22 (1991St01).
538.98	6 ⁺		
904.4	8 ⁺	5.1 ps 4	T _{1/2} : From Doppler-shift method (1977Ke06).
977.1	1 ⁻		

Coulomb excitation (continued) ^{158}Gd Levels (continued)

E(level)	J^π [†]	$T_{1/2}$	Comments
1023.7	2 ⁻		
1041.7	3 ⁻		B(E3) \uparrow =0.124 7 B(E3) \uparrow : From 1981Mc06; other: 0.084 (1993Su16).
1158.9?	4 ⁻		
1176.4	5 ⁻		
1187.1	2 ⁺	0.61 ps 4	B(E2) \uparrow =0.089 4 $T_{1/2}$: From B(E2) and γ branching from Adopted Levels, Gammas dataset. B(E2) \uparrow : Weighted average of 0.106 15 (1974Ba81), 0.090 10 (1977Ro08, 1976Ha26), 0.100 15 (1977Wo03), 0.085 5 (1981Mc06); others: 0.16 8 (1960Na13), \leq 0.08 (1965Yo04) 0.058 (1993Su16). Values given by 1974RoZP and 1974HaXZ are replaced by same authors in 1977Ro08.
1196.1?	0 ⁺		
1259.8	2 ⁺	3.6 ps 3	B(E2) \uparrow =0.0080 6 $T_{1/2}$: From B(E2) and γ branching (1981Mc06). B(E2) \uparrow : From 1981Mc06; others: 0.015 (1993Su16), and < 0.002 (1977Ro08,1976Ha26) which is much smaller than the value adopted.
1263.5	1 ⁻		
1265.5?	3 ⁺		
1350.5	10 ⁺	1.85 ps 15	$T_{1/2}$: From Doppler-shift method (1977Ke06).
1358.4	4 ⁺		
1371.9	6 ⁻		
1390.5	7 ⁻		
1402.86	3 ⁻		B(E3) \uparrow =0.0228 26 B(E3) \uparrow : From 1981Mc06 where it is given as 0.00228, but their ratio B(E3) \uparrow /B(E3)(SP)=2.2 implies 0.0228 which agrees with measured value of 0.028 from 1993Su16.
1406.6	4 ⁺		
1481.4?	5 ⁺		
1517.40	2 ⁺	1.39 ps 15	B(E2) \uparrow =0.0093 9 $T_{1/2}$: From B(E2) and γ branching from Adopted Levels, Gammas dataset. B(E2) \uparrow : From 1981Mc06; other: < 0.002 (1977Ro08,1976Ha26) which is much smaller than the value adopted.
1623	6 ⁺		
1635	6 ⁺		
1653?			
1683.9	9 ⁻		
1866.7	12 ⁺	0.98 ps 8	$T_{1/2}$: From Doppler-shift method (1977Ke06).

[†] See ^{158}Gd Adopted Levels for band assignments.

 $\gamma(^{158}\text{Gd})$

$E_i(\text{level})$	J_i^π	E_γ [†]	E_f	J_f^π	Mult. [‡]	$\alpha^\#$	Comments
79.51	2 ⁺	80.	0.0	0 ⁺	E2		
261.44	4 ⁺	182	79.51	2 ⁺	E2	0.308	
538.98	6 ⁺	278	261.44	4 ⁺	E2		
904.4	8 ⁺	365.	538.98	6 ⁺			
977.1	1 ⁻	898	79.51	2 ⁺			
		977	0.0	0 ⁺			
1023.7	2 ⁻	944	79.51	2 ⁺			
1041.7	3 ⁻	780.	261.44	4 ⁺	E1	R=0.70 2.	
		962.	79.51	2 ⁺	E1	R=0.91 2.	
1158.9?	4 ⁻	897 [@]	261.44	4 ⁺			

Continued on next page (footnotes at end of table)

Coulomb excitation (continued) $\gamma(^{158}\text{Gd})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	E_f	J_f^π	Mult. [‡]	δ	Comments
1176.4	5 ⁻	637	538.98	6 ⁺			
		915	261.44	4 ⁺			
1187.1	2 ⁺	925.7	261.44	4 ⁺	E2		R=1.19 24.
		1108	79.51	2 ⁺	E2+M1	-9.0 15	R=0.816 15.
		1187.	0.0	0 ⁺	E2		R=1.48 3.
1196.1?	0 ⁺	1117@	79.51	2 ⁺			
1259.8	2 ⁺	218.2	1041.7	3 ⁻	E1		
		236.2	1023.7	2 ⁻	E1		
		282.8	977.1	1 ⁻	E1		
		998.4	261.44	4 ⁺	E2		R=1.17 13.
		1180.	79.51	2 ⁺	E2		
		1260.	0.0	0 ⁺	E2		
1263.5	1 ⁻	1184@	79.51	2 ⁺			
		1264	0.0	0 ⁺			
1265.5?	3 ⁺	1186@	79.51	2 ⁺			
1350.5	10 ⁺	446.	904.4	8 ⁺			
1358.4	4 ⁺	1097	261.44	4 ⁺			
		1279	79.51	2 ⁺			
1390.5	7 ⁻	486	904.4	8 ⁺			
		852	538.98	6 ⁺			
1402.86	3 ⁻	1141.	261.44	4 ⁺			
		1323.	79.51	2 ⁺			
1406.6	4 ⁺	1145	261.44	4 ⁺			
		1327	79.51	2 ⁺			
1481.4?	5 ⁺	1220@	261.44	4 ⁺			
1517.40	2 ⁺	114.5	1402.86	3 ⁻	E1		
		253.9	1263.5	1 ⁻	E1		
		475.8	1041.7	3 ⁻	E1		
		493.8	1023.7	2 ⁻	E1		
		540.2	977.1	1 ⁻	E1		
		1256.0	261.44	4 ⁺	E2		
		1438.0	79.51	2 ⁺	M1+E2	-1.6 15	R=0.55 9.
		1517.4	0.0	0 ⁺	E2		R=1.62 20.
1623	6 ⁺	1084@	538.98	6 ⁺			
		1362	261.44	4 ⁺			
1635	6 ⁺	1096@	538.98	6 ⁺			
		1374	261.44	4 ⁺			
1653?		1392@	261.44	4 ⁺			
1683.9	9 ⁻	780	904.4	8 ⁺			
1866.7	12 ⁺	516.	1350.5	10 ⁺			

[†] Values to 1 keV are nominal values from [1993Su16](#) and values to 0.1 keV are from ^{158}Gd Adopted γ radiations are included for use in calculation of $T_{1/2}$ from BE λ .

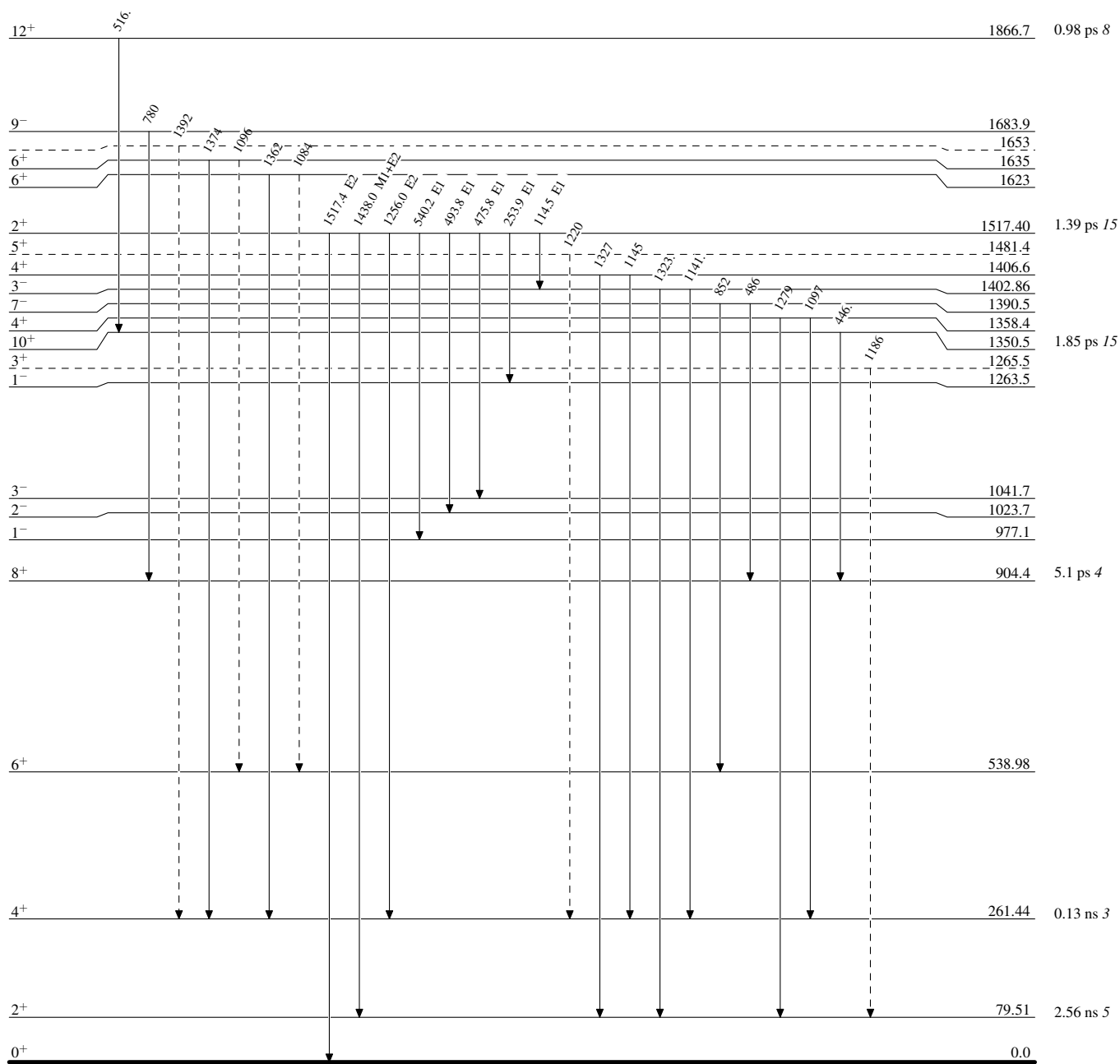
[‡] Multipole character based on initial and final levels J^π values (confirmed in the Adopted Levels, Gammas dataset). Listed in comments are the anisotropy ratios $R = W(0^\circ)/W(90^\circ)$ based on $\gamma(\theta)$ measured by [1981Mc06](#).

Values used in calculations are from ^{158}Gd Adopted γ radiations.

@ Placement of transition in the level scheme is uncertain.

Coulomb excitation

Legend

Level Scheme-----► γ Decay (Uncertain) $^{158}_{64}\text{Gd}_{94}$

Coulomb excitation

Legend

Level Scheme (continued)-----▶ γ Decay (Uncertain)