^{158}Gd(γ,γ′),^{158}Gd(e,e′) 1989Pi05,1984Be54,1984Bo09

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

(γ,γ′):
1984Be54: Irradiated natural Gd with bremsstrahlung with endpoint energy of 3.5 MeV. Authors assume that γ decay to levels above the first 2^+ is 5% 5 which allows the calculation of $\Gamma_{\gamma 0}/\Gamma$.
1989Pi05: Irradiated enriched ^{158}Gd with bremsstrahlung from 4.3 MeV e beam. Measured γ′ at three angles.
(e,e′):
1984Bo09: Irradiated enriched Gd, E_e=25 MeV. Evaluator′s estimate of FWHM is ≈ 55 keV.

^{158}Gd Levels

Model calculations and discussions that may be of interest include 1974Ku13, 1986Fa01, 1986Va26, 1987Ca28, 1987Ci04, 1987Ha38, 1989De42, 1990Fa09, 1990Li07, 1990Vl01, 1990Zi01, 1991De05, 1991De17, 1991Ma08, 1991Ra03, 1994Lo09, 1994Sa08, 1996So05, 1997PiZZ, and 1997No01.
B(E1)↑ values are given by 1989Pi05, B(M1)↑ values by 1984Be54 and 1996So05, and summed M1 strength by 1989Ha20 and 1997No01.

E(level)[†]	J^{π}[#]	$T_{1/2}$[@]	$\Gamma^2_{\gamma 0}/\Gamma$ (eV)[&]	Comments
0	0^+			
80 *1*	2^+			
1264 *1*	1^-	13 fs *4*	0.0053 *12*	
2268 *1*	1	33 fs *8*	0.0069 *12*	
2447 *1*	1	29 fs *8*	0.0048 *10*	
2566 *1*	1	33 fs *9*	0.0072 *12*	
2601 *1*	1	28 fs *10*	0.0063 *17*	
2804 *1*	1	12.5 fs *21*	0.0186 *26*	
2823 *1*	1^-	8.2 fs *22*	0.0071 *13*	
2842 *1*	1	16 fs *3*	0.0104 *16*	
2986 *1*	1	20 fs *4*	0.0110 *17*	
3039 *1*	1	24 fs *6*	0.0114 *16*	
3108 *1*	1	5.7 fs *9*	0.032 *4*	
3161 *1*	1^-	9.0 fs *27*	0.0089 *17*	
3192[‡]	1^+	4.1 fs *6*	0.056 *6*	$\Gamma^2_{\gamma 0}/\Gamma$ (eV): Other: 0.076 *18* (1984Be54).
3201[‡]	1^+	3.2 fs *4*	0.061 *7*	$\Gamma^2_{\gamma 0}/\Gamma$ (eV): Other: 0.11 *3* (1984Be54).
3259 *1*	1^-	9 fs *3*	0.0063 *14*	
3288 *1*	1	34 fs *13*	0.0063 *15*	
3299 *1*	1	7.0 fs *11*	0.030 *4*	
3428 *1*	1	23 fs *8*	0.0074 *16*	
3470 *1*	1	31 fs *12*	0.0076 *19*	
3577 *1*	1	24 fs *10*	0.012 *3*	
3820 *1*	1^-	5.2 fs *23*	0.016 *5*	
3921 *1*	1^-	2.7 fs *15*	0.019 *7*	

[†] Unless otherwise noted from 1989Pi05; from general comment, uncertainties are ≈ 1 keV.
[‡] From 1984Be54 and 1984Bo09.
[#] From 1989Pi05 where all levels above 100 keV are dipole excitations [from $\gamma(\theta)$] which are separated into K=0 or 1 levels and all K=0 levels involve E1 excitations. From (e,e′) (1984Bo09), two levels involve M1 excitations.
[@] Computed by evaluator from T=0.4562E−15/Γ where Γ is calculated as $(\Gamma^2_{\gamma 0}/\Gamma_{\gamma}) * [1 + \Gamma_{\gamma}(2^+)/\Gamma_{\gamma 0}]^2$.
[&] From 1989Pi05.

^{158}Gd(γ,γ'),^{158}Gd(e,e′) 1989Pi05,1984Be54,1984Bo09 (continued)

$\gamma(^{158}Gd)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
1264	1⁻	1184	153 *18*	80	2⁺	E1
		1264	100	0	0⁺	E1
2268	1	2188	41 *11*	80	2⁺	D
		2268	100	0	0⁺	D
2447	1	2367	80 *18*	80	2⁺	D
		2447	100	0	0⁺	D
2566	1	2486	38 *11*	80	2⁺	D
		2566	100	0	0⁺	D
2601	1	2521	62 *21*	80	2⁺	D
		2601	100	0	0⁺	D
2804	1	2724	40 *7*	80	2⁺	D
		2804	100	0	0⁺	D
2823	1⁻	2743	180 *30*	80	2⁺	E1
		2823	100	0	0⁺	E1
2842	1	2762	68 *13*	80	2⁺	D
		2842	100	0	0⁺	D
2986	1	2906	45 *12*	80	2⁺	D
		2986	100	0	0⁺	D
3039	1	2959	28 *12*	80	2⁺	D
		3039	100	0	0⁺	D
3108	1	3028	58 *7*	80	2⁺	D
		3108	100	0	0⁺	D
3161	1⁻	3081	139 *30*	80	2⁺	E1
		3161	100	0	0⁺	E1
3192	1⁺	3112	41 *5*	80	2⁺	M1
		3192	100	0	0⁺	M1
3201	1⁺	3121	53 *5*	80	2⁺	M1
		3201	100	0	0⁺	M1
3259	1⁻	3179	190 *44*	80	2⁺	E1
		3259	100	0	0⁺	E1
3288	1	3208	45 *23*	80	2⁺	D
		3288	100	0	0⁺	D
3299	1	3219	47 *7*	80	2⁺	D
		3299	100	0	0⁺	D
3428	1	3348	64 *23*	80	2⁺	D
		3428	100	0	0⁺	D
3470	1	3390	39 *23*	80	2⁺	D
		3470	100	0	0⁺	D
3577	1	3497	26 *21*	80	2⁺	D
		3577	100	0	0⁺	D
3820	1⁻	3740	135 *42*	80	2⁺	E1
		3820	100	0	0⁺	E1
3921	1⁻	3841	199 *67*	80	2⁺	E1
		3921	100	0	0⁺	E1

[†] From level energies.

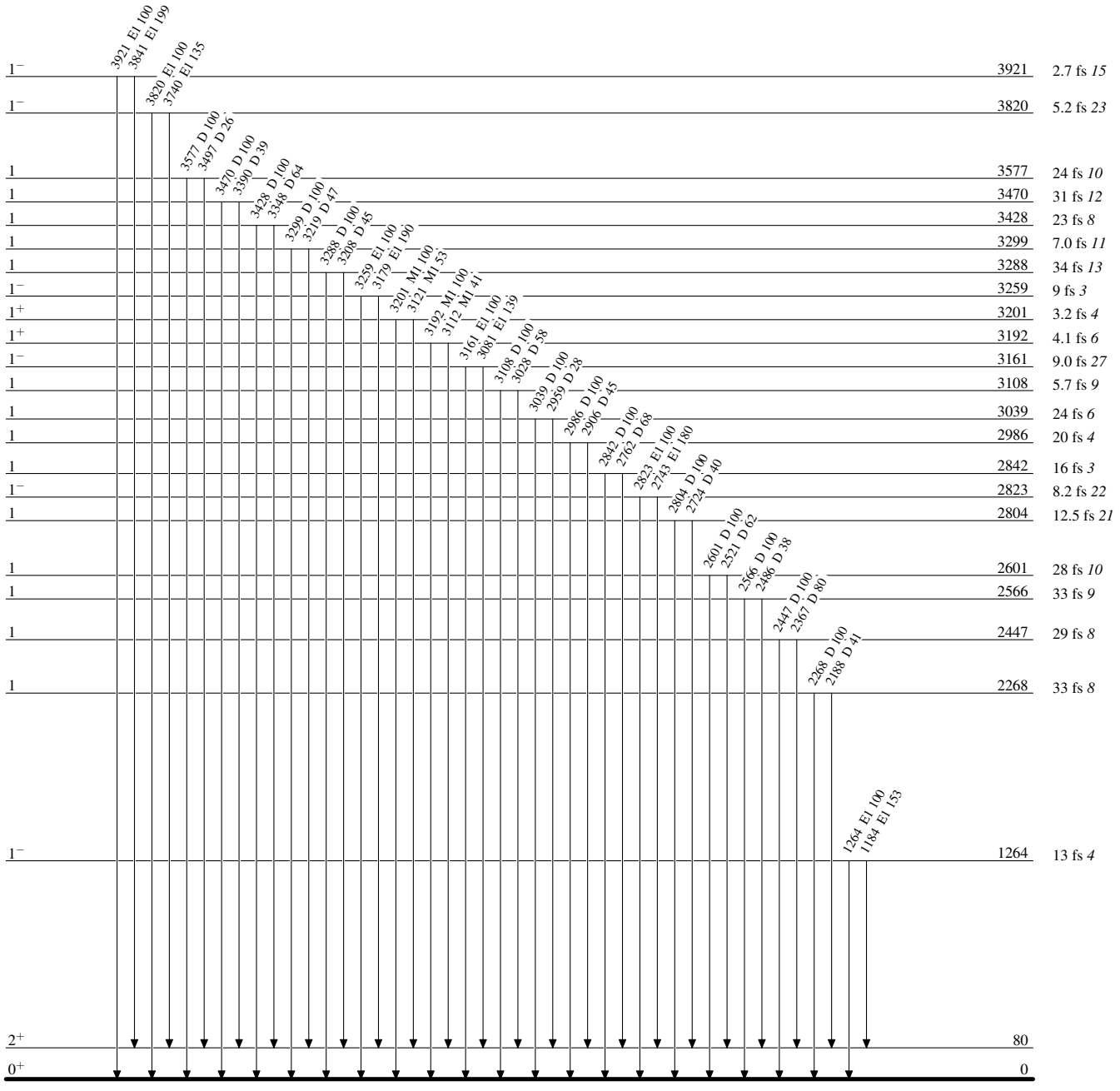
[‡] From 1989Pi05 where values are quoted as relative widths; values are relative to the ground-state transition.

[#] From scattering at 90° and 127°, authors (1989Pi05) conclude all transitions are of dipole character. This information also permits excitations with ΔK=1 and 0 to be distinguished from each other. The ΔK=0 states are considered $J^\pi=1^-$ by the authors.

^{158}Gd(γ,γ′),^{158}Gd(e,e′) 1989Pi05,1984Be54,1984Bo09

Level Scheme

Intensities: Relative photon branching from each level



$^{158}_{64}Gd_{94}$