^{160}Gd(^{19}F,α4nγ) 1998Bb02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin, E. A. Mccutchan	NDS 151, 334 (2018)	30-Jun-2018

1998Bb02: E=103, 105 MeV; SIBALL 4π array (21 Si surface barrier detectors), NORDBALL array of 20 HPGe detectors (at E=103 MeV), and 18 HPGe and 2 LEP detectors (for E=105 MeV experiment), 60-element BaF_2 multiplicity filter; thick Pb-backed and thin targets; measured Eγ, Iγ, $\gamma\gamma$ coin, α-$\gamma\gamma$ coin, DCO ratio (θ=37° (or 143°) and 79° (or 101°)).

^{171}Lu Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0&	7/2+	1269.3g	13/2+	2345.1h 3	27/2+	3581.1j 5	(37/2−)
71.0	1/2−	1274.4i 2	17/2+	2369.7# 3	27/2−	3582.0o 4	35/2−
72.6k	5/2−	1320.3l 2	19/2−	2373.7o 2	27/2−	3620.0b 4	(35/2−)
122.0a 1	9/2+	1328.0o 2	19/2−	2447.7g 2	29/2+	3640.8m 6	(35/2+)
158.8k 2	9/2−	1340.2a 1	21/2+	2509.1b 3	27/2−	3729.8a 3	(37/2+)
205.9l	3/2−	1352.7f 3	15/2+	2515.1a 1	29/2+	3796.4@ 4	37/2−
208.0i 8	1/2+	1366.8h 2	19/2+	2549.3k 2	33/2−	3813.6f 3	39/2+
220.6h	3/2+	1381.7@ 2	17/2−	2621.9@ 2	29/2−	3880.5n 4	37/2−
269.0& 1	11/2+	1416.7k 2	25/2−	2624.5m 4	27/2(+)	3889.7 4	
295.2d 1	5/2+	1454.4g 3	17/2+	2644.6 10		3893.5k 2	(41/2−)
333.5i 4	5/2+	1498.4e 8	19/2+	2675.2n 2	29/2−	3913.3c 17	(37/2−)
335.8k 2	13/2−	1541.9# 2	19/2−	2695.2f 2	31/2+	3917.7i 5	(37/2+)
364.8h 2	7/2+	1564.6n 2	21/2−	2723.0 7		4034.0& 3	(39/2+)
378.8l 6	7/2−	1576.3f 2	19/2+	2731.1i 4	29/2+	4057.5 11	
394.4e 1	7/2+	1613.1& 1	23/2+	2766.7c 9	(29/2−)	4098.3g 2	41/2+
439.8a 1	13/2+	1701.0i 2	21/2+	2830.6& 2	31/2+	4117.9h 4	39/2+
468.9n 1	9/2−	1717.8g 2	21/2+	2852.4 2		4128.1# 5	(39/2−)
519.0d 1	9/2+	1721.1@ 2	21/2−	2885.6h 3	31/2+	4178.3 6	(39/2−)
558.4i 3	9/2+	1760.2d 6	21/2+	2891.1# 3	(31/2−)	4182.7l 6	(39/2−)
593.2o 1	11/2−	1786.4l 2	23/2−	2912.8l 3	31/2−	4216.7b 6	(39/2−)
605.8k 2	17/2−	1818.1o 2	23/2−	2925.4g 2	33/2+	4242.4j 6	(41/2−)
612.0h 2	11/2+	1837.2h 3	23/2+	2972.3o 3	31/2−	4255.7m 9	(39/2+)
619.3l 3	11/2−	1843.9c 4	21/2−	3027.7j 5	(33/2−)	4335.9a 4	(41/2+)
633.5& 1	15/2+	1874.7f 2	23/2+	3041.9b 4	31/2−	4458.3n 5	(41/2−)
670.2e 2	11/2+	1901.7a 1	25/2+	3096.8m 5	(31/2+)	4477.8f 4	(43/2+)
742.2n 1	13/2−	1919.0# 2	23/2−	3137.3a 2	33/2+	4478.4@ 5	(41/2−)
841.5d 2	13/2+	1947.1k 2	29/2−	3177.1@ 3	33/2−	4585.9i 8	(41/2+)
849.0a 1	17/2+	2028.0 13		3206.7k 2	37/2−	4598.5k 3	(45/2−)
874.3i 3	13/2+	2043.6g 2	25/2+	3218.3f 2	35/2+	4663.9& 6	(43/2+)
914.3o 1	15/2−	2047.2b 3	23/2−	3285.3n 3	33/2−	4792.1g 3	(45/2+)
932.7l 2	15/2−	2092.2n 2	25/2−	3300.1i 4	33/2+	4826.9h 6	(43/2+)
951.2h 2	15/2+	2135.4@ 2	25/2−	3328.1c 13	(33/2−)	4836.0# 9	(43/2−)
967.5k 2	21/2−	2151.7 6		3389.2 8		4994.7a 5	(45/2+)
1042.1e 4	15/2+	2202.9i 3	25/2+	3440.6& 2	35/2+	5207f 4	(47/2+)
1085.0& 1	19/2+	2203.6& 1	27/2+	3472.6h 3	35/2+	5213.9@ 12	(45/2−)
1110.3n 2	17/2−	2247.2f 2	27/2+	3475.7g 2	37/2+	5340.1k 3	(49/2−)
1240.9# 1	15/2−	2268.4c 4	25/2−	3479.0# 4	(35/2−)	5352.5& 7	(47/2+)
1246.9d 2	17/2+	2321.0l 2	27/2−	3538.6l 3	35/2−	5556.3g 3	(49/2+)

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^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

^{171}Lu Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
5717.3[a] 8	(49/2+)	6132.7[k] 5	(53/2−)	6980.8[k] 9	(57/2−)	8255[g] 6	(61/2+)
5991[@] 3	(49/2−)	6389[g] 4	(53/2+)	7290[g] 5	(57/2+)	8840[k] 3	(65/2−)
5997[f] 5	(51/2+)	6505[a] 5	(53/2+)	7749[f] 7	(59/2+)	9846[k] 5	(69/2−)
6104.5[&] 12	(51/2+)	6844[f] 6	(55/2+)	7884.3[k] 16	(61/2−)	10905[k] 6	(73/2−)

† Authors′ values. A least-squares adjustment of the reported Eγ data (omitting Eγ=277.91 *18*, which is in error) reveals that 30 of the 282 Eγ values in this dataset deviate by at least 3σ from the least-squares adjusted value, and 11 of those deviate by at least 5σ. Also, the resulting level energies have much higher precision than those reported in 1998Bb02. This suggests the existence of additional (presumably systematic) uncertainties in the reported Eγ values. A private communication to the evaluator from the first author of 1998Bb02 establishes that the reported uncertainties are statistical only.

‡ Authors′ values based on transition multipolarities and deduced band structure.

[#] Band(a): (π 7/2[404])(ν 7/2[633])(ν 1/2[521]), α=−1/2 band. See comment on signature partner band.

[@] Band(A): (π 7/2[404])(ν 7/2[633])(ν 1/2[521]), α=+1/2 band. Three-quasiproton configuration excluded by intraband B(ΔJ=1)/B(ΔJ=2) values and K≈15/2 bandhead. Decays to 7/2[404] band.

[&] Band(b): π 7/2[404], α=−1/2 band.

[a] Band(B): π 7/2[404], α=+1/2 band.

[b] Band(c): (π 1/2[541])(π 1/2[411])(π 7/2[404]), α=−1/2 band. See comment on signature partner band.

[c] Band(C): (π 1/2[541])(π 1/2[411])(π 7/2[404]), α=+1/2 band. Configuration assignment supported by observed alignment and intraband B(ΔJ=1)/B(ΔJ=2) values. Decays to 7/2[404] band. Bandhead may not have been observed.

[d] Band(D): π 5/2[402], α=+1/2 band.

[e] Band(d): π 5/2[402], α=−1/2 band.

[f] Band(e): (π 1/2[541])(ν 7/2[633])(ν 1/2[521]), α=−1/2 band. See comment on signature partner band.

[g] Band(E): (π 1/2[541])(ν 7/2[633])(ν 1/2[521]), α=+1/2 band. Configuration assignment supported by observed alignment and intraband B(ΔJ=1)/B(ΔJ=2) values. Configuration known in ^{177}Re and ^{173}Ta also.

[h] Band(f): π 1/2[411], α=−1/2 band.

[i] Band(F): π 1/2[411], α=+1/2 band.

[j] Band(G): π=(−), α=+1/2 band. May contain the yrare states of the crossing of the (π 1/2[541]) band by its S band (aligned $i_{13/2}$ neutrons); assignment supported by two-band fit to E(level) for this band and the 1/2[541] α=+1/2 band.

[k] Band(H): π 1/2[541], α=+1/2 band.

[l] Band(h): π 1/2[541], α=−1/2 band.

[m] Band(I): (π 1/2[541])(ν 7/2[633])(ν π=−), α=−1/2 band. Exhibits large alignment, as does the (π 1/2[541])(ν 7/2[633])(ν 1/2[521]) band.

[n] Band(J): π 9/2[514], α=+1/2 band.

[o] Band(j): π 9/2[514], α=−1/2 band.

γ(^{171}Lu)

Eγ†	Iγ	Ei(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
84.7 *13*	5.8 *10*	1352.7	15/2+	1269.3	13/2+		
86.28 *3*	>45	158.8	9/2−	72.6	5/2−	Q	DCO=1.09 *13*.
99.04 *4*	5.3 *5*	394.4	7/2+	295.2	5/2+		
101.5 *14*	2.5 *13*	1454.4	17/2+	1352.7	15/2+		
112.90 *14*	0.9 *2*	333.5	5/2+	220.6	3/2+		
121.89 *6*	5.0 *9*	1576.3	19/2+	1454.4	17/2+		
122.03 *1*	>138	122.0	9/2+	0.0	7/2+	(D+Q)	DCO=1.24 *19*.
123.0 *4*	1.2 *2*	1701.0	21/2+	1576.3	19/2+		
124.22 *3*	14.3 *8*	593.2	11/2−	468.9	9/2−	(D)	DCO=0.7 *3*.

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^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
124.53 *4*	8.9 *6*	519.0	9/2$^+$	394.4	7/2$^+$	(D)	DCO=0.7 *6*.
125.49 *20*	1.0 *10*	333.5	5/2$^+$	208.0	1/2$^+$		
136.95 *8*	110.0 *20*	208.0	1/2$^+$	71.0	1/2$^-$		
140.79 *3*	8.6 *5*	1381.7	17/2$^-$	1240.9	15/2$^-$		DCO=1.3 *8*.
141.7 *7*	2.0 *2*	1717.8	21/2$^+$	1576.3	19/2$^+$		
144.19 *4*	62 *7*	364.8	7/2$^+$	220.6	3/2$^+$	(Q)	DCO=1.2 *6*.
146.93 *1*	58.8 *26*	269.0	11/2$^+$	122.0	9/2$^+$		DCO=1.1 *3*.
148.84 *2*	18.1 *8*	742.2	13/2$^-$	593.2	11/2$^-$		
151.25 *3*	11.1 *6*	670.2	11/2$^+$	519.0	9/2$^+$		
156.88 *4*	5.7 *3*	1874.7	23/2$^+$	1717.8	21/2$^+$	(D)	DCO=0.5 *4*.
160.26 *4*	7.7 *4*	1541.9	19/2$^-$	1381.7	17/2$^-$		DCO=1.3 *10*.
168.95 *4*	10.0 *4*	2043.6	25/2$^+$	1874.7	23/2$^+$	D	DCO=0.56 *17*.
170.79 *2*	39.0 *15*	439.8	13/2$^+$	269.0	11/2$^+$		DCO=1.02 *14*.
171.23 *3*	14.2 *7*	841.5	13/2$^+$	670.2	11/2$^+$		
172.10 *3*	15.2 *7*	914.3	15/2$^-$	742.2	13/2$^-$		
172.90 *14*	0.1 *7*	378.8	7/2$^-$	205.9	3/2$^-$		
173.48 *7*	4.0 *3*	1874.7	23/2$^+$	1701.0	21/2$^+$	(D)	DCO=0.6 *6*.
177.05 *3*	224 *9*	335.8	13/2$^-$	158.8	9/2$^-$	Q	DCO=1.04 *7*.
179.36 *6*	5.9 *3*	1721.1	21/2$^-$	1541.9	19/2$^-$		
185.13 *4*	1.1 *6*	1454.4	17/2$^+$	1269.3	13/2$^+$		
193.52[#] *8*	5.1 *6*	558.4	9/2$^+$	364.8	7/2$^+$		
193.59 *2*	25.2 *9*	633.5	15/2$^+$	439.8	13/2$^+$		
195.89 *2*	14.1 *6*	1110.3	17/2$^-$	914.3	15/2$^-$		
197.70 *9*	3.0 *2*	1919.0	23/2$^-$	1721.1	21/2$^-$		DCO=0.9 *5*.
199.61 *10*	3.5 *3*	468.9	9/2$^-$	269.0	11/2$^+$		
200.35 *6*	6.7 *4*	2447.7	29/2$^+$	2247.2	27/2$^+$	D	DCO=0.5 *3*.
200.41 *4*	9.2 *5*	1042.1	15/2$^+$	841.5	13/2$^+$	(D)	DCO=0.4 *6*.
202.2 *5*	0.5 *2*	1701.0	21/2$^+$	1498.4	19/2$^+$		
203.49 *5*	7.6 *4*	2247.2	27/2$^+$	2043.6	25/2$^+$	D+Q	DCO=0.25 *22*.
204.82 *3*	8.5 *4*	1246.9	17/2$^+$	1042.1	15/2$^+$		
210.03 *10*	2.7 *2*	1320.3	19/2$^-$	1110.3	17/2$^-$		
215.35 *3*	16.8 *7*	849.0	17/2$^+$	633.5	15/2$^+$		DCO=1.2 *3*.
216.13 *12*	2.7 *2*	2135.4	25/2$^-$	1919.0	23/2$^-$		DCO=1.1 *5*.
217.62 *3*	9.0 *4*	1328.0	19/2$^-$	1110.3	17/2$^-$		
219.8 *3*	1.3 *3*	378.8	7/2$^-$	158.8	9/2$^-$		
223.63 *19*	1.3 *2*	519.0	9/2$^+$	295.2	5/2$^+$		
223.73 *7*	4.0 *8*	1576.3	19/2$^+$	1352.7	15/2$^+$		
224.82 *10*	3.5 *5*	558.4	9/2$^+$	333.5	5/2$^+$		
229.7 *6*	0.5 *2*	841.5	13/2$^+$	612.0	11/2$^+$		
230.11 *10*	3.1 *3*	2925.4	33/2$^+$	2695.2	31/2$^+$	(D)	DCO=0.5 *5*.
232.34 *10*	3.3 *3*	1274.4	17/2$^+$	1042.1	15/2$^+$		
233.98 *14*	1.7 *2*	2369.7	27/2$^-$	2135.4	25/2$^-$		
235.85 *4*	11.3 *5*	1085.0	19/2$^+$	849.0	17/2$^+$		
236.39[#] *4*	9.3 *4*	1564.6	21/2$^-$	1328.0	19/2$^-$		
240.41 *23*	2.4 *3*	619.3	11/2$^-$	378.8	7/2$^-$		
247.10 *4*	19.5 *12*	612.0	11/2$^+$	364.8	7/2$^+$	Q	DCO=1.16 *22*.
247.43 *7*	5.9 *4*	2695.2	31/2$^+$	2447.7	29/2$^+$	D	DCO=0.60 *15*.
251.69 *17*	2.0 *2*	2621.9	29/2$^-$	2369.7	27/2$^-$		
252.04 *14*	2.8 *3*	1498.4	19/2$^+$	1246.9	17/2$^+$		
253.39 *3*	9.5 *4*	1818.1	23/2$^-$	1564.6	21/2$^-$		
254.88[#] *5*	8.5 *4*	1340.2	21/2$^+$	1085.0	19/2$^+$		
257.49 *20*	2.2 *2*	3475.7	37/2$^+$	3218.3	35/2$^+$		
261.84 *13*	2.6 *3*	1760.2	21/2$^+$	1498.4	19/2$^+$		
262.49 *8*	5.3 *4*	874.3	13/2$^+$	612.0	11/2$^+$	(D)	DCO=0.7 *7*.
263.1 *4*	3.1 *3*	1717.8	21/2$^+$	1454.4	17/2$^+$		

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^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
268.90 *2*	53.3 *26*	269.0	$11/2^+$	0.0	$7/2^+$	Q	DCO=1.04 *9*.
270.05 *3*	234 *7*	605.8	$17/2^-$	335.8	$13/2^-$	Q	DCO=1.02 *6*.
272.80 *7*	6.8 *4*	1613.1	$23/2^+$	1340.2	$21/2^+$		
273.6[#] *4*	2.0 *3*	742.2	$13/2^-$	468.9	$9/2^-$		E_γ: corrected value (from private communication between evaluator and first author of 1998Bb02); published value of 277.91 *18* is not correct.
273.89 *4*	9.8 *4*	2092.2	$25/2^-$	1818.1	$23/2^-$		
275.77 *8*	3.8 *3*	670.2	$11/2^+$	394.4	$7/2^+$		
281.25[#] *4*	8.2 *4*	2373.7	$27/2^-$	2092.2	$25/2^-$		
283.66 *14*	2.6 *4*	619.3	$11/2^-$	335.8	$13/2^-$		
288.44 *5*	7.2 *4*	1901.7	$25/2^+$	1613.1	$23/2^+$		
291.72[#] *12*	17.5 *25*	364.8	$7/2^+$	72.6	$5/2^-$		
292.33 *26*	3.2 *3*	3218.3	$35/2^+$	2925.4	$33/2^+$		
295.13 *2*	>16	295.2	$5/2^+$	0.0	$7/2^+$		
295.65 *8*	5.4 *4*	1246.9	$17/2^+$	951.2	$15/2^+$		
296.43 *13*	4.4 *6*	3582.0	$35/2^-$	3285.3	$33/2^-$		
296.96 *15*	4.3 *6*	2972.3	$31/2^-$	2675.2	$29/2^-$		
298.37 *8*	5.8 *3*	3880.5	$37/2^-$	3582.0	$35/2^-$		
298.42 *3*	22.5 *11*	1874.7	$23/2^+$	1576.3	$19/2^+$	Q	DCO=1.1 *3*.
300.99 *5*	9.8 *5*	1541.9	$19/2^-$	1240.9	$15/2^-$		DCO=0.6 *4*. Mult.: DCO is inconsistent with proposed stretched Q character as suggested by the J^π assignments.
301.36 *5*	7.2 *4*	2675.2	$29/2^-$	2373.7	$27/2^-$		
302.04 *7*	5.4 *4*	2203.6	$27/2^+$	1901.7	$25/2^+$		
303.61 *25*	3.0 *3*	3440.6	$35/2^+$	3137.3	$33/2^+$		
306.29 *13*	2.5 *2*	3137.3	$33/2^+$	2830.6	$31/2^+$		
306.4 *5*	0.9 *2*	378.8	$7/2^-$	72.6	$5/2^-$		
311.11 *10*	3.5 *3*	2515.1	$29/2^+$	2203.6	$27/2^+$		
312.91 *7*	4.4 *3*	3285.3	$33/2^-$	2972.3	$31/2^-$		
313.51 *8*	8.0 *5*	932.7	$15/2^-$	619.3	$11/2^-$		
314.96[#] *11*	3.7 *3*	2830.6	$31/2^+$	2515.1	$29/2^+$		
315.91 *8*	9.5 *7*	874.3	$13/2^+$	558.4	$9/2^+$		
317.73 *1*	84 *3*	439.8	$13/2^+$	122.0	$9/2^+$	Q	DCO=1.04 *9*.
321.12 *7*	6.3 *4*	914.3	$15/2^-$	593.2	$11/2^-$		
322.59 *6*	7.4 *4*	841.5	$13/2^+$	519.0	$9/2^+$		
322.73 *14*	3.2 *3*	1274.4	$17/2^+$	951.2	$15/2^+$		
324.20 *19*	3.6 *3*	593.2	$11/2^-$	269.0	$11/2^+$		
325.75 *3*	20.6 *8*	2043.6	$25/2^+$	1717.8	$21/2^+$	Q	DCO=0.94 *15*.
326.52 *17*	2.9 *4*	932.7	$15/2^-$	605.8	$17/2^-$	D	DCO=0.46 *27*.
334.05 *6*	6.6 *3*	1701.0	$21/2^+$	1366.8	$19/2^+$		
339.17 *4*	22.0 *10*	951.2	$15/2^+$	612.0	$11/2^+$		
339.36 *3*	15.4 *7*	1721.1	$21/2^-$	1381.7	$17/2^-$	Q	DCO=1.02 *18*.
342.60 *3*	15.9 *6*	2043.6	$25/2^+$	1701.0	$21/2^+$	Q	DCO=0.91 *19*.
346.74 *2*	32.1 *20*	468.9	$9/2^-$	122.0	$9/2^+$		
350.73 *7*	5.3 *3*	1717.8	$21/2^+$	1366.8	$19/2^+$		
353.20 *12*	3.9 *3*	1320.3	$19/2^-$	967.5	$21/2^-$		
361.62 *3*	229 *7*	967.5	$21/2^-$	605.8	$17/2^-$		
364.55 *1*	89 *3*	633.5	$15/2^+$	269.0	$11/2^+$		
366.25 *22*	2.4 *3*	2202.9	$25/2^+$	1837.2	$23/2^+$		
368.18 *6*	7.5 *4*	1110.3	$17/2^-$	742.2	$13/2^-$		
369.8 *4*	0.9 *2*	1786.4	$23/2^-$	1416.7	$25/2^-$		
371.87 *5*	10.6 *6*	1042.1	$15/2^+$	670.2	$11/2^+$		
372.45 *2*	31.9 *12*	2247.2	$27/2^+$	1874.7	$23/2^+$	(Q)	DCO=1.02 *20*.
377.07 *3*	15.5 *7*	1919.0	$23/2^-$	1541.9	$19/2^-$	(Q)	DCO=0.9 *3*.
386.32 *20*	1.6 *2*	2731.1	$29/2^+$	2345.1	$27/2^+$		

Continued on next page (footnotes at end of table)

^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
387.71 *7*	9.5 *6*	1320.3	19/2$^-$	932.7	15/2$^-$		
391.33[#] *8*	5.7 *4*	1240.9	15/2$^-$	849.0	17/2$^+$	(D)	DCO=0.8 *3*.
393.1 *10*	0.7 *4*	1760.2	21/2$^+$	1366.8	19/2$^+$		
394.40 *9*	3.5 *4*	394.4	7/2$^+$	0.0	7/2$^+$		
395.34 *7*	5.6 *4*	1328.0	19/2$^-$	932.7	15/2$^-$		
396.96 *7*	3.6 *4*	519.0	9/2$^+$	122.0	9/2$^+$		
400.17 *7*	8.0 *5*	1274.4	17/2$^+$	874.3	13/2$^+$		
401.49 *8*	6.6 *4*	670.2	11/2$^+$	269.0	11/2$^+$		
404.10 *2*	42.6 *15*	2447.7	29/2$^+$	2043.6	25/2$^+$		
405.29 *5*	13.8 *7*	1246.9	17/2$^+$	841.5	13/2$^+$		
405.69 *13*	5.2 *4*	1320.3	19/2$^-$	914.3	15/2$^-$		
409.22 *1*	82 *3*	849.0	17/2$^+$	439.8	13/2$^+$	Q	DCO=1.02 *9*.
413.76 *6*	7.2 *4*	1328.0	19/2$^-$	914.3	15/2$^-$		
414.27 *3*	16.7 *7*	2135.4	25/2$^-$	1721.1	21/2$^-$	Q	DCO=1.06 *16*.
414.7 *3*	1.4 *3*	3300.1	33/2$^+$	2885.6	31/2$^+$		
415.53 *4*	18.1 *8*	1366.8	19/2$^+$	951.2	15/2$^+$	Q	DCO=1.07 *16*.
424.65 *10*	3.6 *3*	2268.4	25/2$^-$	1843.9	21/2$^-$		
426.34 *12*	3.3 *3*	1701.0	21/2$^+$	1274.4	17/2$^+$		
443.14 *13*	0.8 *3*	2202.9	25/2$^+$	1760.2	21/2$^+$		
443.30 *11*	3.7 *3*	1717.8	21/2$^+$	1274.4	17/2$^+$		
448.00 *3*	29.6 *12*	2695.2	31/2$^+$	2247.2	27/2$^+$	Q	DCO=1.00 *18*.
449.09 *3*	203 *6*	1416.7	25/2$^-$	967.5	21/2$^-$	Q	DCO=1.06 *7*.
450.74 *6*	10.6 *7*	2369.7	27/2$^-$	1919.0	23/2$^-$	Q	DCO=1.1 *4*.
451.49 *2*	76.1 *26*	1085.0	19/2$^+$	633.5	15/2$^+$	(Q)	DCO=1.12 *11*.
452.79 *26*	2.8 *5*	612.0	11/2$^+$	158.8	9/2$^-$		
454.13 *5*	16.4 *7*	1701.0	21/2$^+$	1246.9	17/2$^+$		
454.43 *4*	12.9 *6*	1564.6	21/2$^-$	1110.3	17/2$^-$		
456.70 *10*	5.8 *5*	1498.4	19/2$^+$	1042.1	15/2$^+$		
458.9 *3*	1.4 *3*	1786.4	23/2$^-$	1328.0	19/2$^-$		
460.55 *14*	4.7 *8*	619.3	11/2$^-$	158.8	9/2$^-$	D	DCO=0.4 *4*.
461.96 *7*	6.6 *4*	2509.1	27/2$^-$	2047.2	23/2$^-$		
466.02 *6*	11.0 *6*	1786.4	23/2$^-$	1320.3	19/2$^-$	(Q)	DCO=0.9 *6*.
469.21[#] *5*	17.4 *13*	468.9	9/2$^-$	0.0	7/2$^+$		
470.48 *8*	8.9 *6*	1837.2	23/2$^+$	1366.8	19/2$^+$	Q	DCO=1.0 *5*.
470.81 *3*	20.1 *8*	1717.8	21/2$^+$	1246.9	17/2$^+$	(Q)	DCO=0.90 *13*.
472.35 *9*	4.5 *3*	3096.8	(31/2$^+$)	2624.5	27/2$^{(+)}$		
477.69 *2*	40.5 *14*	2925.4	33/2$^+$	2447.7	29/2$^+$	Q	DCO=1.06 *12*.
485.06 *20*	3.1 *5*	2202.9	25/2$^+$	1717.8	21/2$^+$	(Q)	DCO=0.8 *4*.
485.70 *18*	4.4 *5*	1760.2	21/2$^+$	1274.4	17/2$^+$		
486.49 *4*	15.5 *7*	2621.9	29/2$^-$	2135.4	25/2$^-$	(Q)	DCO=0.94 *17*.
490.22 *6*	13.6 *7*	1818.1	23/2$^-$	1328.0	19/2$^-$		
491.23 *2*	66.6 *22*	1340.2	21/2$^+$	849.0	17/2$^+$	Q	DCO=1.06 *8*.
498.14 *13*	3.2 *3*	1818.1	23/2$^-$	1320.3	19/2$^-$		
498.31 *21*	7.1 *4*	2766.7	(29/2$^-$)	2268.4	25/2$^-$		
501.84 *8*	7.6 *5*	2202.9	25/2$^+$	1701.0	21/2$^+$		DCO=1.3 *5*. Q.
508.09 *11*	6.3 *5*	2345.1	27/2$^+$	1837.2	23/2$^+$		
508.29 *13*	4.8 *4*	1874.7	23/2$^+$	1366.8	19/2$^+$		
521.44 *5*	11.4 *6*	2891.1	(31/2$^-$)	2369.7	27/2$^-$		
523.12 *3*	28.0 *10*	3218.3	35/2$^+$	2695.2	31/2$^+$	Q	DCO=0.85 *18*.
527.5 *3*	2.5 *4*	3041.9	31/2$^-$	2515.1	29/2$^+$		
527.52 *26*	13.1 *6*	2092.2	25/2$^-$	1564.6	21/2$^-$		
528.05 *9*	7.2 *7*	2731.1	29/2$^+$	2202.9	25/2$^+$		
528.16 *2*	62.2 *21*	1613.1	23/2$^+$	1085.0	19/2$^+$	Q	DCO=0.91 *9*.
530.37 *3*	158 *5*	1947.1	29/2$^-$	1416.7	25/2$^-$	Q	DCO=0.97 *7*.
532.71 *6*	10.0 *5*	3041.9	31/2$^-$	2509.1	27/2$^-$		

Continued on next page (footnotes at end of table)

^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
534.61 *6*	14.9 *7*	2321.0	27/2$^-$	1786.4	23/2$^-$	Q	DCO=1.2 *4*.
540.52 *13*	4.4 *4*	2885.6	31/2$^+$	2345.1	27/2$^+$		
543.98 *12*	3.2 *3*	3640.8	(35/2$^+$)	3096.8	(31/2$^+$)		
550.38 *2*	36.0 *12*	3475.7	37/2$^+$	2925.4	33/2$^+$	Q	DCO=1.05 *13*.
553.40 *19*	1.9 *2*	3581.1	(37/2$^-$)	3027.7	(33/2$^-$)		
555.21 *4*	12.1 *6*	3177.1	33/2$^-$	2621.9	29/2$^-$	Q	DCO=0.96 *12*.
555.74 *5*	12.2 *6*	2373.7	27/2$^-$	1818.1	23/2$^-$		
561.45 *24*	6.5 *5*	3328.1	(33/2$^-$)	2766.7	(29/2$^-$)	Q	DCO=0.84 *9*.
561.56 *2*	56.8 *19*	1901.7	25/2$^+$	1340.2	21/2$^+$	Q	DCO=0.94 *10*.
569.04 *7*	10.9 *6*	3300.1	33/2$^+$	2731.1	29/2$^+$		
577.79 *9*	5.8 *4*	4458.3	(41/2$^-$)	3880.5	37/2$^-$		
578.13 *6*	9.8 *5*	3620.0	(35/2$^-$)	3041.9	31/2$^-$		
583.20 *5*	13.4 *6*	2675.2	29/2$^-$	2092.2	25/2$^-$		
585.2 *3*	4.5 *3*	3913.3	(37/2$^-$)	3328.1	(33/2$^-$)		
587.08 *9*	7.1 *4*	3472.6	35/2$^+$	2885.6	31/2$^+$		
587.88 *6*	9.7 *5*	3479.0	(35/2$^-$)	2891.1	(31/2$^-$)		
590.49 *3*	42.7 *15*	2203.6	27/2$^+$	1613.1	23/2$^+$	Q	DCO=0.87 *13*.
591.83 *7*	12.7 *6*	2912.8	31/2$^-$	2321.0	27/2$^-$		
592.43 *6*	14.3 *8*	3729.8	(37/2$^+$)	3137.3	33/2$^+$		
593.37 *7*	12.7 *7*	4034.0	(39/2$^+$)	3440.6	35/2$^+$		
595.24 *9*	8.4 *5*	3880.5	37/2$^-$	3285.3	33/2$^-$		
595.32 *4*	21.3 *8*	3813.6	39/2$^+$	3218.3	35/2$^+$	Q	DCO=0.94 *10*.
596.68 *9*	6.5 *4*	4216.7	(39/2$^-$)	3620.0	(35/2$^-$)		
596.88 *11*	10.1 *8*	932.7	15/2$^-$	335.8	13/2$^-$	D	DCO=0.34 *24*.
598.59 *6*	12.4 *6*	2972.3	31/2$^-$	2373.7	27/2$^-$		
602.20 *3*	113 *4*	2549.3	33/2$^-$	1947.1	29/2$^-$	Q	DCO=0.96 *7*.
606.17 *7*	8.3 *5*	4335.9	(41/2$^+$)	3729.8	(37/2$^+$)		
607.41 *11*	7.1 *5*	2509.1	27/2$^-$	1901.7	25/2$^+$		
607.60 *11*	7.0 *5*	1240.9	15/2$^-$	633.5	15/2$^+$		
609.96 *16*	7.2 *8*	3582.0	35/2$^-$	2972.3	31/2$^-$		
609.99 *4*	20.3 *8*	3440.6	35/2$^+$	2830.6	31/2$^+$		
610.29 *12*	9.2 *8*	3285.3	33/2$^-$	2675.2	29/2$^-$		
610.85 *12*	6.7 *5*	2028.0		1416.7	25/2$^-$		
613.39 *2*	41.3 *14*	2515.1	29/2$^+$	1901.7	25/2$^+$	Q	DCO=0.94 *13*.
614.85 *18*	2.1 *3*	4255.7	(39/2$^+$)	3640.8	(35/2$^+$)		
615.25 *18*	5.2 *5*	951.2	15/2$^+$	335.8	13/2$^-$		
617.61 *9*	9.1 *6*	3917.7	(37/2$^+$)	3300.1	33/2$^+$		
619.38 *6*	9.6 *5*	3796.4	37/2$^-$	3177.1	33/2$^-$	Q	DCO=0.97 *14*.
622.28 *3*	22.9 *9*	3137.3	33/2$^+$	2515.1	29/2$^+$		
622.53 *4*	18.5 *7*	4098.3	41/2$^+$	3475.7	37/2$^+$	Q	DCO=0.95 *11*.
625.76 *7*	11.5 *6*	3538.6	35/2$^-$	2912.8	31/2$^-$		
627.01 *3*	30.7 *11*	2830.6	31/2$^+$	2203.6	27/2$^+$		
629.92 *13*	5.1 *4*	4663.9	(43/2$^+$)	4034.0	(39/2$^+$)		
634.85[#] *12*	7.0 *4*	2247.2	27/2$^+$	1613.1	23/2$^+$		
639.65 *10*	6.2 *4*	4178.3	(39/2$^-$)	3538.6	35/2$^-$		
644.09 *16*	3.7 *4*	4182.7	(39/2$^-$)	3538.6	35/2$^-$		
645.36 *11*	5.4 *4*	4117.9	39/2$^+$	3472.6	35/2$^+$		
649.04 *7*	7.6 *4*	4128.1	(39/2$^-$)	3479.0	(35/2$^-$)		
655.03 *11*	8.1 *6*	2268.4	25/2$^-$	1613.1	23/2$^+$		
657.45 *3*	76.9 *24*	3206.7	37/2$^-$	2549.3	33/2$^-$	Q	DCO=0.95 *8*.
658.81 *10*	8.0 *7*	4994.7	(45/2$^+$)	4335.9	(41/2$^+$)		
661.21 *10*	7.2 *4*	4242.4	(41/2$^-$)	3581.1	(37/2$^-$)		
664.16 *7*	9.6 *5*	4477.8	(43/2$^+$)	3813.6	39/2$^+$		
668.15 *15*	3.9 *4*	4585.9	(41/2$^+$)	3917.7	(37/2$^+$)		
681.99 *11*	4.5 *3*	4478.4	(41/2$^-$)	3796.4	37/2$^-$		

Continued on next page (footnotes at end of table)

^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
682.89 *9*	7.1 *4*	3889.7		3206.7	37/2$^-$		
686.79 *4*	43.2 *14*	3893.5	(41/2$^-$)	3206.7	37/2$^-$		
688.56 *13*	3.9 *3*	5352.5	(47/2$^+$)	4663.9	(43/2$^+$)		
693.00 *10*	8.6 *6*	1541.9	19/2$^-$	849.0	17/2$^+$	D	DCO=0.7 *5*.
693.90 *6*	10.4 *5*	4792.1	(45/2$^+$)	4098.3	41/2$^+$		
705.03 *4*	29.8 *17*	4598.5	(45/2$^-$)	3893.5	(41/2$^-$)		
706.93 *9*	6.8 *6*	2047.2	23/2$^-$	1340.2	21/2$^+$	D	DCO=0.44 *18*.
707.94 *21*	2.5 *3*	4836.0	(43/2$^-$)	4128.1	(39/2$^-$)		
709.06 *10*	6.4 *4*	4826.9	(43/2$^+$)	4117.9	39/2$^+$		
714.61 *14*	6.4 *6*	1320.3	19/2$^-$	605.8	17/2$^-$	D+Q	DCO=0.24 *19*.
722.53 *18*	7.4 *5*	5717.3	(49/2$^+$)	4994.7	(45/2$^+$)		
723.29[#] *19*	4.6 *4*	1328.0	19/2$^-$	605.8	17/2$^-$		
729.2 *10*	6.7 *3*	5207	(47/2$^+$)	4477.8	(43/2$^+$)		
734.91 *14*	5.5 *5*	2151.7		1416.7	25/2$^-$		
735.5 *3*	3.2 *5*	5213.9	(45/2$^-$)	4478.4	(41/2$^-$)		
741.52 *6*	16.9 *9*	5340.1	(49/2$^-$)	4598.5	(45/2$^-$)		
748.32 *7*	10.8 *7*	1381.7	17/2$^-$	633.5	15/2$^+$	D	DCO=0.56 *14*.
752.06 *24*	5.5 *5*	6104.5	(51/2$^+$)	5352.5	(47/2$^+$)		
759.39 *15*	4.0 *6*	1843.9	21/2$^-$	1085.0	19/2$^+$	D	DCO=0.6 *3*.
760.93 *10*	9.0 *5*	1366.8	19/2$^+$	605.8	17/2$^-$	D+Q	DCO=0.29 *17*.
764.1 *3*	6.7 *11*	5556.3	(49/2$^+$)	4792.1	(45/2$^+$)		
775.88 *18*	3.4 *4*	2723.0		1947.1	29/2$^-$		
776.8 *8*	2.3 *4*	5991	(49/2$^-$)	5213.9	(45/2$^-$)		
787.8 *14*	3.7 *4*	6505	(53/2$^+$)	5717.3	(49/2$^+$)		
789.58 *20*	4.1 *10*	5997	(51/2$^+$)	5207	(47/2$^+$)		
792.66 *10*	10.3 *6*	6132.7	(53/2$^-$)	5340.1	(49/2$^-$)		
801.33 *5*	18.1 *10*	1240.9	15/2$^-$	439.8	13/2$^+$	D	DCO=0.54 *6*.
818.84 *11*	6.3 *4*	1786.4	23/2$^-$	967.5	21/2$^-$	D+Q	DCO=0.17 *14*.
833.0 *3*	5.3 *8*	6389	(53/2$^+$)	5556.3	(49/2$^+$)		
847.80 *9*	4.0 *8*	6844	(55/2$^+$)	5997	(51/2$^+$)		
848.03 *20*	9.0 *4*	6980.8	(57/2$^-$)	6132.7	(53/2$^-$)		
850.7 *3*	3.1 *3*	4057.5		3206.7	37/2$^-$		
869.68 *12*	6.9 *5*	1837.2	23/2$^+$	967.5	21/2$^-$	D	DCO=0.47 *20*.
874.14 *19*	3.1 *4*	3389.2		2515.1	29/2$^+$		
901.1 *7*	3.0 *7*	7290	(57/2$^+$)	6389	(53/2$^+$)		
903.5 *4*	5.6 *7*	7884.3	(61/2$^-$)	6980.8	(57/2$^-$)		
904.28 *13*	5.2 *4*	2321.0	27/2$^-$	1416.7	25/2$^-$		
904.4 *10*	1.0 *4*	7749	(59/2$^+$)	6844	(55/2$^+$)		
907.6 *3*	3.0 *3*	1874.7	23/2$^+$	967.5	21/2$^-$		
910.91 *18*	2.9 *3*	4117.9	39/2$^+$	3206.7	37/2$^-$		
923.31 *13*	4.8 *4*	3472.6	35/2$^+$	2549.3	33/2$^-$		
928.42 *10*	7.8 *5*	2345.1	27/2$^+$	1416.7	25/2$^-$	Q	DCO=0.93 *18*.
938.54 *9*	6.9 *4*	2885.6	31/2$^+$	1947.1	29/2$^-$	D	DCO=0.52 *13*.
955.3 *6*	3.1 *6*	8840	(65/2$^-$)	7884.3	(61/2$^-$)		
964.9 *10*	1.8 *6*	8255	(61/2$^+$)	7290	(57/2$^+$)		
965.61 *18*	2.8 *3*	2912.8	31/2$^-$	1947.1	29/2$^-$		
970.83 *8*	1.3 *3*	1576.3	19/2$^+$	605.8	17/2$^-$		
989.7 *3*	1.5 *2*	3538.6	35/2$^-$	2549.3	33/2$^-$		
1006.8 *7*	2.0 *4*	9846	(69/2$^-$)	8840	(65/2$^-$)		
1017.01 *16*	5.5 *8*	1352.7	15/2$^+$	335.8	13/2$^-$	D	DCO=0.57 *25*.
1031.68 *15*	4.9 *3*	3581.1	(37/2$^-$)	2549.3	33/2$^-$		
1035.86 *25*	2.3 *3*	4242.4	(41/2$^-$)	3206.7	37/2$^-$		
1058.6 *7*	1.4 *4*	10905	(73/2$^-$)	9846	(69/2$^-$)		
1080.49 *14*	3.3 *3*	3027.7	(33/2$^-$)	1947.1	29/2$^-$	Q	DCO=1.5 *5*.
1207.83 *9*	5.7 *4*	2624.5	27/2$^{(+)}$	1416.7	25/2$^-$	D	DCO=0.51 *12*.

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^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)

$\gamma(^{171}Lu)$ (continued)

E_γ [†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Comments
1227.83 *25*	2.5 *3*	2644.6		1416.7	25/2$^-$	
1435.76 *19*	2.8 *3*	2852.4		1416.7	25/2$^-$	DCO=1.10 *22*.

† Uncertainties are statistical only; see general comment on level energies.
‡ Based on measured DCO ratio. Expected ratios are 1.0 for stretched Q (or D, ΔJ=0) transitions and≈0.6 for stretched D transitions.
# Deviates from least-squares adjusted value by at least 5σ.

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme

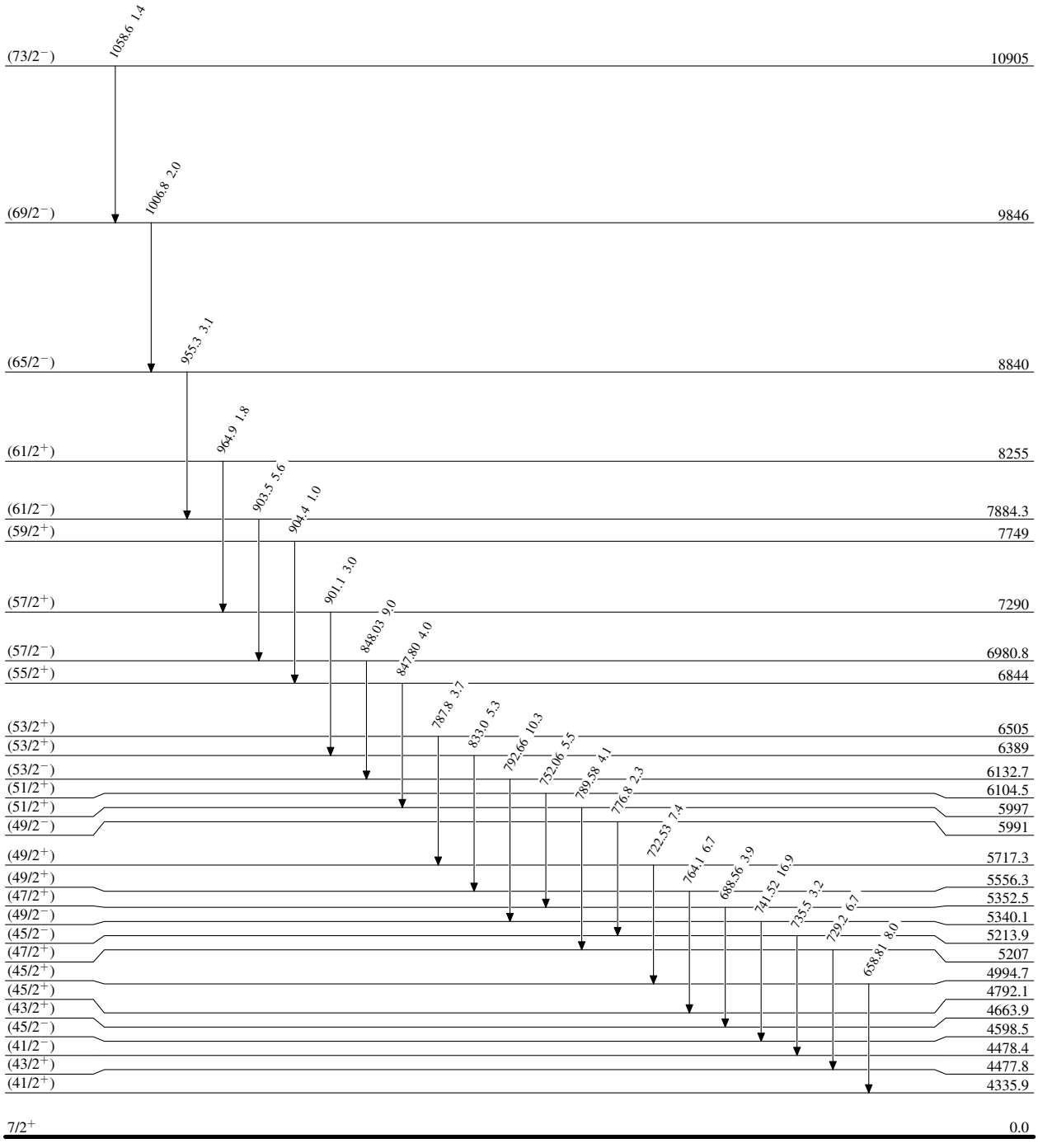
Intensities: Relative I_γ

Legend

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

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

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



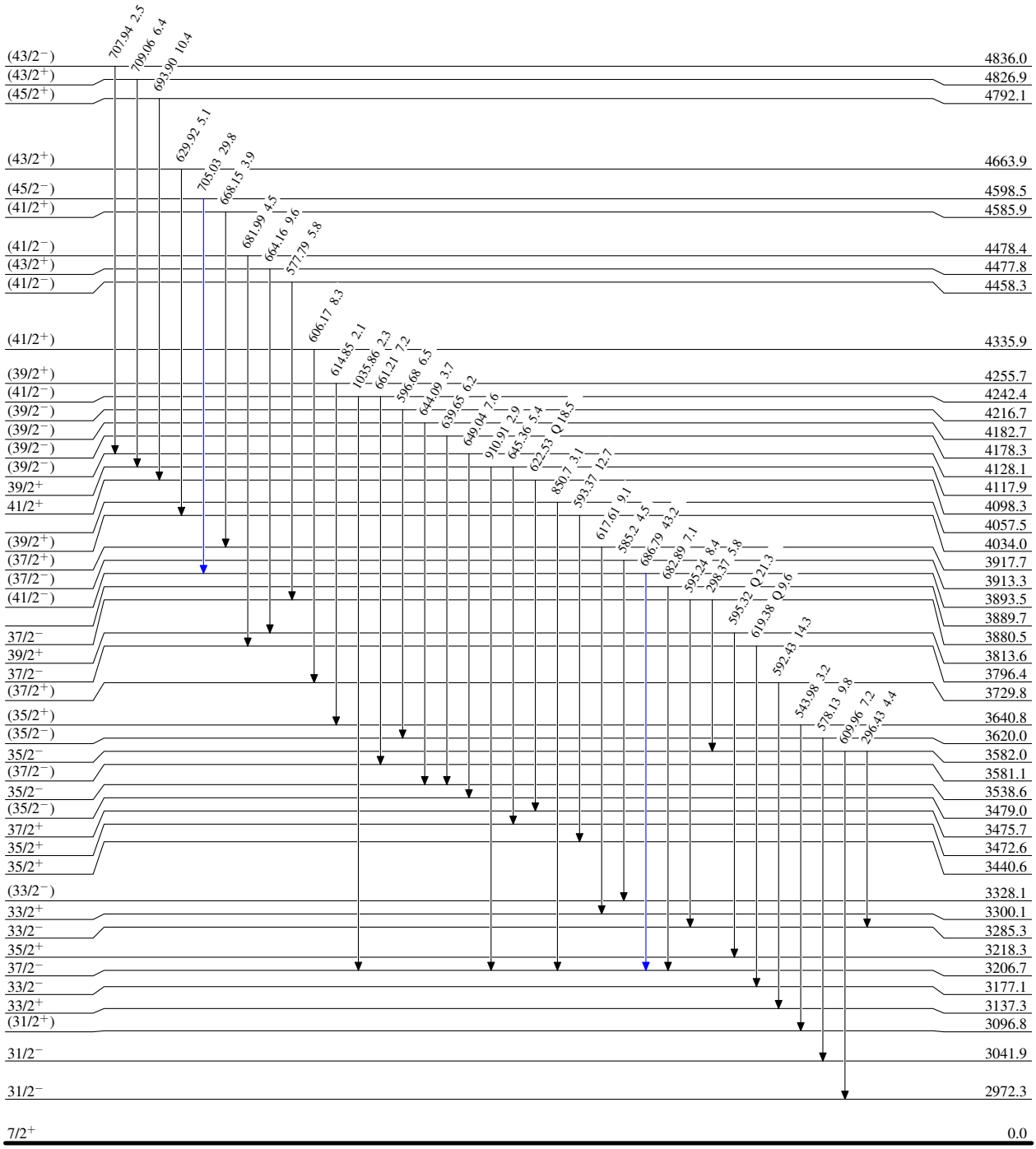
$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



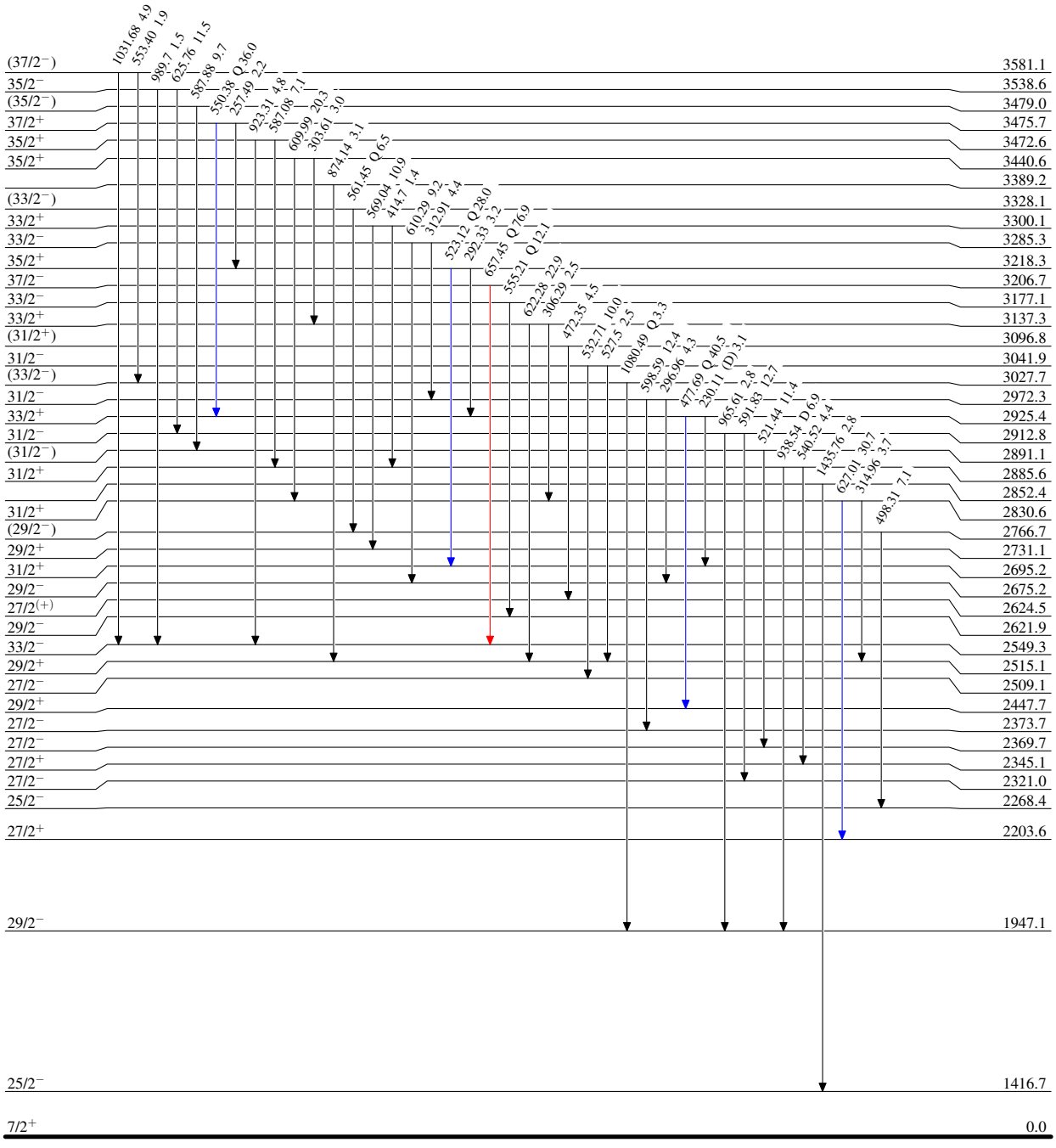
$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

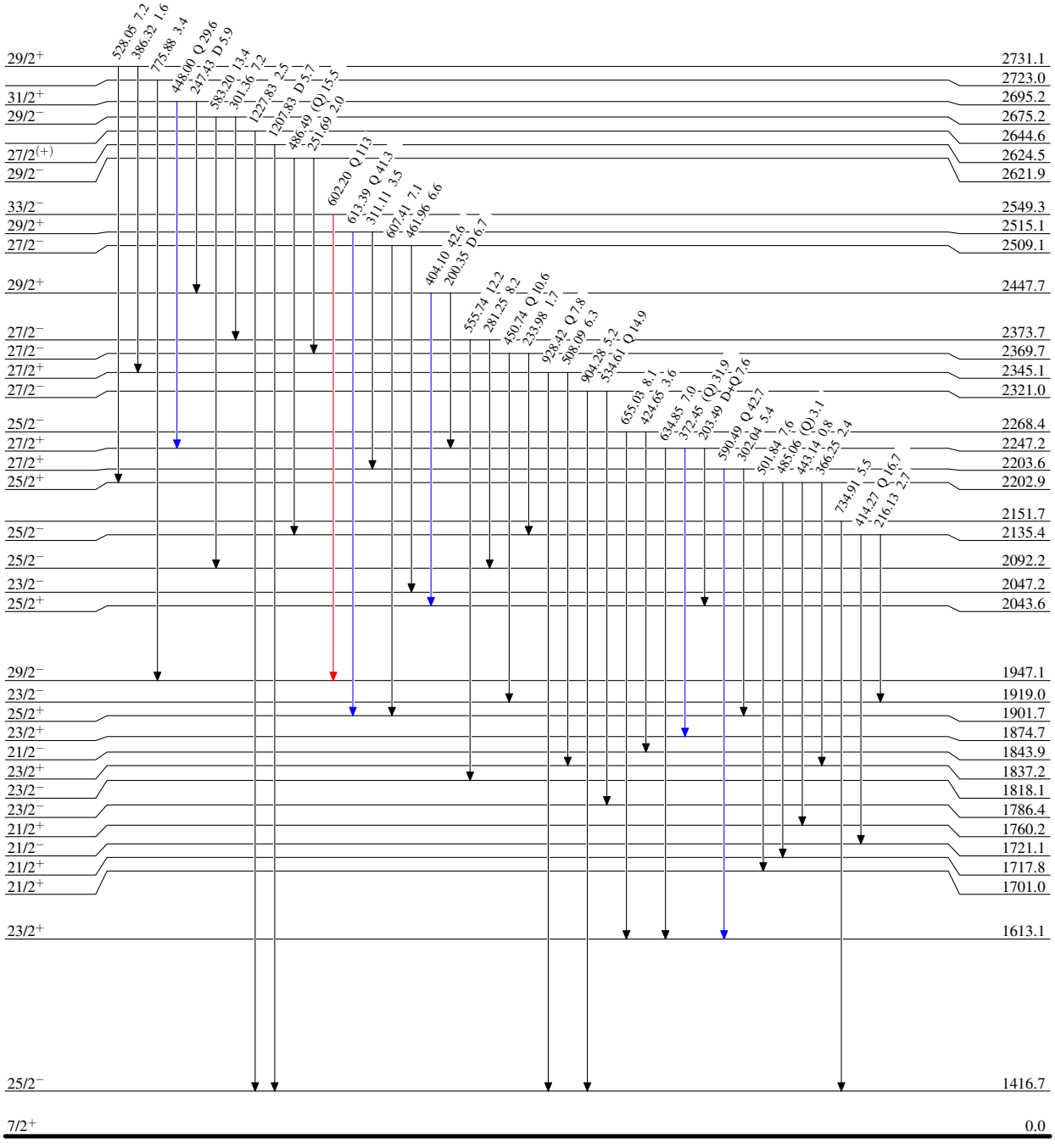
Intensities: Relative I_γ

Legend

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

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

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



$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

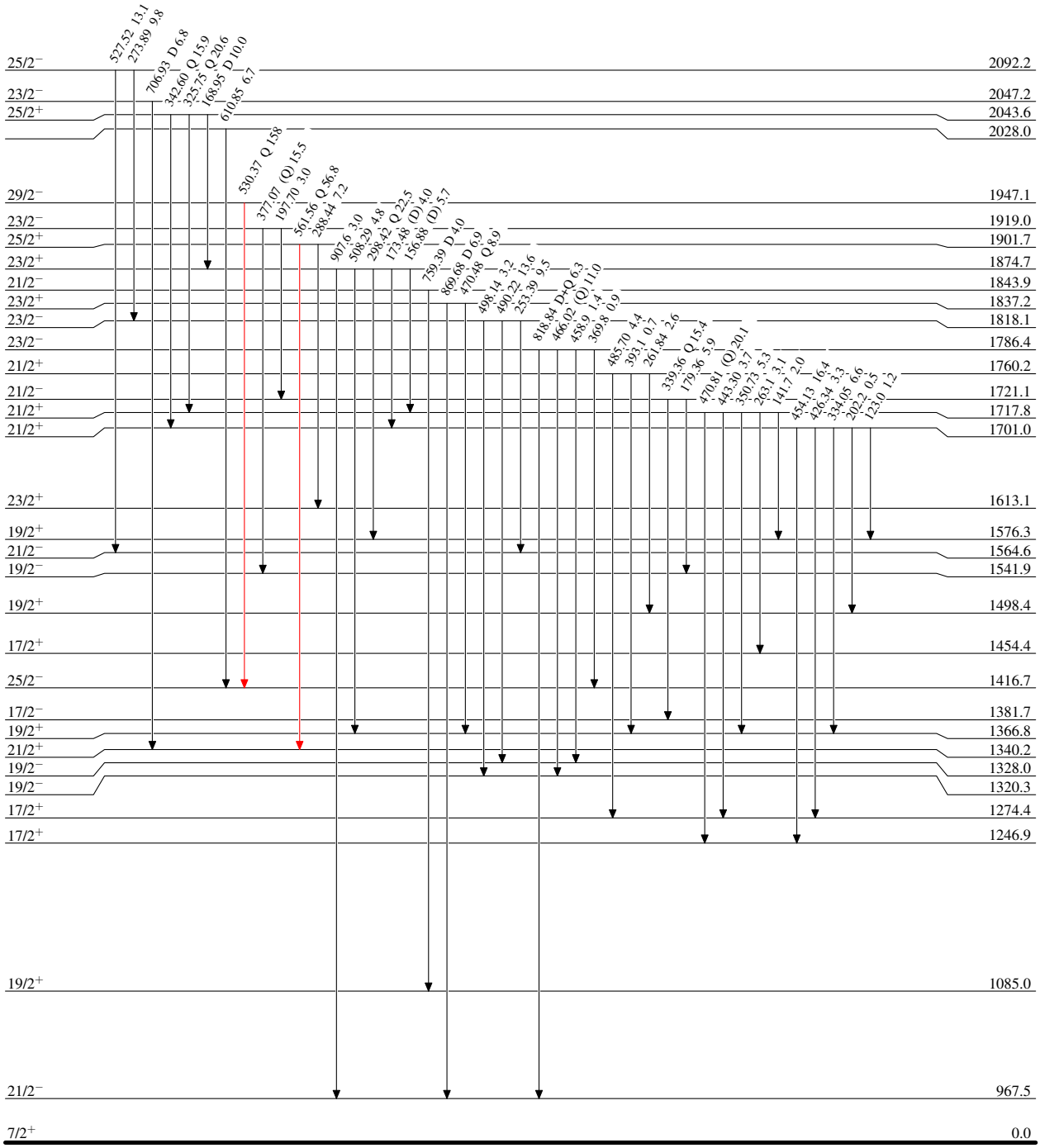
Intensities: Relative I_γ

Legend

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

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

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



$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

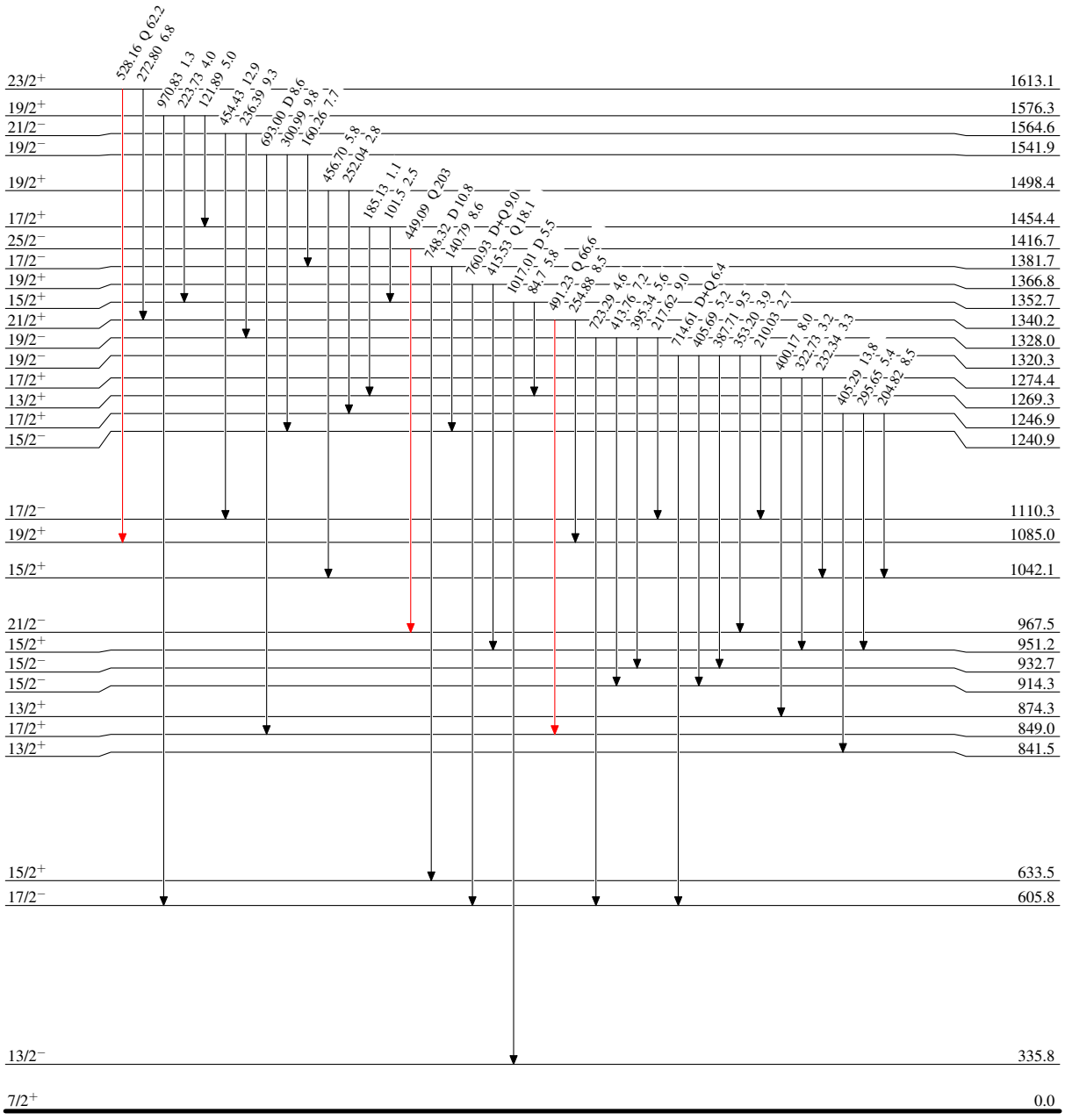
Intensities: Relative I_γ

Legend

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

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

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



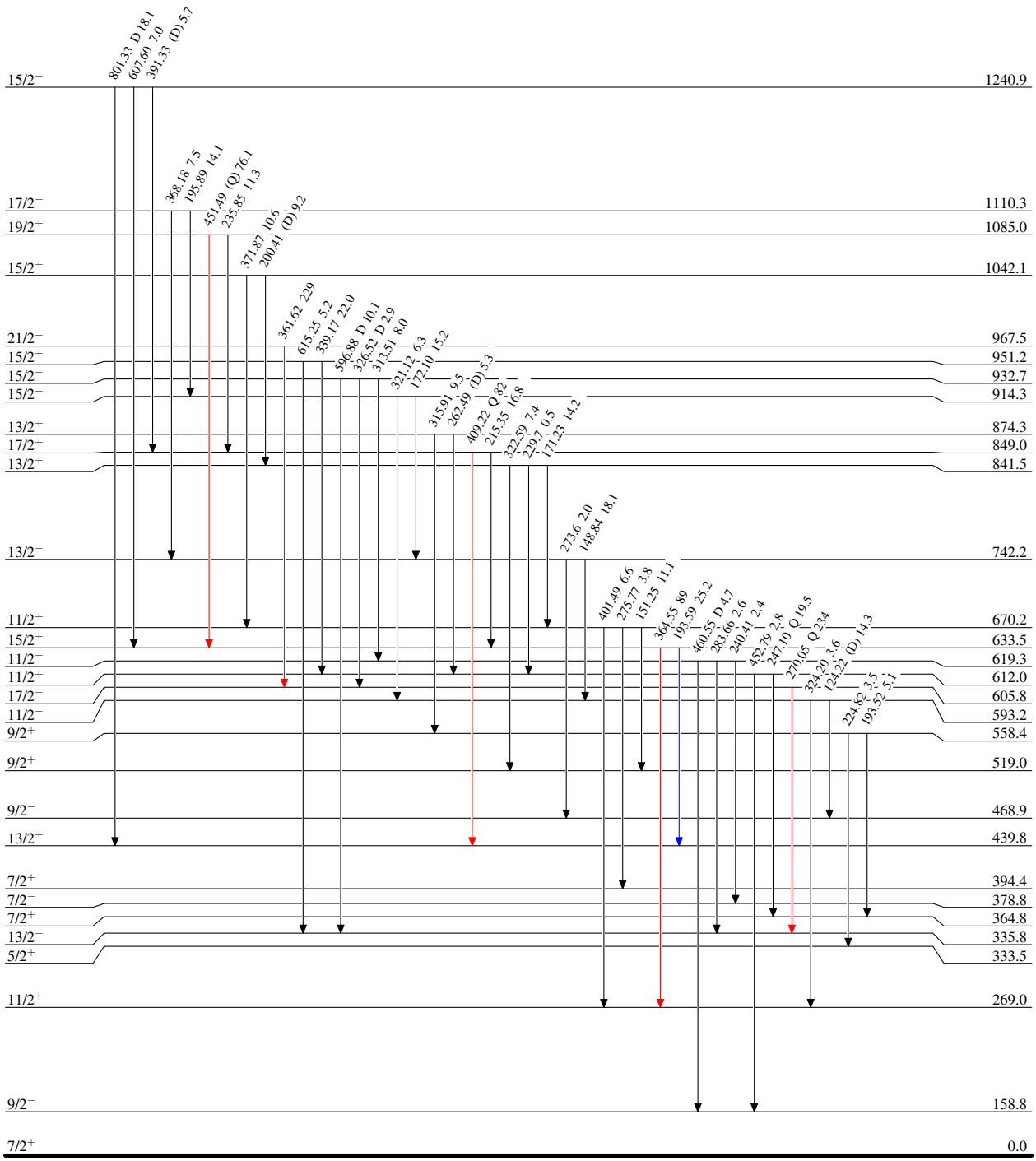
$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$

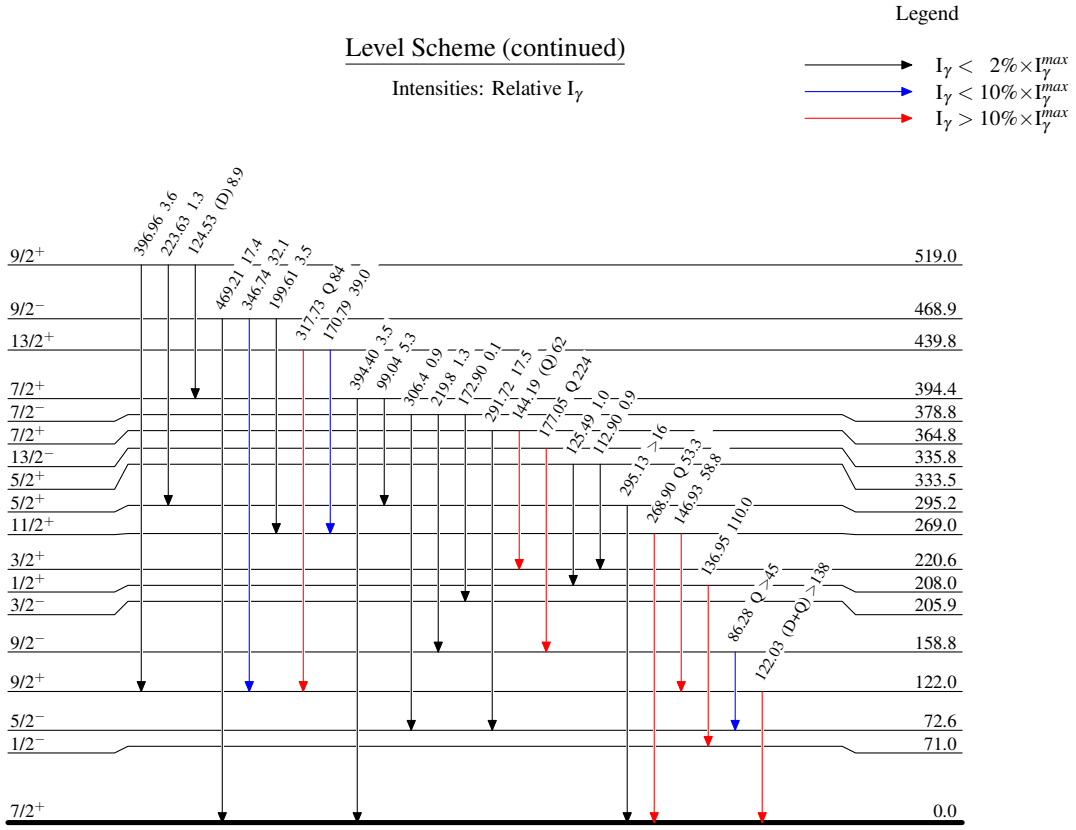


$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02

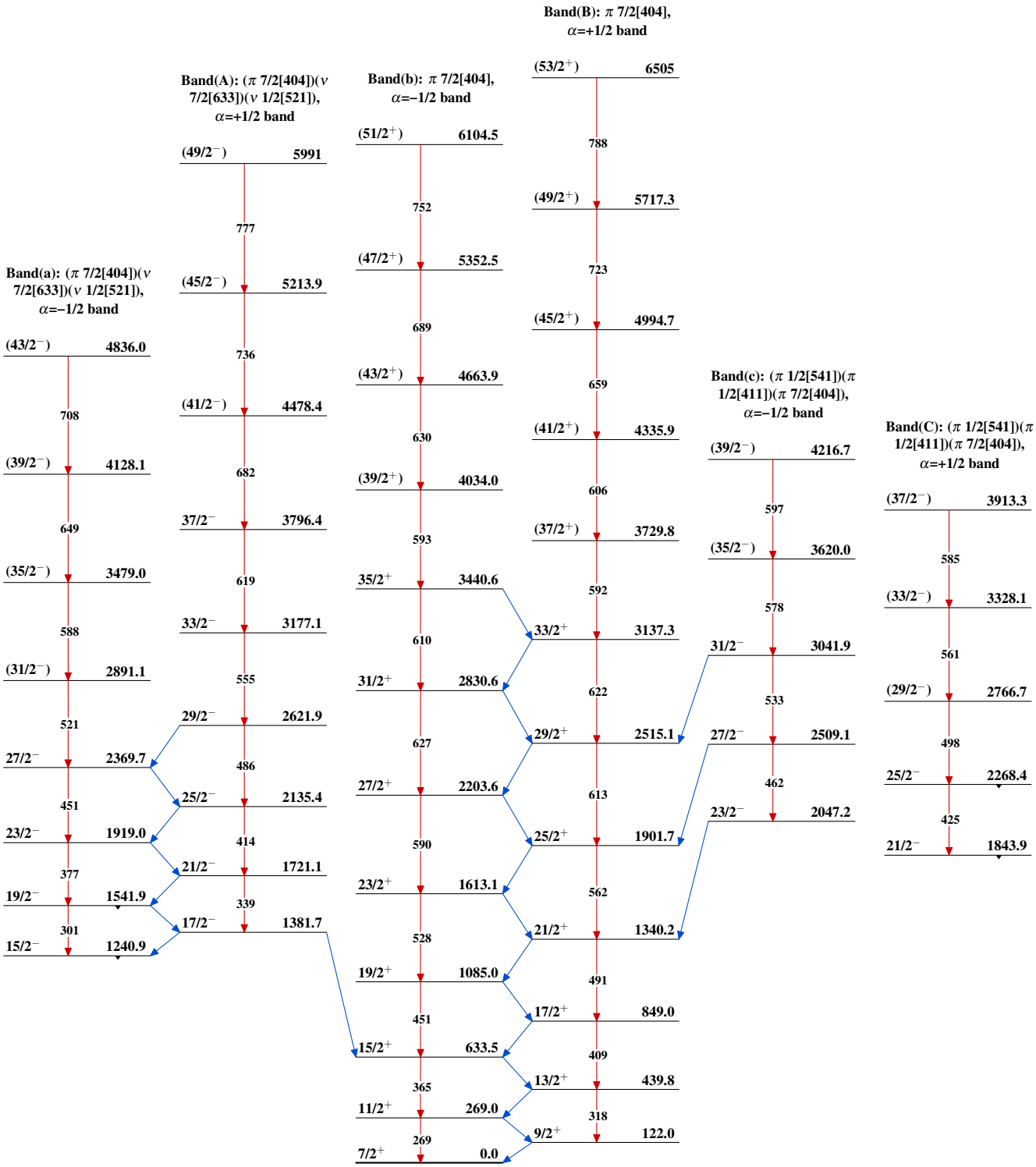
Level Scheme (continued)

Intensities: Relative I_γ



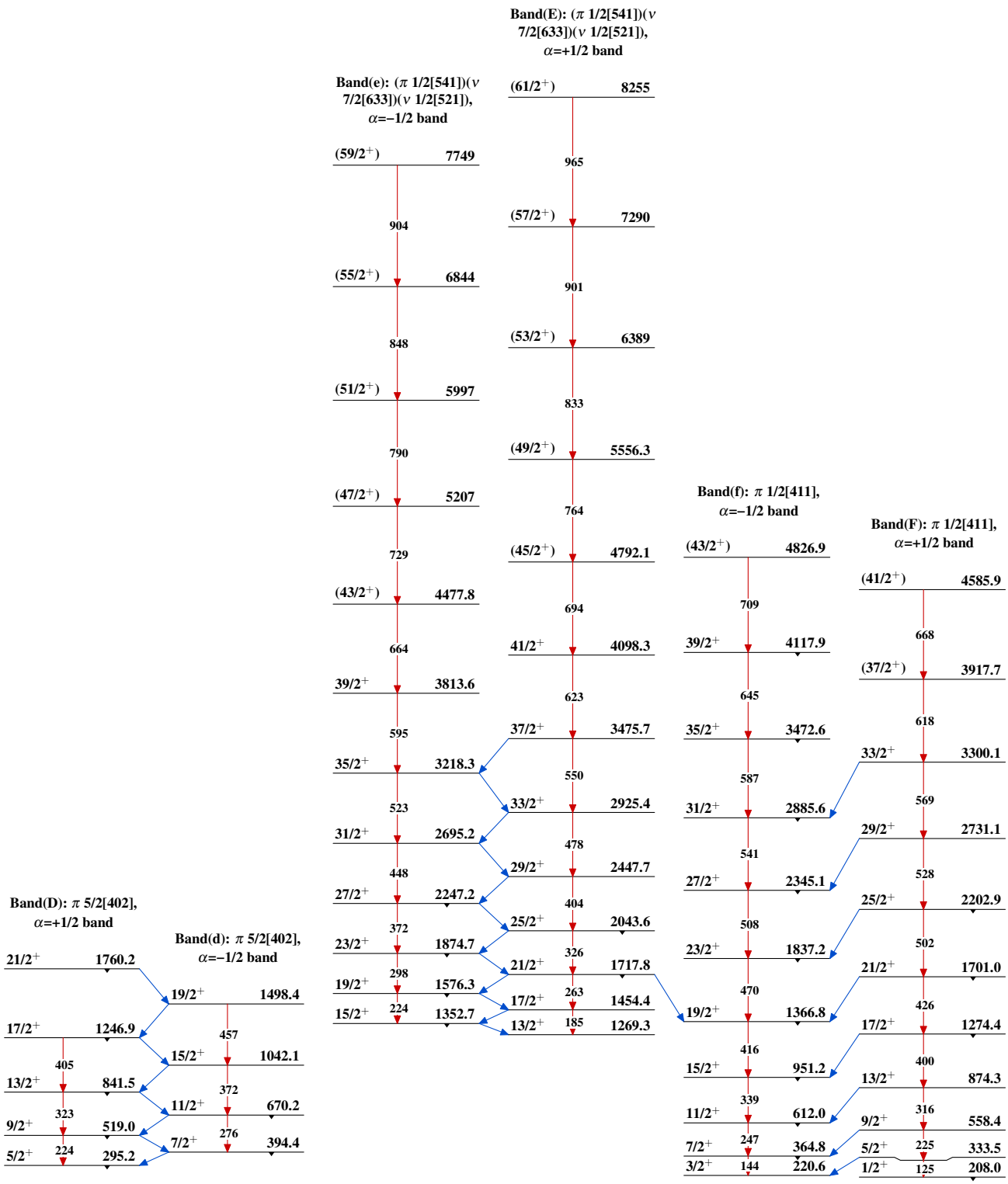
$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02



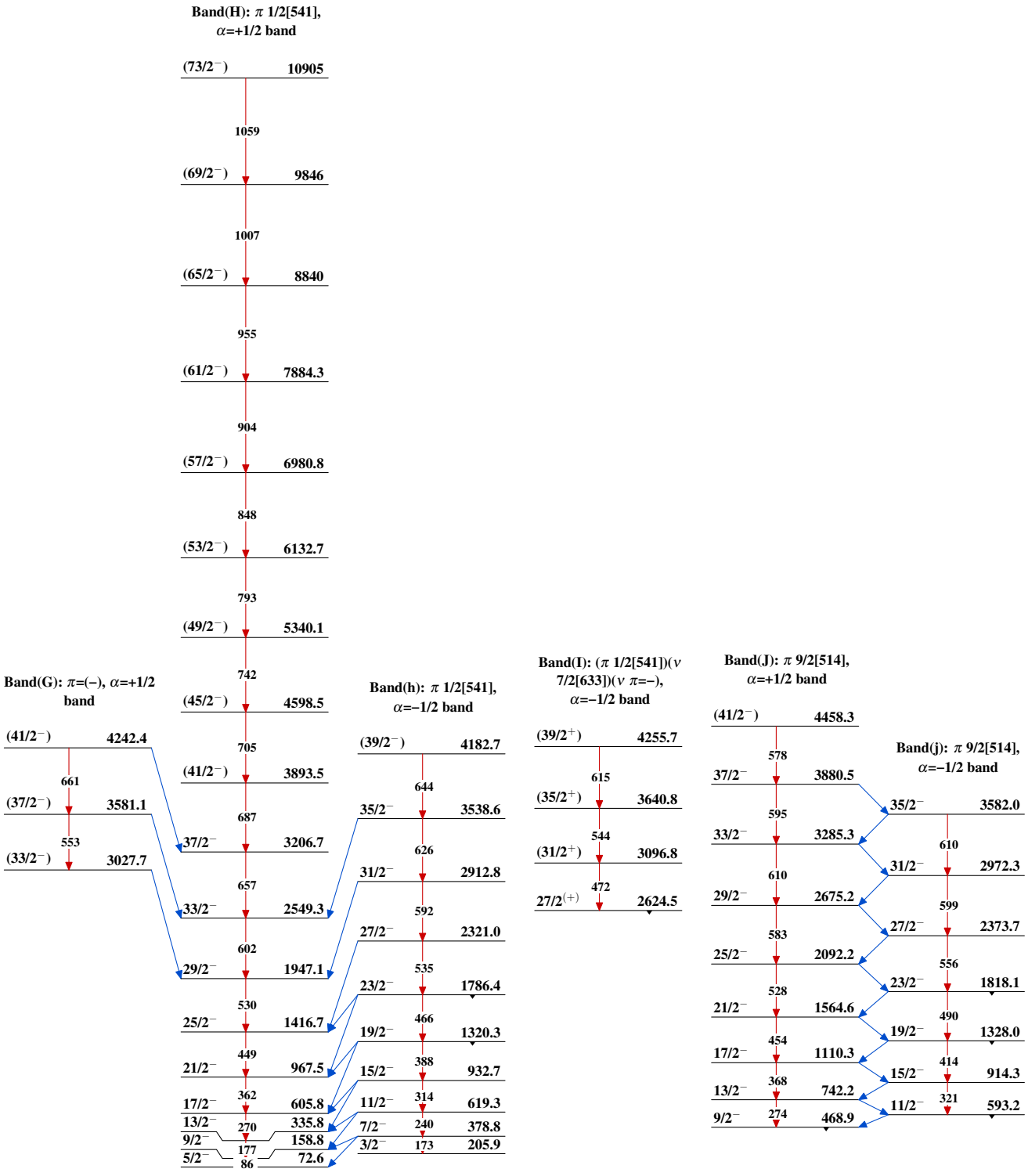
$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)



$^{171}_{71}Lu_{100}$

^{160}Gd(^{19}F,α4nγ) 1998Bb02 (continued)



$^{171}_{71}Lu_{100}$