^{157}Gd(d,t) 1993Kl03

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 2537 (2012)	1-Mar-2012

$J^\pi(^{157}Gd)=3/2^-$. Conf=ν3/2[521].

^{157}Gd(d,t): E(d)=22 MeV, enriched (≈90%) target, 50 μg/cm^2 thick. triton spectra studied at θ=15°, 30° and 50° over an energy range from 0 to 3.5 MeV using a Q3d magnetic spectrometer with a multiwire proportional counter. FWHM between 5 and 8 keV. the angles of observation were chosen from DWBA considerations. spectra were recorded in≈500−keV segments. Below 1.7 MeV, the association of (d,t) levels and those from (n,γ) is believed by the authors to be accurate, except for close doublets. From 1.7 to 2.5 MeV, the correspondence between these two groups of levels is believed to be possible with high probability. Above this, it becomes more uncertain.

^{156}Gd Levels

1993Kl03 report no L values or spectroscopic factors for the peaks they observe, thus making detailed interpretation of these data problematic.

E(level)	J^π[†]	S[#]	Comments
0[@a]	0^+	6.9[&] 5	
89.0[@a]	2^+	27.0[&] 9	
288.2[@a]	4^+	35.2[&] 11	
584.7[@a]	6^+	3.2[&] 3	
964.8[a] 14	8^+	0.14 9	
1129.9[b] 5	2^+	0.79 19	
1154.7[c] 5	2^+	0.67 18	
1168.7[d] 3	0^+	2.3 3	
1242.91[e] 23	1^-	1.95 22	
1258.2[d] 3	2^+	7.0 4	
1275.5[e] 3	3^-	1.47 19	
1297.37[b] 18	4^+	3.1 3	
1319.4[e] 3	2^-	1.66 20	
1355.60[c] 24	4^+	1.63 20	
1366.0[f] 4	1^-	0.98 16	
1407.96[e] 19	5^-	1.48 15	
1462.42[d] 12	4^+	4.2 3	
1507.8[c] 11	5^+	0.11 5	
1539.4[f] 3	3^-	1.07 13	
1576.87 24		1.38 15	
1637.96[e] 22	7^-	1.53 16	J^π: Assumed by the evaluator to be the same as the 1638.2, 7^- state seen in (α,2nγ). From its intensity in (d,t), relative to those of the lower-spin band members of the $K^\pi=1^-$ octupole band, this level is reasonably considered to be the 7^- band member, an assignment also made in (α,2nγ).
1708.07[e] 18	6^-	2.78 23	
1756.8 4	6^+	1.04 14	
1768.58 19		3.7 3	E(level): Possible doublet including the 1765, 6^+, and the 1771, 2^+, levels.
1779.9[g] 4	2^-	1.00 14	
1804.0 7		0.37 9	
1831.1 5	2^+	1.04 14	
1851.7 5		0.90 17	J^π: Possible doublet including the 1851.1, 0^+, level and the 1951.8, 3^-, level. 1993Kl03 associate this with the 0^+ level only.
1861.34 11	4^+	10.1 4	

Continued on next page (footnotes at end of table)

^{157}Gd(d,t) 1993Kl03 (continued)

^{156}Gd Levels (continued)

E(level)	J$^{\pi}$[†]	S[#]	Comments
1916.3 *6*	3$^+$	0.80 *16*	
1934.44 *19*		22.3 *8*	E(level): Possible doublet including the 1934.1, 2$^-$, and the 1934.3, 3$^-$, levels.
1944.5 *8*	1$^-$	2.6 *5*	
1952.07[g] *24*		5.8 *4*	J$^{\pi}$: Possible doublet including the 1952.36, 4$^-$, level and the 1952.39, 0$^-$, level. 1993Kl03 associate this with the 4$^-$ level only.
1963.38 *18*		8.0 *5*	E(level): Possible multiplet including the 1962.01, 1$^-$, the 1962.07, 5$^+$, and perhaps the 1965.1, 4$^-$, and the 1965.9, 1$^+$, levels.
1995.4 *5*	4$^-$	1.37 *21*	
2003.4 *5*	2$^+$	2.0 *3*	
2010.2 *15*	4$^+$	2.0 *6*	
2016.31 *24*	5$^-$	6.5 *4*	
2025.5 *3*	3$^-$	5.8 *4*	
2033.0 *3*	4$^-$	3.3 *3*	
2047.7 *6*	2$^+$	6.0 *11*	
2052.8 *4*	2$^+$	12.3 *13*	
2064.06 *12*		13.1 *5*	
2081.6 *6*	0$^+$	1.13 *20*	
2103.62[‡] *8*	3$^-$	56.4 *15*	
2138.32 *15*	3$^+$	21.3 *9*	
2175.3 *4*		12.6 *12*	J$^{\pi}$: Possible doublet including the 2174, 2$^+$, level and the 2175, J=4, level. 1993Kl03 associate this with the 2174 level only.
2183.3 *4*	2$^+$	18.2 *14*	
2200.34[‡h] *8*	2$^-$	82.5 *17*	
2240.14 *14*	2$^+$,3$^+$	37.2 *13*	
2250.4 *3*	4$^+$	15.8 *11*	
2259.57[‡] *20*	1$^-$	49.2 *16*	
2274.9 *5*		9.8 *8*	
2292.2 *8*	1$^-$	3.6 *7*	
2303.43 *22*	2$^+$	18.9 *9*	
2317.1 *3*	1$^-$,2$^-$	13.7 *7*	
2324.5 *15*	2$^+$	6.5 *16*	
2340.5 *4*	(2$^-$)	6.5 *6*	
2350.9 *5*	3$^+$	5.2 *5*	
2365.97 *24*	2$^+$	11.7 *7*	
2383.3 *16*	2$^+$	5.9 *18*	
2392.1 *3*	(2$^-$)	17.3 *13*	
2404.72[‡] *11*		95.9 *29*	J$^{\pi}$: Possible doublet including the 2403, 1$^+$, level and the 2406, 1$^-$,3$^-$ level.
2415.2 *4*	3$^+$	13.0 *12*	
2436.0 *4*	(2$^+$)	9.1 *10*	
2446.8 *3*	2$^+$	20.2 *14*	
2460.2 *5*		6.5 *8*	
2502.9 *4*	3$^+$	11.8 *11*	
2511.0 *10*		3.6 *6*	
2520.2 *5*	(4$^+$,5$^-$)	7.5 *9*	
2544.7 *5*		8.5 *9*	
2555.8 *12*	(1$^-$)	1.6 *3*	
2572.2 *4*	1$^+$,2$^+$	11.0 *11*	
2584.0 *9*		4.3 *6*	
2591.9 *16*		2.3 *5*	J$^{\pi}$: Possible doublet including the 2588.9, 1$^+$,2$^+$, level and the 2594 level.
2601.7 *13*	1$^+$,2$^+$	1.6 *4*	
2619.1 *10*		2.0 *4*	J$^{\pi}$: Possible doublet including the 2617, 1$^+$,2$^+$, level and the 2622, 1$^-$ to 3$^+$ level.
2629.7 *10*		2.0 *4*	
2654.8 *5*		5.1 *5*	
2668.5 *7*		2.8 *4*	
2700.2 *5*	(2$^+$)	4.5 *5*	

Continued on next page (footnotes at end of table)

^{157}Gd(d,t) 1993Kl03 (continued)

^{156}Gd Levels (continued)

E(level)	J^{π}†	S#	E(level)	J^{π}†	S#	E(level)	S#
2717.2 *14*	$1^+,2^+$	1.3 *3*	3083.2 *15*		1.3 *3*	3487.1 *10*	10.3& *27*
2727.4 *8*		2.9 *4*	3096.1 *7*	2^+	2.9 *4*	3520.9 *13*	7.4& *23*
2740.9 *6*		3.4 *4*	3151.3 *17*		3.3& *16*	3552.0 *12*	7.1& *23*
2804.0 *8*	(2^+)	2.4 *3*	3165.2 *16*		3.4& *16*	3580.7 *13*	6.8& *23*
2831.5 *10*	2^+	2.1 *3*	3334.9 *18*		3.4& *17*		
3071.3 *7*	1^+	3.5 *5*	3470.9 *15*		6.2& *22*		

† From adopted values. These assignments depend on correctly associating a (d,t) peak with a particular adopted level, based on agreement with the reported level energies. Where this cannot be done, or where multiple levels are involved, no J^{π} values are given. see the Cross References in the Adopted Levels for the associations.

‡ The large (d,t) intensity of these peaks, together with their absence (or relative weakness) in (d,p), strongly suggests that at least some of them are associated with the pick-up of a 1/2[400] or a 3/2[402] neutron.

Relative I_t at 30°. Values for E(d)=22 MeV.

@ Nominal value. Value not determined from the (d,t) study because of overlap-related problems (1993Kl03).

& Values are subject to large possible systematic errors because of missing overlap with other regions (1993Kl03).

a Band(A): $K^{\pi}=0^+$, g.s. band.

b Band(B): First excited $K^{\pi}=0^+$ band.

c Band(C): $K^{\pi}=2^+$, γ-vibrational band.

d Band(D): $K^{\pi}=0^+$ band.

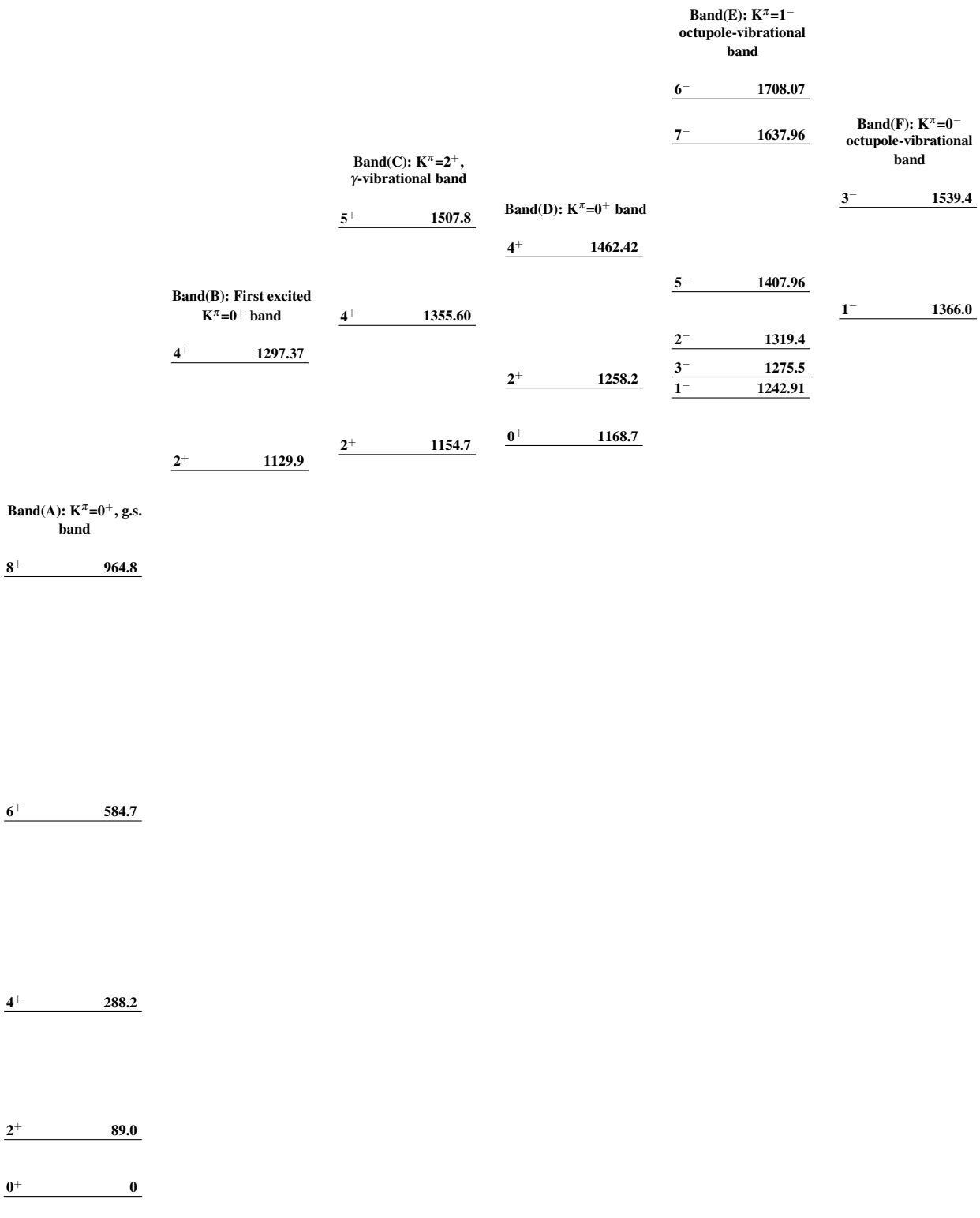
e Band(E): $K^{\pi}=1^-$ octupole-vibrational band.

f Band(F): $K^{\pi}=0^-$ octupole-vibrational band.

g Band(G): $K^{\pi}=2^-$ octupole-vibrational band.

h Band(H): Probable $K^{\pi}=2^-$ bandhead. Conf=ν3/2[521]+ν1/2[400].

^{157}Gd(d,t) 1993Kl03



$^{156}_{64}Gd_{92}$

^{157}Gd(d,t) 1993Kl03 (continued)

Band(H): Probable $K^{\pi}=2^{-}$ bandhead

2^{-} 2200.34

Band(G): $K^{\pi}=2^{-}$ octupole-vibrational band

1952.07

2^{-} 1779.9

$^{156}_{64}Gd_{92}$