^{158}Gd(d,p) 2004Gr26,1967Tj01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

Additional information 1.

Data are mostly from 2004Gr26.

Configuration assignments are the dominant ones from nuclear-model calculations reported in 2004Gr26. For further details for some specific cases, see the Adopted Values.

2004Gr26: E(d)=18 MeV. Enriched (97.0% ^{158}Gd) target of Gd_2O_3 of thickness 130 μg/cm^2 evaporated onto a 5.6−μg/cm^2 C backing. p analyzed in a Q3d magnetic spectrograph and detected in its 1.8-m long focal plane, using a long position-sensitive detector consisting of two single-wire proportional chambers, a multiwire proportional chamber and a plastic scintillator with ΔE/E particle identification for background suppression. p spectra measured at laboratory angles of 13°, 17°, 21°, 25°, 30°, 35°, 40°, 45°, and 55°. FWHM≈5 keV. DWBA analysis. Nuclear-model calculations of the configurational makeup of the levels.

1967Tj01: E(d)=12.1 MeV, p measured in magnetic spectrometer with FWHM≈13 keV, cross sections reported for 60°, 90°, and 125°. Above 1 MeV, the uncertainties in the energies are 5 keV, from a general statement by the authors.

^{159}Gd Levels

E(level)[†]	Jπ[#@]	L[&]	S[bc]	Comments
0.0[d]	1/2−,3/2−	1	197	
51.2[‡d] 9	(5/2−,7/2−)	(3)[a]	7	
67.0[‡e] 7	3/2+,5/2+	2	3	
122.1[d] 6	5/2−,7/2−	3	242	
146.8[f] 6	5/2−,7/2−	3	71	
185.6[e] 6	7/2+,9/2+	4	85	
212.8[‡d] 6	9/2−,11/2−	5	24	
227.3[f] 6	5/2−,7/2−	3	328	
274.0[e] 7	11/2+,13/2+	6	4	
324.9[d] 8	9/2−,11/2−	5	8	part of a doublet peak reported at 330 keV by 1967Tj01.
331.0[f] 6	9/2−,11/2−	5	35	part of a doublet peak reported at 330 keV by 1967Tj01.
372.8[e] 6	11/2+,13/2+	6	44	
456.5[f] 8	9/2−,11/2−	5	28	
507.9[g] 7	1/2−,3/2−	1	626	
557.9[g] 8	(1/2−,3/2−)	(1)[a]	66	
589.0[g] 6	5/2−,7/2−	3	182	
601.8[p] 12	3/2+,5/2+	2	1	
632.9[l] 10	7/2+,9/2+	4	10	Assigned as the bandhead of ν7/2[633] by 2004Gr26.
684.1[h] 7	(9/2−,11/2−)	(5)[a]	12	
705.0[g] 7	(5/2−,7/2−)	(3)	332	
744.7[i] 6	3/2+,5/2+	2	61	Jπ: from data at θ=40°.
759.8[g] 8	9/2−,11/2−	5	29	
781.6[j] 6	1/2+	0	38	
819.5[‡] 8	11/2+,13/2+	6	1	
835.5 8	(7/2+,9/2+)	(4)	16	
858.4[‡j] 8	3/2+,5/2+	2	4	
874.5 11	(1/2+)	(0)[a]	6	E(level): may be a component of the 875 peak reported by 1967Tj01.
876.0[i] 9			5	E(level): may be a component of the 875 peak reported by 1967Tj01. E(level): from value at θ=40°. See the comment for the cross section value for this level. Jπ: Probable 7/2+ member of the ν3/2[402] band, as assigned by 2004Gr26. S: from value at θ=40°. 2004Gr26 indicate that this value is for θ=20°, but the evaluator assumes that this comes from a misplaced footnote in their listing of the

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^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

^{159}Gd Levels (continued)

E(level)[†]	Jπ[#@]	L[&]	S[bc]	Comments
				(d,p) and (d,t) data (their Table iii).
926.8[‡] *7*			3	E(level): from value at θ=40°. See the comment for the cross section value for the 876.0 level. S: from value at θ=40°. See the comment for the cross section value for the 876.0 level.
938.6[‡g] *8*	(9/2⁻,11/2⁻)	(5)[a]	10	
948.9[k] *6*	5/2⁻,7/2⁻	3	360	
974.4[m] *6*	1/2⁺	0	58	
1001.2[m] *8*	3/2⁺,5/2⁺	2	7	
1043.1[k] *7*	9/2⁻,11/2⁻	5	12	
1060.8[‡m] *11*	3/2⁺,5/2⁺	2	8	
1079.9[‡] *8*	1/2⁻,3/2⁻	1	24	
1093.0[‡l] *7*	11/2⁺,13/2⁺	6	13	Assigned by 2004Gr26 as the 13/2⁺ member of the ν7/2[633] band.
1111.5[‡q] *8*	1/2⁻,3/2⁻	1	34	
1134.6[s] *5*	5/2⁻,7/2⁻	3	260	
1145.2[‡r] *16*	1/2⁻,3/2⁻	1	21	
1151.0[‡] *9*	(1/2⁺)	(0)	34	
1160.4[‡] *7*	3/2⁺,5/2⁺	2	28	
≈1182				Level reported by 1967Tj01 only but not confirmed by 2004Gr26. The level is not ADOPTED.
1194.2 *8*	7/2⁺,9/2⁺	4	8	
1203.5[s] *7*	9/2⁻,11/2⁻	5	34	
1229.8[‡m] *8*	7/2⁺,9/2⁺	4	22	
1239.1[q] *9*	(5/2⁻,7/2⁻)	(3)	8	
1283.8 *6*	(7/2⁺,9/2⁺)	(4)[a]	44	E(level): 1967Tj01 report E=1287.
1296.6[‡] *7*	1/2⁻,3/2⁻	1	6	
1303.7[‡r] *6*	5/2⁻,7/2⁻	3	11	
1322.2[‡] *11*	(3/2⁺,5/2⁺)	(2)	1	
1344.2[‡] *8*	(3/2⁻,5/2⁻)	[a]	7	Jπ: values not consistent with a single L value.
1394.1 *6*	(5/2⁻,7/2⁻)	3[a]	26	
1419.0[‡] *12*	(7/2⁺,9/2⁺)	4	20	
1430.4 *6*	3/2⁺,5/2⁺	2	174	
1467.8[‡] *8*	3/2⁺,5/2⁺	2	7	
1478.1 *7*	3/2⁺,5/2⁺	2	19	E(level): 1967Tj01 report E=1474.
1491.8 *7*	7/2⁺,9/2⁺	4	31	
1509.1[‡] *8*	3/2⁺,5/2⁺	2	17	
1521.2 *7*	1/2⁻,3/2⁻	1	103	
1540.6[‡] *8*	(3/2⁺,5/2⁺)	(2)[a]	39	
1560.4[‡] *7*	7/2⁺,9/2⁺	4	93	
1571.2[‡] *7*	7/2⁺,9/2⁺	4	44	
1579.6[‡n] *6*	1/2⁻,3/2⁻	1	1	
1584.3[‡] *12*	3/2⁺,5/2⁺	2	39	
1593.7[‡] *8*	3/2⁺,5/2⁺	2	66	
1603.1[n] *6*	1/2⁻,3/2⁻	1	582	
1621.6[‡] *7*	3/2⁺,5/2⁺	2	70	
1628.5[‡] *8*	3/2⁺,5/2⁺	2	60	
1637.7[t] *7*	1/2⁻,3/2⁻	1[a]	105	
1646.2[‡] *8*	3/2⁺,5/2⁺	2	69	
1655.7[‡] *11*	3/2⁺,5/2⁺	2	68	

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^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

^{159}Gd Levels (continued)

E(level)[†]	Jπ[#@]	L[&]	S[bc]	Comments
1668.1[‡] *8*	3/2+,5/2+	2	51	
1675.5[‡] *10*	3/2+,5/2+	2	37	
1685.4[‡] *8*	3/2+,5/2+	2	31	
1693.5[n] *6*	(5/2−,7/2−)	(3)[a]	96	
1702.1[‡t] *6*	5/2−,7/2−	3	52	Jπ: Note that the evaluator has not adopted this band assignment.
1713.7[‡] *11*				
1718.7 *8*	3/2+,5/2+	2	35	
1728.3[‡n] *12*	5/2−,7/2−	3	14	Jπ: Note that the evaluator has not adopted this band assignment.
1745.1[‡] *10*	(3/2+,5/2+)	(2)[a]	10	
1751.0 *10*	7/2+,9/2+	4		
1759.0[‡] *9*	1/2−,3/2−	1	12	
1783.2 *9*	1/2−,3/2−	1	104	
1809.2[t] *12*	5/2−,7/2−	3	54	
1813.4[‡] *12*	(3/2+,5/2+)	2[a]	54	
1826.2[‡] *9*	1/2+	0	20	
1846.6 *8*	5/2−,7/2−	3	28	E(level): 1967Tj01 report E=1840.
1874.2[‡] *10*	(3/2+,5/2+)	2[a]	14	
1885.4 *7*	1/2−,3/2−	1	21	
1892.0[‡] *8*	1/2−,3/2−	1	54	
1910.4 *17*	(1/2−,3/2−)	(1)[a]	10	
1918.4[‡] *8*	(1/2−,3/2−)	(1)[a]	26	
1927.9 *8*	1/2−,3/2−	1	25	
1933.3 *11*	5/2−,7/2−	3	25	
1958.1 *6*	1/2−,3/2−	1	50	E(level): 1967Tj01 report E=1953.
1971.0[‡] *9*	(1/2+)	(0)[a]	26	
1983.0[o] *8*	1/2+	0	152	E(level): 1967Tj01 report E=1977.
1997.3[u] *7*	1/2−,3/2−	1	197	E(level): 1967Tj01 report E=1993.
2003.2[‡o] *8*	3/2+,5/2+	2	25	
2011.1[‡] *9*	(1/2−,3/2−)	(1)[a]	48	
2032.6[‡] *10*	(5/2−,7/2−)	(3)[a]	22	
2042.0 *6*	(3/2+,5/2+)	(2)	77	
2048.7 *6*	(1/2−,3/2−)	(1)[a]	173	
2058.0[u] *8*	5/2−,7/2−	3	222	
2074.1 *6*	(5/2−,7/2−)	(3)[a]	38	
2088.1[o] *10*	(3/2+,5/2+)	(2)	27	
2092.0 *12*	(3/2+,5/2+)	(2)[a]	29	
2100.8 *8*	1/2−,3/2−	1	25	E(level): 1967Tj01 report E=2106.
2121.7 *12*	5/2−,7/2−	3	63	
2134 *5*			123	E(level): from 1967Tj01. The data of 2004Gr26 do not extend this high. S: value at θ=60°, from 1967Tj01.
2189 *5*			92	E(level): from 1967Tj01. The data of 2004Gr26 do not extend this high. S: value at θ=60°, from 1967Tj01.
2193 *5*			52	E(level): from 1967Tj01. The data of 2004Gr26 do not extend this high. S: value at θ=60°, from 1967Tj01.

[†] From average over the data from 2004Gr26 at all the angles. a systematic uncertainty of 0.5 keV due to the long position-sensitive detector is included. Where significant differences with the data from 1967Tj01 exist, these are indicated. Association of the peaks reported by 1967Tj01 at 2053 and 2081 with those reported by 2004Gr26 is problematic.

[‡] Level not reported by 1967Tj01.

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^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

^{159}Gd Levels (continued)

Values as listed by 2004Gr26, presumably representing the choices allowed by the L values from the DWBA analysis. They are consistent with the Adopted Values.
@ Conf assignments are based on the agreement between the measured cross sections for individual levels within a band and those expected for the proposed Nilsson orbital (the 'fingerprint').
& Value inferred by the evaluator from the J^{π} values given by 2004Gr26. These authors do not explicitly list L values.
a The angular distribution of the protons from this level could not be satisfactorily described by the DWBA calculations.
b Label=$d\sigma/d\Omega(\mu b/sr)$.
c Values at 30°, unless noted otherwise.
d Band(A): $\nu 3/2[521]$ band (g.s. band).
e Band(B): $\nu 5/2[642]$ band.
f Band(C): $\nu 5/2[523]$ band.
g Band(D): $\nu 1/2[521]$ band.
h Band(E): $\nu 11/2[505]$ bandhead.
i Band(F): $\nu 3/2[402]$ band.
j Band(G): $\nu 1/2[660]$ band, mixed with $\nu 1/2[400]$ and the K-2 γ-vibration based on $\nu 5/2[642]$.
k Band(H): $\nu 5/2[512]$ band.
l Band(I): $\nu 7/2[633]$ band.
m Band(J): $\nu 1/2[400]$ band, mixed with $\nu 1/2[660]$.
n Band(K): $\nu 1/2[510]$ band.
o Band(L): $\nu 1/2[651]$ band.
p Band(M): $\nu 3/2[651]$ bandhead.
q Band(N): $\nu 3/2[532]$ band.
r Band(O): $\nu 1/2[530]$ band.
s Band(P): $\nu 7/2[514]$ band.
t Band(Q): $\nu 3/2[512]$ band. Conf and band tentatively proposed by 2004Gr26.
u Band(R): $\nu 1/2[770]$ band member. Conf and band tentatively proposed by 2004Gr26 but not adopted by the evaluator.

^{158}Gd(d,p) 2004Gr26,1967Tj01

Band(D): ν1/2[521] band

(9/2$^-$,11/2$^-$)	938.6
9/2$^-$,11/2$^-$	759.8
(5/2$^-$,7/2$^-$)	705.0
5/2$^-$,7/2$^-$	589.0
(1/2$^-$,3/2$^-$)	557.9
1/2$^-$,3/2$^-$	507.9

Band(E): ν11/2[505] bandhead

(9/2$^-$,11/2$^-$)	684.1

Band(C): ν5/2[523] band

9/2$^-$,11/2$^-$	456.5
9/2$^-$,11/2$^-$	331.0
5/2$^-$,7/2$^-$	227.3
5/2$^-$,7/2$^-$	146.8

Band(B): ν5/2[642] band

11/2$^+$,13/2$^+$	372.8
11/2$^+$,13/2$^+$	274.0
7/2$^+$,9/2$^+$	185.6
3/2$^+$,5/2$^+$	67.0

Band(A): ν3/2[521] band (g.s. band)

9/2$^-$,11/2$^-$	324.9
9/2$^-$,11/2$^-$	212.8
5/2$^-$,7/2$^-$	122.1
(5/2$^-$,7/2$^-$)	51.2
1/2$^-$,3/2$^-$	0.0

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^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

Band(J): ν1/2[400] band, mixed with ν1/2[660]

$7/2^+,9/2^+$ 1229.8

Band(I): ν7/2[633] band

$11/2^+,13/2^+$ 1093.0

Band(H): ν5/2[512] band

$3/2^+,5/2^+$ 1060.8

$9/2^-,11/2^-$ 1043.1

$3/2^+,5/2^+$ 1001.2

$1/2^+$ 974.4

$5/2^-,7/2^-$ 948.9

Band(G): ν1/2[660] band, mixed with ν1/2[400] and the K-2 γ-vibration based on ν5/2[642]

Band(F): ν3/2[402] band

876.0

$3/2^+,5/2^+$ 858.4

$1/2^+$ 781.6

$3/2^+,5/2^+$ 744.7

$7/2^+,9/2^+$ 632.9

$^{159}_{64}Gd_{95}$

^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

Band(L): ν1/2[651] band

$(3/2^+,5/2^+)$ 2088.1

$3/2^+,5/2^+$ 2003.2

$1/2^+$ 1983.0

Band(K): ν1/2[510] band

$5/2^-,7/2^-$ 1728.3

$(5/2^-,7/2^-)$ 1693.5

$1/2^-,3/2^-$ 1603.1

$1/2^-,3/2^-$ 1579.6

Band(O): ν1/2[530] band

$5/2^-,7/2^-$ 1303.7

Band(N): ν3/2[532] band

$(5/2^-,7/2^-)$ 1239.1

$1/2^-,3/2^-$ 1145.2

$1/2^-,3/2^-$ 1111.5

Band(M): ν3/2[651] bandhead

$3/2^+,5/2^+$ 601.8

$^{159}_{64}Gd_{95}$

^{158}Gd(d,p) 2004Gr26,1967Tj01 (continued)

Band(R): ν1/2[770] band member

5/2$^-$,7/2$^-$ 2058.0

1/2$^-$,3/2$^-$ 1997.3

Band(Q): ν3/2[512] band

5/2$^-$,7/2$^-$ 1809.2

5/2$^-$,7/2$^-$ 1702.1

1/2$^-$,3/2$^-$ 1637.7

Band(P): ν7/2[514] band

9/2$^-$,11/2$^-$ 1203.5

5/2$^-$,7/2$^-$ 1134.6

$^{159}_{64}Gd_{95}$