^{158}Gd(p,dγ)   2014Ro25,2013Ro23

		History	
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 132, 1 (2016)	4-Dec-2015

Compiled for the XUNDL database by B. Singh (McMaster).

E(p)=25 MeV beam from LBNL cyclotron facility. Target=1.01 mg/cm^2 thick with 92.0% enrichment. Measured Eγ, Iγ, E(d), dγγ-coin, angular distribution of deuterons in coincidence with γ rays using STARS array of Si detectors for particles and LIBERACE array of five HPGe Clover detectors for γ rays. FWHM=150 keV for particle detectors. DWBA analysis for angular distribution of deuterons.

Most details and data are from 2014Ro25; 2013Ro23 give information about four discrete levels populated between 1500-2000 keV with L=2 distribution; the 1589 and 1825 levels are considered as tentative.

^{157}Gd Levels

E(level)[†]	J^{π}[†‡]	L	S[#@]	Comments
0.0[b]	3/2$^-$			
54.533[&b] 6	5/2$^-$			
63.917[&c] 5	5/2$^+$			E(level): 63.91 5 in table VII of 2014Ro25.
115.717[&c] 7	7/2$^+$			
131.455[b] 9	7/2$^-$		6.1 7	E(level): uncertainty is 0.007 in table VII of 2014Ro25.
180.229[&c] 11	9/2$^+$			E(level): uncertainty is 0.011 in table VII of 2014Ro25.
227.31[b] 5	9/2$^-$		1.1 2	
272.25[c] 21	11/2$^+$		2.7 3	
347.25[b] 7	11/2$^-$		1.5 2	
361.10[c] 10	13/2$^+$		0.03 1	
426.60[&d] 5	11/2$^-$			
434.426[e] 6	5/2$^-$		2.35 24	
474.629[f] 6	3/2$^+$		63.6 25	
478.87[b] 8	13/2$^-$		2.0 2	
514.671[e] 8	7/2$^-$		4.0 4	
524.850[f] 7	5/2$^+$		2.4 6	
579.46[&d] 9	(13/2$^-$)			
617.48[e] 3	9/2$^-$		1.7 3	
682.90[g] 4	1/2$^+$		100 4	L: 0,1 or 4 for a level at 680 keV; L=0 is consistent with 1/2$^+$ assignment.
683.233[&i] 9	3/2$^+$			
729.02 17	1/2$^-$,3/2$^-$	0,1,4	13.4 9	A previously assigned 614γ from this level is not observed in the present experiment. L: from angular distribution of ≈730−keV deuterons in coincidence with 729γ. L=1 is consistent with 1/2$^-$,3/2$^-$ assignment. Tentative ν3/2[532] configuration.
751.432[&g] 13	3/2$^+$			
793.5[h] 2	1/2$^-$		4.1 3	
809.0[h] 2	3/2$^-$		33.5 28	
849.3 2	11/2$^+$,13/2$^+$		2.43 27	L: L=0,1 and 4 are ruled out from angular distribution of deuterons. S: relative population listed as 3.8 in text of 2014Ro04.
919.50 5	7/2$^+$		3.9 5	
1552.2[a] 2	5/2$^+$	2	3.6 6	
1563.1 6	(3/2$^-$,5/2,7/2$^-$)		1.4 4	J^{π}: from γ decays to lower states.
1589.8[a] 2	3/2$^+$,5/2$^+$	2	4.8 8	
1735.6[a] 2	5/2$^+$	2	4 1	L: from figure 7c and discussion in text in 2014Ro25; but listed as 2,5 in authors' table.

^{158}**Gd(p,dγ)**   **2014Ro25,2013Ro23** **(continued)**

^{157}Gd Levels (continued)

E(level)[†]	J$^\pi$[†‡]	L	S[#@]	Comments
1825.6[a] *1*	5/2$^+$	2	14.3 *32*	
1905.9 *4*	(11/2$^-$)		4.9 *15*	Configuration=ν9/2[514] (2014Ro25).

[†] Below 1 MeV excitation, energies and J$^\pi$ values are quoted by authors from the Adopted Levels of ^{157}Gd in ENSDF database (except for the energy and J$^\pi$ of of 849 level which is from this work). Above 1 MeV, all data are from 2014Ro25.

[‡] From angular distribution of the deuterons in the silicon detectors, in coincidence with G rays.

[#] Label=Relative population.

[@] Relative population of a level measured from area of the deuteron peak in coincidence with a γ ray from that level, corrected for internal conversion and γ-detection efficiency.

[&] Level not populated directly in the present work.

[a] Any of the 1552, 1589, 1735 or 1825 levels is a possible candidate for ν5/2[402] configuration.

[b] Band(A): ν3/2[521].

[c] Band(B): ν5/2[642].

[d] Band(C): ν11/2[505].

[e] Band(D): ν5/2[523].

[f] Band(E): ν3/2[402].

[g] Band(F): ν1/2[400].

[h] Band(G): ν1/2[530].

[i] Band(H): ν3/2[651].

γ(^{157}Gd)

E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$	E$_f$	J$^\pi_f$	Comments
361.10	13/2$^+$	181		180.229	9/2$^+$	
682.90	1/2$^+$	208		474.629	3/2$^+$	
		619		63.917	5/2$^+$	Assignment of 619γ from 682.9 level in contrast to previous assignment from 683.2, 3/2$^+$ level is based on L=0,1 or 4 from angular distribution of $\approx$680 keV deuterons in coincidence with 619γ, whereas L=2 is ruled out.
		683		0.0	3/2$^-$	
729.02	1/2$^-$,3/2$^-$	674		54.533	5/2$^-$	
		729		0.0	3/2$^-$	
849.3	11/2$^+$,13/2$^+$	488.23 *14*	100	361.10	13/2$^+$	
1552.2	5/2$^+$	1420.97 *18*	95 *19*	131.455	7/2$^-$	
		1497.30 *30*	100 *20*	54.533	5/2$^-$	
		1552.35 *22*	88 *17*	0.0	3/2$^-$	
1563.1	(3/2$^-$,5/2,7/2$^-$)	1431.8 *4*	58 *21*	131.455	7/2$^-$	
		1507.7 *8*	64 *25*	54.533	5/2$^-$	
		1563.6 *6*	100 *32*	0.0	3/2$^-$	
1589.8	3/2$^+$,5/2$^+$	1064.74 *20*	33 *6*	524.850	5/2$^+$	
		1115.55 *16*	100 *12*	474.629	3/2$^+$	
		1154.87 *22*	46 *7*	434.426	5/2$^-$	
1735.6	5/2$^+$	984.23 *22*	29 *7*	751.432	3/2$^+$	
		1221.20 *30*	31 *7*	514.671	7/2$^-$	
		1301.13 *13*	100 *12*	434.426	5/2$^-$	
1825.6	5/2$^+$	1310.89 *15*	37 *4*	514.671	7/2$^-$	
		1350.86 *21*	9.4 *19*	474.629	3/2$^+$	
		1391.24 *6*	100 *6*	434.426	5/2$^-$	

^{158}Gd(p,dγ)   **2014Ro25,2013Ro23 (continued)**

γ(^{157}Gd) (continued)

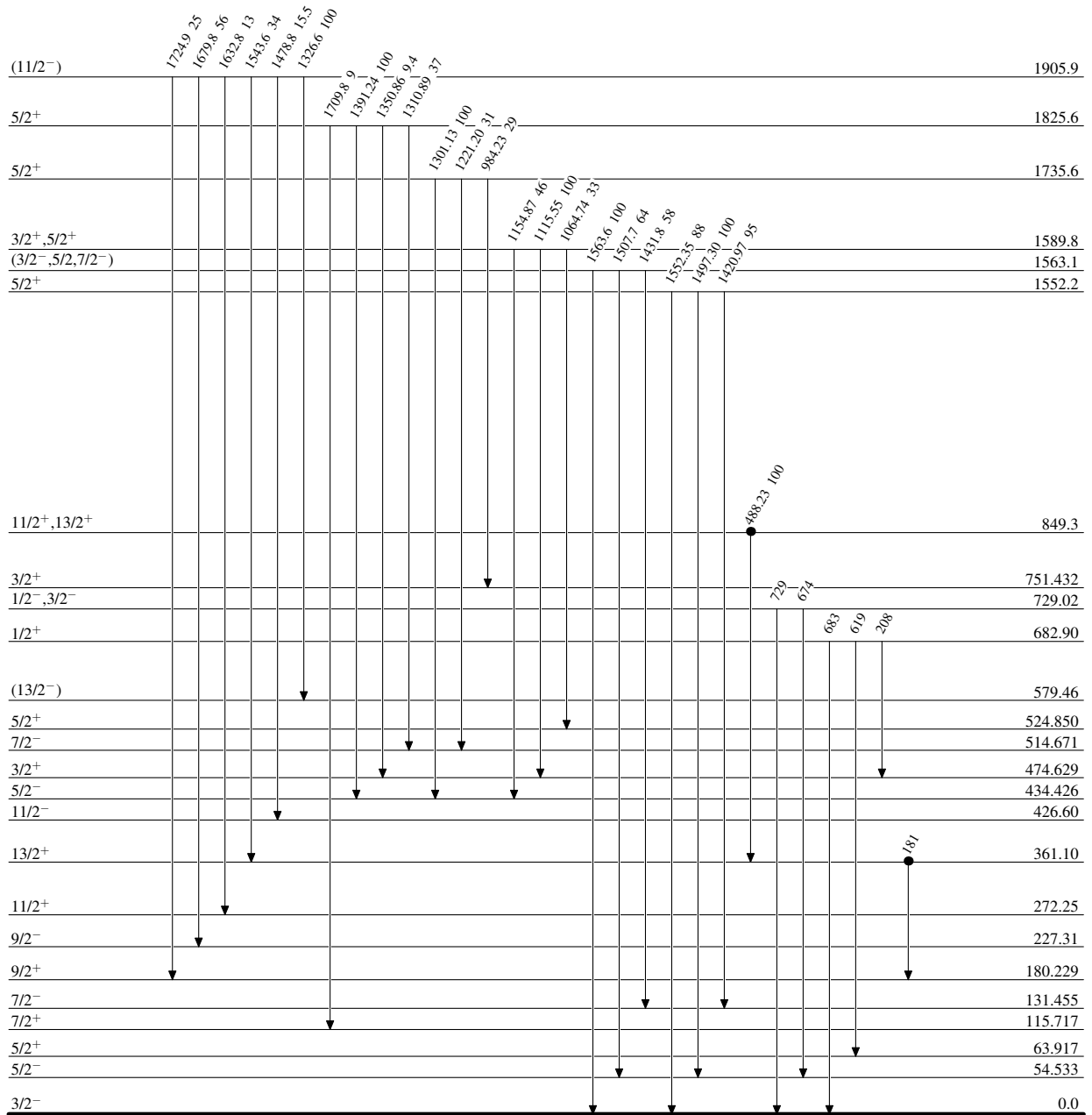| E_i(level)	J^{π}_i	E_γ	I_γ	E_f	J^{π}_f
1825.6	5/2$^+$	1709.8 *4*	9 *2*	115.717	7/2$^+$
1905.9	(11/2$^-$)	1326.6 *2*	100 *15*	579.46	(13/2$^-$)
		1478.8 *3*	15.5 *57*	426.60	11/2$^-$
		1543.6 *5*	34 *9*	361.10	13/2$^+$
		1632.8 *4*	13 *5*	272.25	11/2$^+$
		1679.8 *5*	56 *12*	227.31	9/2$^-$
		1724.9 *4*	25 *7*	180.229	9/2$^+$

^{158}Gd(p,dγ)   2014Ro25,2013Ro23   Legend
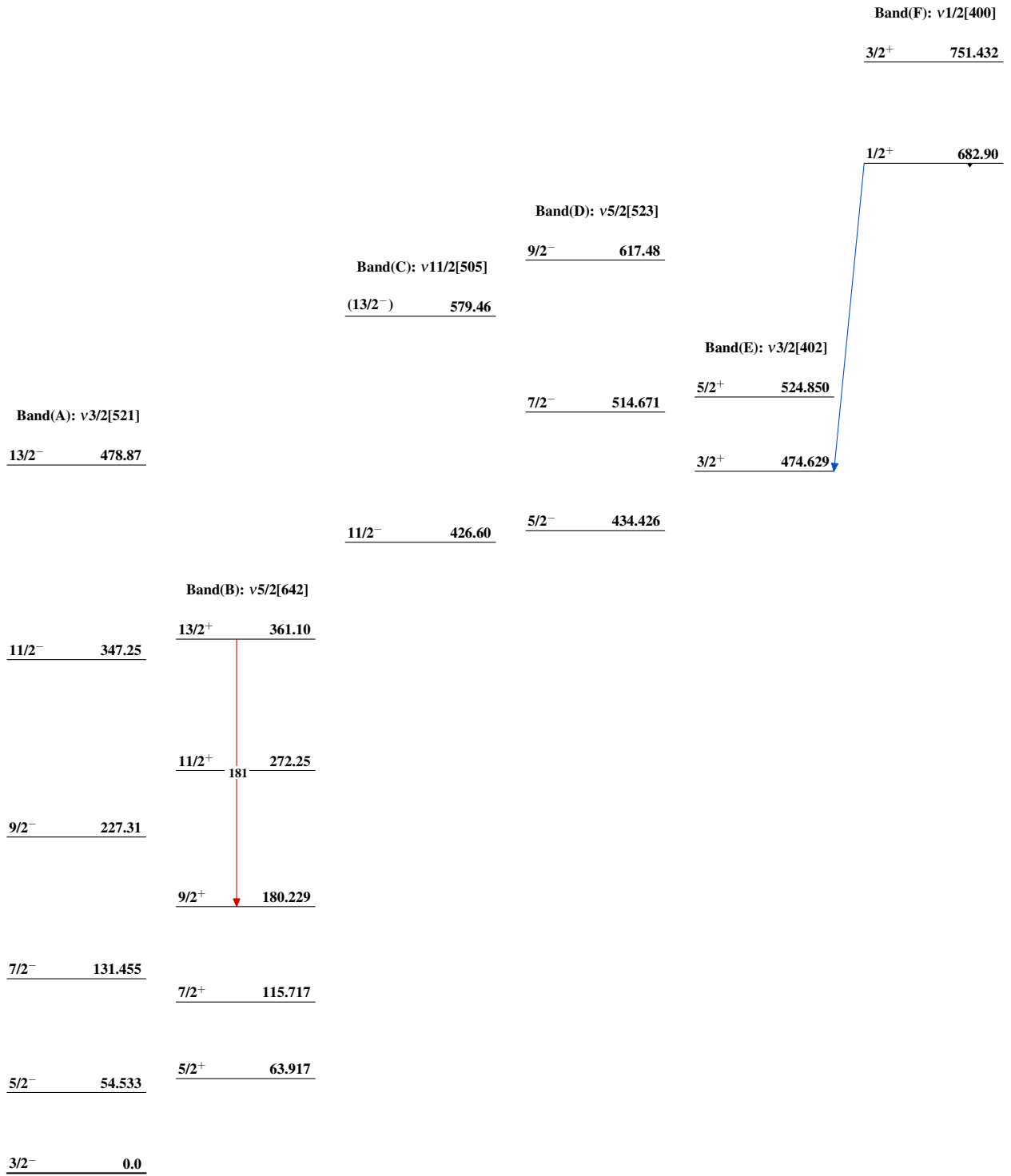
Level Scheme

Intensities: Relative photon branching from each level

●   Coincidence

$^{157}_{64}$Gd$_{93}$

^{158}Gd(p,dγ)   2014Ro25,2013Ro23

Band(F): ν1/2[400]

3/2$^+$ 751.432

1/2$^+$ 682.90

Band(D): ν5/2[523]

9/2$^-$ 617.48

Band(C): ν11/2[505]

(13/2$^-$)   579.46

Band(E): ν3/2[402]

5/2$^+$ 524.850

7/2$^-$ 514.671

Band(A): ν3/2[521]

13/2$^-$ 478.87

3/2$^+$ 474.629

5/2$^-$ 434.426

11/2$^-$ 426.60

Band(B): ν5/2[642]

13/2$^+$ 361.10

11/2$^-$ 347.25

11/2$^+$ 272.25   181

9/2$^-$ 227.31

9/2$^+$ 180.229

7/2$^-$ 131.455

7/2$^+$ 115.717

5/2$^+$ 63.917

5/2$^-$ 54.533

3/2$^-$ 0.0

$^{157}_{64}$Gd$_{93}$

<u>^{158}Gd(p,dγ)   **2014Ro25,2013Ro23 (continued)**</u>

Band(G): ν1/2[530]

<u>**3/2$^-$**</u>   **809.0**

<u>**1/2$^-$**</u>   **793.5**

Band(H): ν3/2[651]

<u>**3/2$^+$**</u>   **683.233**

$^{157}_{64}$Gd$_{93}$