$^{156}Gd(t,\alpha)$,$^{156}Gd(pol\ t,\alpha)$ 1979Bu03,1990Zy01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Additional information 1.

1979Bu03: Metallic Gd targets, enriched to 93.58% ^{156}Gd, were used. Target thicknesses were ≈100 $\mu g/cm^2$ and ≈20 $\mu g/cm^2$, respectively, for the polarized and the unpolarized triton studies. E(pol t)=17 MeV and polarization ≈80%; E(t)=15 MeV. reaction products were momentum analyzed using a Q3D magnetic spectrometer and detected in a helical-cathode position-sensitive proportional counter. FWHM values for the polarized and the unpolarized experiments were 18 keV and 12 keV, respectively. Spectra were measured at 5° intervals from θ=10° to 40°. For the (t,α) reaction, authors estimate ΔE=4 keV.

1990Zy01: (t,α), E(t)=35.32 and 37.32 MeV. Self-supporting (metallic) enriched (93.6% ^{156}Gd) targets, rolled to a thickness of 0.592 mg/cm^2 *14*. Reaction products were detected in an array of ten particle telescopes consisting of Si surface-barrier ΔE detectors (thickness≈100 μm) and 5-mm thick Li-drifted E detectors. Measured σ(E(t),θ), with uncertainty in absolute cross sections estimated to be ≈5%. DWBA analysis. Deduced nuclear structure factors of inner proton-hole states.

^{155}Eu Levels

Energies, cross sections and nuclear-structure factors for groups of states in ^{155}Eu. The data are from the (t,α) study of 1990Zy01.

The second of the ''theory'' entries differs from the first primarily in that it includes hexadecapole deformation (although it also uses different values of β_2 and the gap parameter, Δ).

Ex(MeV)	L, J	$d\sigma/d\Omega(\mu b/sr)\times J^\pi$	conf	nuclear struct.factor exp't	theoretical	
0.00-0.23	4, 7/2	1178	7/2$^+$,5/2[413]	1.22	0.53	0.49
0.23-0.55	5,11/2	2284	11/2$^-$,5/2[532]	1.32	0.62	0.54
0.85-1.06	2, 5/2	802	5/2$^+$,1/2[420]	0.39	0.37	0.30
1.06-2.0	4, 9/2	2375	9/2[404]	1.10	0.90	0.81
2.0-10.5 (bump)	4, 9/2	10,325	7/2[413],5/2[422], 3/2[431],1/2[440]	≈4.40	4.0	4.0
	4, 7/2	2345@	1/2[431]	≈1.94	1.0	1.0

×at θ=12.5°
@=obtained after subtraction of 10325 from the measured cross-section value of 12670 μb/sr 2345

E(level)[@]	J^π[†]	S[‡#]
0.0[c]	5/2$^+$	13
79[c] *2*	7/2$^+$	153
≈106[d]	5/2$^-$	<6
169[d] *2*	7/2$^-$	≤55[&]
≈179[c]	9/2$^+$	≤55[&]
≈246[e]	3/2$^+$	≤38[a]
≈255[d]	9/2$^-$	≤38[a]
307[e] *2*	5/2$^+$	165
357[d] *2*	11/2$^-$	286
≈392[e]	7/2$^+$	6
≈488[d]	13/2$^-$	≤26[b]
502[e] *2*	9/2$^+$	≤26[b]
624[d] *4*	(15/2$^-$)	31
878 *4*		20
911[f] *2*	3/2$^+$	38
≈923[g]	1/2$^+$	49
956[g] *2*	5/2$^+$	201
≈977[h]	7/2$^+$	≤15
≈1004[g]	3/2$^+$	33
1021 *3*		16

Continued on next page (footnotes at end of table)

^{156}Gd(t,α),^{156}Gd(pol t,α) 1979Bu03,1990Zy01 (continued)

^{155}Eu Levels (continued)

E(level)[@]	J^{π}[†]	S[‡#]	Comments
1066[f] 3	5/2+	31	E(level): value from (α,t).
≈1109		≤10	
1132[g] 4	(7/2)+	45	
≈1187		45	
≈1204		43	
1232[i] 3	5/2+	25	J^{π}: 1979Bu03 suggest that the 5/2[402] stripping strength may be split between levels at 1232 and 1481 keV.
≈1342		94	
1421 4	11/2−	27	
1481[j] 4	3/2+	21	J^{π}: listed assignment deduced by 1979Bu03 from negative analyzing power in (pol t,α) and Nilsson states expected in this region.
≈1515		48	
1549[j] 4	(5/2+)	21	
1633[j] 4	7/2+	51	
1736 4		14	
1820 4		20	
≈1845		17	

† From adopted values. In a number of instances, the listed assignments were deduced by 1979Bu03 from comparison of measured (pol t,α) cross sections and analyzing powers with DWBA predictions.
‡ Label=dσ/dΩ(μb/sr).
# Values at E(t)=17 MeV and θ=25°.
@ Listed values are those measured in ^{156}Gd(t,α), unless noted otherwise.
& dσ/dΩ=55 for the 169+179 peaks.
a dσ/dΩ=38 for the 246+256 peaks.
b dσ/dΩ=26 for the 488+501 peaks.
c Band(A): 5/2[413] band.
d Band(B): 5/2[532] band.
e Band(C): 3/2[411] band.
f Band(D): 1/2[411] band.
g Band(E): 1/2[420] band.
h Band(F): 7/2[404] band.
i Band(G): 5/2[402] band.
j Band(H): Proposed 3/2[422] band.

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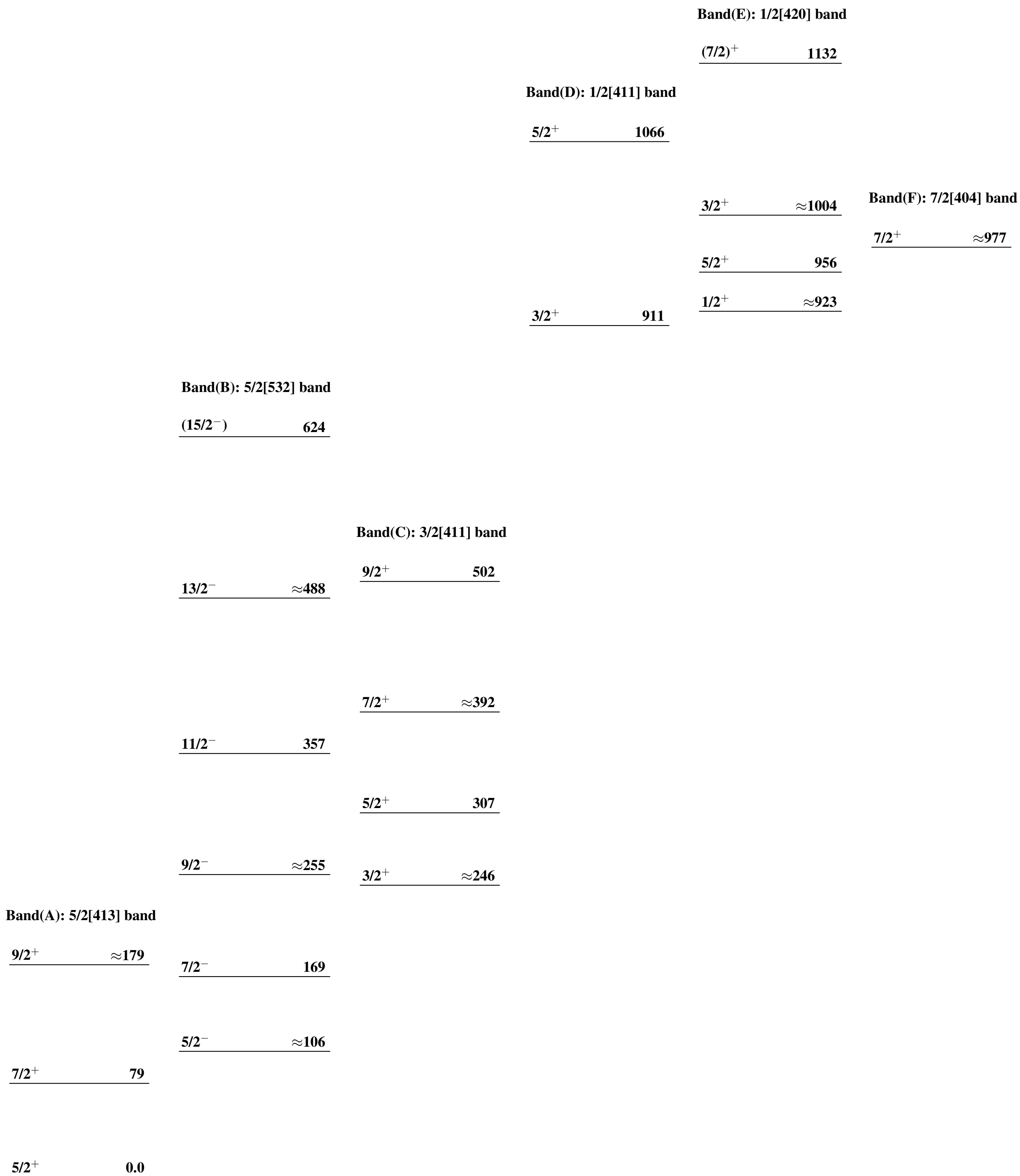

$^{155}_{63}Eu_{92}$

^{156}Gd(t,α),^{156}Gd(pol t,α) 1979Bu03,1990Zy01 (continued)