^{152}Sm(^{3}He,d) 2005Bu02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 170, 1 (2020)	16-Aug-2020

Additional information 1.

E=24 MeV. Measured E(deuterons), $\sigma(\theta)$ with a magnetic spectrograph and photographic plates as detectors. The particle spectra were obtained at five angles from θ=10° to 45°. DWBA analysis. FWHM ≈ 12 keV.

Others:

1969Un04: E=28 MeV. Measured E(deuterons), $\sigma(\theta)$ at θ=10° to 40° in steps of 5°, and 70°, magnetic spectrograph, FWHM=15-25 keV, DWBA analysis. A total of 20 groups reported up to 1478 keV. 1969Un04 list differential cross sections at all the eight angles.

1970Bu21: Discussion of levels at 83, 173 and 322 keV.

1981Ow02: E=35 MeV. Measured E(deuterons), magnetic spectrograph, FWHM=28 keV, DWBA analysis. The spectrum figure shows 28 groups up to ≈ 1650 keV. In authors′ table 1, cross sections are listed for levels up to 396 keV. The $\sigma(\theta)$ distributions are shown for 173, 235, 327 and 700 groups. This work mainly deals with the form factors in single-particle transfer reactions.

All data are from 2005Bu02 unless otherwise stated.

^{153}Eu Levels

The assignments for 5/2[413], 5/2[532], 3/2[411], 1/2[420] and 7/2[404] bands are from the literature. The 7/2[523], 3/2[541] and 1/2[541] assignments are from 2005Bu02.

Differential cross section data in μb/sr at 30°

Level	dσ/dΩ	Level	dσ/dΩ
0	≤2	1050	3 *1*
84	13 *4*	1074	8 *1*
101	5 *1*	1138	7 *2*
154	17 *2*	1150	12 *2*
173	156 *6*	1167	19 *2*
191	≤2	1188	23 *2*
235	≤1	1204	8 *2*
269	≤1.7	1223	38 *4*
323	34 *3*	1236	22 *4*
399	3 *1*	1306	29 *4*
571	18 *2*	1331	11 *2*
592	2 *1*	1357	82 *1*
616	≤3	1436	4 *1*
635	11 *2*	1477	32 *3*
696	126 *1*	1558	8 *2*
706	48 *7*	1583	5 *2*
718	82 *8*	1599	7 *2*
784	11 *2*	1626	12 *2*
821	≤1.1	1663	7 *2*
841	33 *3*		
889	8 *1*		

E(level)†	Jπ@	L&	NSFb	Comments
0?#	5/2+		≤0.01#	
84c *3*	7/2+	(4)	0.34	L: σ ratio suggests L=4,5; but band assignment requires L=4.
101e *2*	5/2−&3/2+		≤0.025	E(level): doublet corresponding to 97.43 and 103.18 in 'Adopted Levels' for ^{153}Eu. L: σ ratio suggests L=1,2; but band assignment for doublet requires L=2+3. NSF: for 5/2−; ≤0.01 for 3/2+.

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^{152}Sm(^{3}He,d) 2005Bu02 (continued)

^{153}Eu Levels (continued)

E(level)†	Jπ@	L&	NSF[b]	Comments
154[d] 2	7/2−		≤0.08	
173[e]	5/2+	2[a]	0.58	
191?# 2	9/2+		≤0.05#	
235?# 2	9/2−		≤0.03#	
269?# 3	7/2+		≤0.04#	
323[d] 2	11/2−	5[a]	1.1	
399[e] 3	9/2+		≈0.07	
571[g] 2	7/2+	(4)	0.38	L: σ(θ) in 1969Un04 gives L=4,5; σ ratio suggests L=4,5; but band assignment requires L=4.
592[d] 3	15/2−			
616?# 2	5/2+		#	
635[i] 2	1/2+&3/2−	(0,1)	0.024	E(level): doublet corresponding to 634.59 and 636.52 in 'Adopted Levels' for ^{153}Eu. L: 3,4 given by 1969Un04, but no σ(θ) plot shown for weak peaks. NSF: for 1/2+.
696‡[f] 2	5/2+	2[a]	0.40	
706 3	5/2+		≈0.16	This level is strongly mixed, having 5/2[402] and 1/2[420] configurations and probably other components as discussed in 2005Bu02.
718‡[f] 2	3/2+	(2)	0.25	
784 2		(2)		
821?# 2	11/2−	(5)	#	
841 2		2[a]		L: σ ratio suggests 1,2.
889[f] 3	7/2+		0.17	L: σ ratio suggests L=3 or 4; L=4 required by band assignment.
1050 3				
1074‡[h] 2	11/2−	(5)	0.24	
1138 3		(4,5)		
1150 3	5/2+			
1167 2	(1/2−)	(1,0)	0.023	NSF: for L=1.
1188[j] 2	(1/2−)	(1,0)	0.03	NSF: for L=1.
1204 3				
1223[j] 2	(5/2−)	(3)	0.13	L: σ ratio suggests L=2, L=3 from σ(θ) for a 1228 group (1969Un04).
1236 3		(3)		L: L=3 for a 1228 group in 1969Un04.
1306 3		1[a]		L: σ ratio suggests 1,2.
1331[j] 3	(9/2−)		0.31	L: σ ratio suggests L=3,4.
1357 2	(5/2−)	3[a]	≈0.3	L: σ ratio suggests L=2.
1436 3				
1477 2	5/2+	2[a]	0.09	
1558 3				
1583 3				
1599 3				
1626 2				
1663 4				

† Averages from spectra at several angles, and are measured relative to the strongly populated 5/2+, 173 level.
‡ 2005Bu02 indicates that this level is strongly mixed. For detailed discussion see 2005Bu02.
# From (α,t) reaction in 2005Bu02; not observed in (^{3}He,d) reaction. Only an upper limit of cross section is given.
@ From Adopted Levels for most of the levels.
& Unless otherwise indicated, the values are deduced from comparison of the measured ratios [dσ/dΩ in $(^{3}He,d)_{\theta=30^\circ}$]/[dσ/dΩ in $(\alpha,t)_{\theta=60^\circ}$] with those calculated from DWBA. These ratios do not give definitive L values but serve as guides to possible L values.

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^{152}Sm(^{3}He,d) 2005Bu02 (continued)

^{153}Eu Levels (continued)

[a] From $\sigma(\theta)$ data (1969Un04).
[b] The spectroscopic strengths are given as Nuclear Structure Factors, NSF=[dσ/dΩ(exp)]/[2N(dσ/dΩ(DWBA))], N=4.42. These values are compared with the calculated values for 'unmixed' and 'mixed' configurations given in table 3 of 2005Bu02.
[c] Band(A): 5/2[413].
[d] Band(B): 5/2[532].
[e] Band(C): 3/2[411].
[f] Band(D): 1/2[420].
[g] Band(E): 7/2[404].
[h] Band(F): 7/2[523].
[i] Band(G): 3/2[541].
[j] Band(H): 1/2[541] band (?). Possible band assignment from 2005Bu02 based on systematics of neighboring nuclides and approximate L values from (α,t)/(^{3}He,d) σ ratio.

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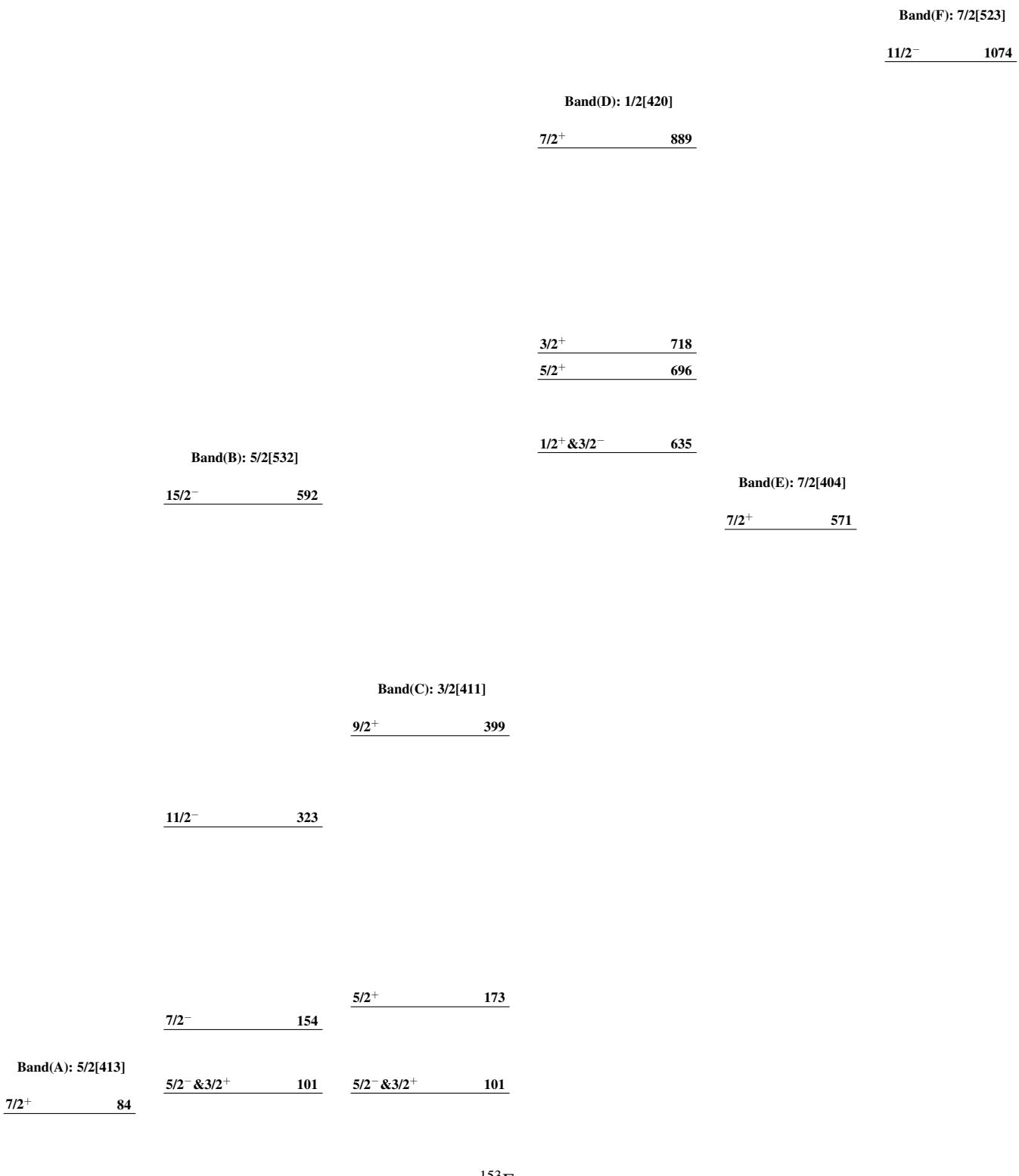

$^{153}_{63}Eu_{90}$

^{152}Sm(^{3}He,d) 2005Bu02 (continued)

Band(H): 1/2[541] band (?)

(9/2$^-$) 1331

(5/2$^-$) 1223

(1/2$^-$) 1188

Band(G): 3/2[541]

1/2$^+$&3/2$^-$ 635

$^{153}_{63}Eu_{90}$