^{164}Dy(t,α) 1992Ga15

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111, 1211 (2010)	12-Apr-2010

1992Ga15: E=17 MeV. Enriched (98.4%) target, Enge-split pole magnetic spectrograph. Measured $\sigma(\theta)$ from 10° to 50° in 5° steps. FWHM=16− 19 keV. Cross section uncertainties ≈20%. Deduced L-transfers and spectroscopic factors from comparison of $\sigma(\theta)$ data with DWBA predictions using Nilsson-orbital description in terms of spherical shell-model states. Experimental spectroscopic factors ("finger-print" pattern) compared with calculations using Nilsson model with pairing and Coriolis mixing. The following orbitals were included in the calculations: 3/2[411], 5/2[413], 5/2[532], 7/2[523], 7/2[404], 1/2[420], 1/2[411], 1/2[541], 3/2[541], 1/2[550].

^{163}Tb Levels

Cross sections in μb/sr at θ=40°

Energy	dσ/dΩ	Energy	dσ/dΩ
0	28	1065	30
54	276	1112	9.2
128	13	1186	14
223	20	1219	75
344	14	1281	127
373	16	1351	13
422	9	1428	28
452	163	1498	7.2
522	178	1549	11
552	31	1815	37
662	51 a	1902	8.6
771	17	1982	61
890	121	2204	28
960	4	2334	42
987	47	2432	48

a: 5.1 in 1992Ga15 is a misprint

E(level)[†]	J$^\pi$[‡]	L[#]	Spectroscopic strength[@]
0[d]	3/2$^+$	(2)	0.09
54[d] 2	5/2$^+$	2	0.60
128[d] 5	7/2$^+$	(4)	0.11
223[d] 2	9/2$^+$	(4)[a]	0.10
344[e] 5	7/2$^-$	(3)	0.03
373[f] 5	5/2$^+$	(2)[a]	0.04
422[e] 5	9/2$^-$		
452[f] 2	7/2$^+$	4	1.1
522[e] 2	11/2$^-$	5	1.3
552[&f] 5	9/2$^+$	4	0.12
552?[g]	(5/2$^-$)		
640?[k] 10	(3/2$^+$)		
662[g] 5	7/2$^-$	3	0.15
678?[k] 10	(5/2$^+$)		
771[g] 5	9/2$^-$	[b]	
890[g] 2	11/2$^-$	5	0.87
960[h] 5	(1/2$^+$)		
987[h] 2	(3/2)$^+$	2	0.11

Continued on next page (footnotes at end of table)

^{164}Dy(t,α) 1992Ga15 (continued)

^{163}Tb Levels (continued)

E(level)[†]	Jπ[‡]	L[#]	Spectroscopic strength[@]
1065[h] 2	(5/2)+	2	0.06
1112[h] 5	(7/2)+	(4)	0.06
1186 5		[b]	
1219[i] 2	(1/2+)	(0)	0.11
1281[&i] 2	3/2+&5/2+	2	≤0.26
1351 5		[b]	
1428[&i] 2	7/2+&9/2+	(4)	0.20
1498 5		[b]	
1549 5		[b]	
1815[j] 2	(7/2)−	(3)	0.10
1902 5			
1982[j] 2	(11/2)−	5	0.13[c]
2204 5			
2334 5			
2432 5			

[†] Uncertainties are assigned (evaluators) as 2 keV for strong and resolved peaks (as stated by the authors) and 5 keV for others.
[‡] From 1992Ga15, based primarily on relative cross sections of band members ("finger-print" method) and consistency of L-transfer. Parentheses are by the evaluators.
[#] Implied by $\sigma(\theta)$ distributions and DWBA fits (figure 7 of 1992Ga15).
[@] $C^2_{j,l}V^2a^2$, where V is the fullness parameter, the $C_{j,l}$ are the expansion coefficients of the spherical-shell-model states in the deformed-orbital wave function, and a is the Coriolis-mixing amplitude. Uncertainties are 30-50%.
[&] Doublet.
[a] Poor agreement of $\sigma(\theta)$ with DWBA calculations.
[b] $\sigma(\theta)$ does not uniquely determine L-value.
[c] The predicted value of 1.1 is much larger than observed; possibly due to more strength transferred to low-lying levels than accounted for by the Coriolis-mixing calculations, or due to the fragmentation of higher-lying orbitals.
[d] Band(A): π3/2[411] band. A=11.2. The 5/2 member is the strongest populated in this band as expected, since the 3/2[411] orbital arises from the $d_{5/2}$ spherical shell-model state.
[e] Band(B): π7/2[523] band.
[f] Band(C): π5/2[413] band. This band was identified (1992Ga15) by comparing the "finger-print" pattern of experimental strengths of different band members to that for ^{161}Tb. The 7/2 member is the strongest populated in this band, as expected, since the 5/2[413] orbital arises from the $g_{7/2}$ spherical shell-model state.
[g] Band(D): π5/2[532] band.
[h] Band(E): $K^\pi=1/2^+$ band. Configuration=π1/2[411] + [3/2[411]-Q_{22}, 5/2[413]-Q_{22}] (upper fragment). A=11.5, a=−0.39. This band is identified, based on similar structures in ^{159}Tb and ^{161}Tb (1992Ga15).
[i] Band(F): π1/2[420] band.
[j] Band(G): π3/2[541] band.
[k] Band(H): $K^\pi=1/2^+$ band. Configuration=π1/2[411] + [3/2[411]-Q_{22}, 5/2[413]-Q_{22}] (lower fragment).

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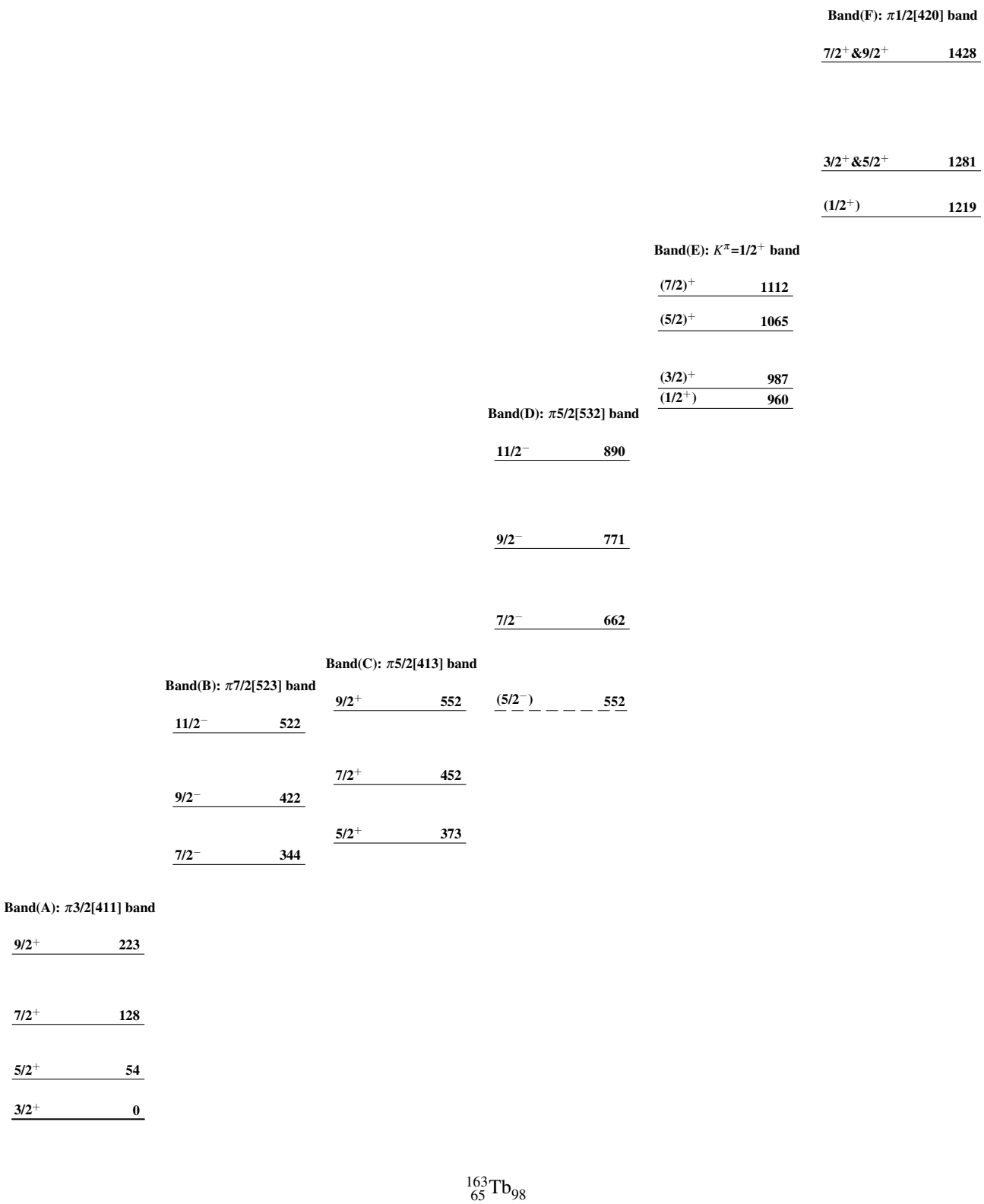

$^{163}_{65}Tb_{98}$

^{164}Dy(t,α) 1992Ga15 (continued)

Band(G): π3/2[541] band

(11/2)$^-$ **1982**

(7/2)$^-$ **1815**

Band(H): K^π=1/2$^+$ band

(5/2$^+$) **678**

(3/2$^+$) **640**

$^{163}_{65}Tb_{98}$