^{164}Dy(^{3}He,d) 1975Wa12,1974Le27

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 194,460 (2024)	31-Oct-2022

1975Wa12: E(α)=24 MeV. Measured σ at 60° using Enge split-pole magnetic spectrograph and photographic emulsion plates at McMaster University FN tandem Van de Graaff accelerator. Enriched (98.43%) target on a 50 μg/cm^2 carbon backing. FWHM≈12 keV. DWBA analysis.

1974Le27: E=46.5 MeV. Measured $\sigma(\theta)$(0° to 35°) using magnetic spectrograph and photographic emulsion plates at the University of Michigan S3-inch cyclotron. FWHM≈15 keV. DWBA analysis.

1976Br37: Coupled channels Born approximation (CCBA) analysis.

^{165}Ho Levels

NSF=Nuclear Structure Factor=[dσ/dΩ(exp)]/[2N((dσ/dΩ)(DWBA))], N=23. Theoretically NSF=$[\Sigma_i C^i_{jl} a_i U_i]^2$,where C^i_{jl}=coefficients to describe Nilsson orbitals in terms of spherical states, a_i=Coriolis mixing amplitudes of states with same spin, U_i=emptiness factors for the target. The Nuclear Structure Factors are listed under comments; for theoretical values, see 1975Wa12.

E(level)[†‡]	J$^\pi$[&]	L[@]	dσ/dΩ(μb/sr)[‡a]	Comments
0.0[b]	7/2$^-$		2.1	NSF=0.037. L: σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12) suggests 0,1,2; inconsistent with Adopted J^π=7/2$^-$.
93[b] *1*	9/2$^-$	(5)	≈1.0	L: 5 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); but L=3,4 not ruled out. NSF≈0.087.
210[b] *1*	11/2$^-$	5	21.2	L: 5 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF=1.49.
421[c] *1*	5/2$^+$	2	≈31.9	L: 2,3,4 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF≈0.49.
≈430[d]	1/2$^+$		≈11.8	NSF≈0.110.
451[d] *1*	3/2$^+$	2	35.7	L: 2,3 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF=0.61.
539[d] *1*	5/2$^+$	2	15.2	L: 2 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF=0.23.
590[d] *1*	7/2$^+$	4	3.5	L: 3 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12) is inconsistent. NSF=0.21.
639 *1*			≈0.8	Possible J^π=7/2$^-$,3/2$^-$, π7/2[523]⊗2$^+$.
682[e] *1*	1/2$^-$	1	14.2	L: 0 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12) is inconsistent. NSF=0.104.
702[e] *1*	5/2$^-$	3	22.3	NSF≈0.38. L: 3 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).
716[f] *1*	7/2$^+$	(4)	22.3	L: 4,5 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF=1.30.
736 *5*				
≈791[e]	3/2$^-$	1	≈17.4	L: 0,1 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF≈0.118.
≈800[e]	9/2$^-$	(5)	≈17.4	NSF≈1.41. L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).
820?[#f] *5*	9/2$^+$	(4)		E(level): only a weak peak may have been seen by 1975Wa12. L: L=1 from $\sigma(\theta)$ in 1974Le27, disagrees with L=4,5 from their σ(^{3}He,d)/σ(α,t) ratio.
958[e] *1*	7/2$^-$		8.1	L=4 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12) in disagrement with 7/2$^-$ assignment in their band assignment. NSF=0.10.
995 *1*	5/2$^+$	(2)	3.2	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).

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^{164}Dy(^{3}He,d) 1975Wa12,1974Le27 (continued)

^{165}Ho Levels (continued)

E(level)[†][‡]	Jπ[&]	L[@]	dσ/dΩ(μb/sr)[‡][a]	Comments
				NSF=0.042, 5/2[413] assignment.
1058[g] *2*	5/2+	2	89	L: 2 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). NSF=1.12.
1076?[#] *10*		3		E(level): part of the peak may be due to shoulder of strong 1058 peak as explained by 1975Wa12.
1128 *3*			≈2.4	
≈1144[g]	7/2+		≈1.4	NSF≤0.007.
1194 *3*			4.4	
1244 *3*			3.4	
1288 *3*			4.0	
1339 *2*		2	8.4	
1390 *3*			3.3	
1471[h] *3*	(9/2−)	(5)	1.0	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=4 is not ruled out.
1486[i] *3*	(7/2−)	(3)	2.4	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=1,2 are not ruled out.
1534 *3*			1.7	
1594[h] *2*	11/2−	(5)	15.7	NSF=0.80. L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). E(level),L: other: L=6 from σ(θ) and 5 or 6 from σ(^{3}He,d)/σ(α,t) ratio (1974Le27) for a 1561 group which is identified with 1594 group in 1975Wa12.
1616 *2*	1/2+	0	24.4	L: 0 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=1 is not ruled out. E(level): 1586 *10* in 1974Le27.
≈1653			7.7	L: 1,0,2 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12). E(level): 1620 *10* in 1974Le27.
1760 *3*		(3)	15.2	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).
1844 *3*			15.4	L: 0,1 from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).
1939 *3*		(4)	4.4	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12).
2016 *3*			6.1	
2053 *3*			3.0	
2085 *3*		(2)	32.2	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=1 is not ruled out.
≈2111		(3)	11.6	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=2,4 are not ruled out.
≈2121		(2)	14.5	L: from σ(^{3}He,d)(60°)/σ(α,t)(45°) (1975Wa12); L=3 is not ruled out.

[†] ΔE≤1 keV for E≤1 MeV, ΔE=2-3 keV for E>1 MeV.
[‡] From 1975Wa12, unless otherwise stated. There is general agreement between results 1975Wa12 and 1974Le27, however, there are some differences. Groups in (^{3}He,d) spectrum at 234, 471, 736, 820 and 1076 reported in 1974Le27 are not seen by 1975Wa12. The authors of 1975Wa12 suggest that some of these strong peaks seen by 1974Le27 may be the shoulders (within 15-25 keV) of the nearby strong peaks. Only the 820 and 1076 are included here, others have been omitted.
[#] From 1974Le27, not reported by 1975Wa12.
[@] From 1974Le27, based on comparison of σ(θ) distributions with DWBA calculations, unless otherwise stated. L-transfer from σ(^{3}He,d)/σ(α,t) in 1975Wa12 and 1974Le27 are also stated.
[&] As given by 1975Wa12, based on L-transfer assignments in (α,t), cross section ratio: σ(^{3}He,d)(60°)/σ(α,t)(45°), and band assignments from "finger-print" method.
[a] At 60°. Absolute cross sections accurate to ≈20% and relative cross sections to ≈10%.
[b] Band(A): π7/2[523] band.
[c] Band(B): π3/2[411] band.
[d] Band(C): π1/2[411] band.
[e] Band(D): π1/2[541] band.
[f] Band(E): π7/2[404] band.
[g] Band(F): π5/2[402] band.

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^{164}Dy(^{3}He,d) 1975Wa12,1974Le27 (continued)

^{165}Ho Levels (continued)

[h] Band(G): $\pi 9/2[514]$ band.
[i] Band(H): $\pi 5/2[532]$ band (?).

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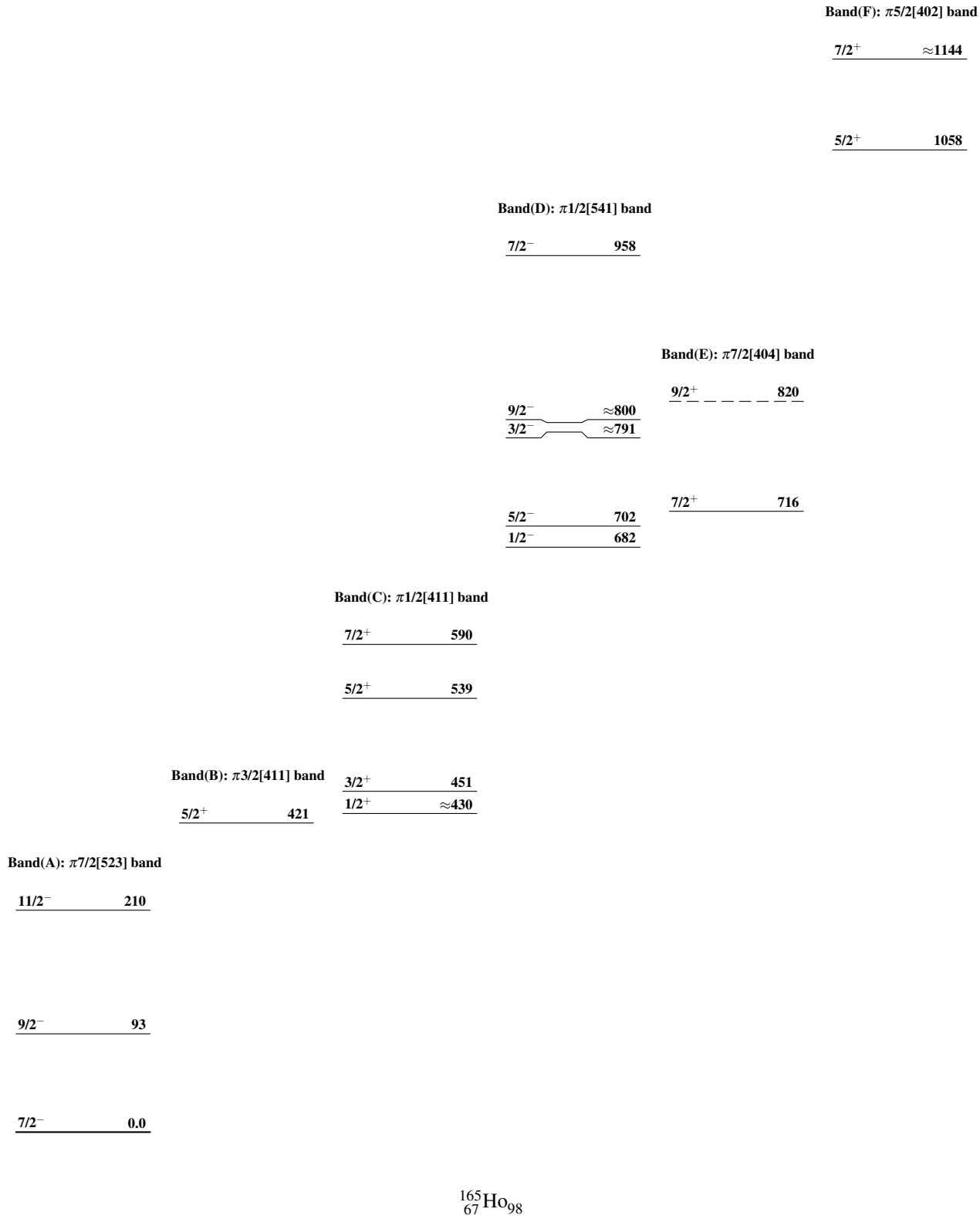

$^{165}_{67}Ho_{98}$

^{164}Dy(^{3}He,d) 1975Wa12,1974Le27 (continued)

Band(G): π9/2[514] band

11/2$^-$ 1594

Band(H): π5/2[532] band (?)

(7/2$^-$) 1486

(9/2$^-$) 1471

$^{165}_{67}Ho_{98}$