^{64}Ni(^{3}He,d) 1976Br36,1976Bo06,2013Sc06

Type	Author	History Citation	Literature Cutoff Date
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1976Br36: E=18 MeV was produced at the Nuclear Physics Laboratory at University of Oxford. Target was 600 mg/cm^2 >98% enriched ^{64}Ni. Reaction products were momentum-analyzed with a multigap spectrograph (FWHM=30 keV). Measured $\sigma(E_d,\theta)$, θ_{cm}=5°−90°. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis.

1976Bo06: E=30.2 MeV ^{3}He beam was produced from the Centre d'Etudes Nucleaires de Saclay cyclotron. Target was 159 μg/cm^2 97.6% enriched ^{64}Ni. Reaction products were detected with two ΔE-E silicon detector telescopes (FWHM≈50 keV). Measured $\sigma(E_d,\theta)$, θ_{cm}=10°−45°. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis.

2013Sc06,2013ScZZ: E=18 MeV α beam was produced from Yale tandem accelerator of WNSL facility. Target was 160 μg/cm^2 ^{64}Ni (91.0% enriched). Reaction products were momentum-analyzed with a split-pole Enge spectrograph (FWHM≈64 keV). Measured $\sigma(E_d,\theta)$. Deduced levels, J, π, spectroscopic factors from DWBA analysis. Comparison with shell-model calculations. Cross section are from 2013ScZZ.

1965Bl14: E=22 MeV ^{3}He beam was produced from the Los Alamos variable-energy cyclotron. Targets were 150-600 μg/cm^2 self-supporting foils of 98.6% enriched ^{64}Ni. Reaction products were detected with ΔE-E detector telescopes (FWHM=70-90 keV). Measured $\sigma(E_d,\theta)$, θ_{cm}≈12°−50°. Deduced levels, L-transfers, spectroscopic factors from DWBA analysis.

dσ/dΩ in mb/sr (2013ScZZ)

Level	10° (^{3}He,d)	25° (^{3}He,d)	5° (α,t)
0	8.51	2.81	
771	4.51	1.26	2.21
1116	0.061	0.32	2.72
1482	0.066	0.11	0.70
1623	0.19	0.84	5.64
1725	0.22	0.079	
2107	0.079	0.14	0.55
2213	1.57	0.44	0.23
2329	1.31	0.41	0.30
2526	0.093	0.63	7.46
2650	0.53	0.18	0.37
2874	0.75	0.33	0.77
3086	0.53	0.16	
3157	0.35	0.12	

^{65}Cu Levels

Spectroscopic factor is obtained from dσ/dΩ(exp)=N×(2J+1)C^{2}S×dσ/dΩ(DWBA), where J is the spin of the final level and N is the normalization factor (1970Ro22).

E(level)†	L‡	(2J+1)C^{2}S‡	Comments
0	1	3.08	(2J+1)C^{2}S: others: 2.22 (2013Sc06), 3.16 (1965Bl14).
763	1	1.30	(2J+1)C^{2}S: others: 0.99 (2013Sc06), 1.50 (1965Bl14).
1113	3	1.14	(2J+1)C^{2}S: others: 1.49 (2013Sc06), 1.56 (1965Bl14).
1503	3	0.32	E(level): other: 1482 (2013Sc06). (2J+1)C^{2}S: others: 0.73 (2013Sc06), 0.40 (1965Bl14).
1589	3	2.40	E(level): other: 1623 (2013Sc06). (2J+1)C^{2}S: others: 3.38 (2013Sc06), 3.42 (1965Bl14).
1743	1	0.06	E(level): other: 1725 (2013Sc06).

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^{64}Ni(^{3}He,d) 1976Br36,1976Bo06,2013Sc06 (continued)

^{65}Cu Levels (continued)

E(level)[†]	L[‡]	(2J+1)C^{2}S[‡]	Comments
			(2J+1)C^{2}S: others: 0.04 (2013Sc06), 0.06 (1965Bl14).
2125	3	0.36	E(level): other: 2107 (2013Sc06). (2J+1)C^{2}S: others: 0.36 (2013Sc06), 0.42 (1965Bl14).
2223	1	0.34	E(level): other: 2213 (2013Sc06). (2J+1)C^{2}S: others: 0.26 (2013Sc06), 0.42 (1965Bl14).
2339	1	0.24	E(level): other: 2329 (2013Sc06). (2J+1)C^{2}S: others: 0.21 (2013Sc06), 0.28 (1965Bl14).
2550	4	3.80	E(level): other: 2526 (2013Sc06). (2J+1)C^{2}S: others: 3.55 (2013Sc06), 2.90 (1965Bl14).
2650 *50*	3	0.31	Peak obscured by impurities in 1976Br36 data. All data are from 1965Bl14. (2J+1)C^{2}S: others: 0.30 (2013Sc06).
2898	1	0.16	E(level): other: 2874 (2013Sc06). (2J+1)C^{2}S: others: 0.11 (2013Sc06), 0.20 (1965Bl14).
3119	1	0.10	E(level): other: 3086 (2013Sc06). (2J+1)C^{2}S: others: 0.078 (2013Sc06), 0.16 (1965Bl14).
3157[#]	(1)	0.051	E(level),(2J+1)C^{2}S: from 2013Sc06. L: possible L=1 from σ ratio (2013ScZZ).
3284			
3391	2	0.24	(2J+1)C^{2}S: other: 0.24 (1965Bl14).
3452	(2)	0.082	(2J+1)C^{2}S: other: 0.14 for L=1 (1965Bl14).
3519[@]	1+3		(2J+1)C^{2}S: 0.48 for L=3 (1965Bl14).
3601	2	0.21	
3768	2	0.18	(2J+1)C^{2}S: other: 0.12 (1965Bl14).
3800 *50*	4	0.4	An L=2+4 doublet at 3800 *50* was reported in 1965Bl14. The L=2 component has been identified as the 3768 level (1976Br36). The data for this component are from 1965Bl14.
3858			
3966	1	0.06	(2J+1)C^{2}S: other: 0.14 (1965Bl14).
4080	1	0.26	Peak obscured by impurities in 1976Br36. All data are from 1965Bl14.
4190 *50*	4	0.7	All data for the 4190 level are from 1965Bl14.
10750 *40*	(3)+(1)		(2J+1)C^{2}S: ≈2.53 for L=(3) and ≈1.42 for L=(1) (1976Bo06). IAS of ^{65}Ni g.s., $J^\pi=5/2^-$ and E(level)=63, $J^\pi=1/2^-$; the corresponding C^{2}S′ are ≈2.5 and ≈1.4.
11760 *40*	(4)	≈7.5	IAS of ^{65}Ni E(level)=1013, $J^\pi=9/2^+$.
12670 *40*	(2)	≈1.7	IAS of ^{65}Ni E(level)=1920, $J^\pi=5/2^+$.
13090 *40*	(3)+(4)		(2J+1)C^{2}S: ≈0.56 for L=(3) and ≈1.1 for L=(4) (1976Bo06). IAS of ^{65}Ni E(level)=2336, $J^\pi=5/2^-$ and the possible level with E(level)≈2330, $J^\pi=9/2^+$; the corresponding C^{2}S′ are ≈0.6 and ≈1.1, respectively.

[†] From 1976Br36, unless otherwise noted.
[‡] From DWBA analysis of measured $\sigma(\theta)$ data in 1976Br36 up to 3966 level and in 1976Bo06 for E(level)>10000, unless otherwise noted.
[#] From 2013ScZZ.
[@] Doublet. (2J+1)C^{2}S=0.42 quoted for total peak cross section corresponding to L=3 (1976Br36).