^{62}Ni(p,d),(pol p,d) 1996Ma11,2013Sc06,1976Ko06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	20-Jan-2020

No changes made since the 2015 update.

1996Ma11: (pol p,d): E(p)=65 MeV, FWHM≈40 keV. Measured σ(E(d),θ), and analyzing powers, DWBA analysis.

2013Sc06, 2013ScZZ: (p,d), E(p)=28 MeV from WNSL-Yale tandem accelerator facility. Measured deuteron spectra, $\sigma(\theta)$, spectroscopic factors C^2S using a split-pole Enge spectrograph. FWHM ≈48 keV. Target=219 μg/cm^2 thick 96.5% enriched. Deduced levels, J, π. DWBA analysis. Comparison with shell-model calculations.

The main purpose of the neutron adding and neutron removal reaction studies by 2013Sc06 was to obtain occupancies of neutron orbitals, proton vacancies, and energy centroids of neutron, neutron-holes, proton-single particle excitations in ^{60}Ni and ^{62}Ni, and thereby investigate closure of $0f_{7/2}$ shell. Some data details of this study are supplied in 2013ScZZ.

1976Ko06: (p,d): E(p)=40 MeV. Measured σ(E(d),θ), 14 angles between 4° and 54°, magnetic spectrograph, FWHM≈45 keV, enriched target.

Others: 1979Ik04, 1974Ko32, 1965Sh06 (12 levels up to 9550 keV).

All data are from 1996Ma11, except as noted.

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dσ/dΩ in mb/sr (2013ScZZ)

Level	10° (p,d)	25° (p,d)
0	14.3	1.19
67	0.78	1.4
283	3.92	0.27
656	0.53	0.059
909	0.001	0.011
1015	0.001	0.025
1100	0.66	0.052
1132	0.001	0.076
1185	1.49	0.16
1455	0.16	0.37
1610	0.073	0.052
1729	0.35	0.029
2122	0.001	0.091
2124	0.22	0.091
2469	0.068	0.12
2593	0.001	0.019
2640	0.05	0.019
2905	0.17	0.38
3308	0.17	0.43

Level energies in 2013Sc06 are from 1999-NDS for A=61 (1999Bh04); these values are nearly the same as in Adopted Levels here

The uncertainties in cross sections are ≈4% for σ>1 mb/sr, ≈7% for 0.1<σ< 1.0 mb/sr, and ≈18% for σ< 0.1 mb/sr at their respective maxima. The uncertainties arising from possible contaminants or previously unidentified states for very weak transitions could be ≈0.02 mb/sr.

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^{62}Ni(p,d),(pol p,d) 1996Ma11,2013Sc06,1976Ko06 (continued)

^{61}Ni Levels

E(level)†	Jπ‡	L#	C²S#	Comments
0.0	3/2⁻	1@	2.0	C²S: 1.92 (2013Sc06,2013ScZZ), 1.8 (1976Ko06).
68	5/2⁻	3@	2.97	C²S: 2.51 (1976Ko06).
286	1/2⁻	1@	0.60	C²S: 0.55 (2013Sc06,2013ScZZ), 0.46 (1976Ko06).
658	1/2⁻	1@	0.10	C²S: 0.08 (2013Sc06,2013ScZZ), 0.09 (1976Ko06).
912	5/2⁻	3@	0.081	C²S: 0.09 (1976Ko06).
1018	(7/2⁻)	(3)	(0.026)	
1123	(5/2)⁻	3+1	0.38	L=1+3 and J=1/2⁻,3/2⁻,5/2⁻ for a doublet 1101+1132 keV from (1976Ko06). C²S: for L=3, 5/2⁻. Others: 0.11 for L=1, 3/2⁻ component (2013Sc06,2013ScZZ); 0.11 for L=1, 0.18 for L=3 (1976Ko06).
1191	3/2⁻	1@	0.27	C²S: 0.24 (2013Sc06,2013ScZZ), 0.25 (1976Ko06).
1458	7/2⁻	3@	0.32	C²S: 0.49 (1976Ko06).
1614	5/2⁻	3@	0.15	C²S: 0.13 (1976Ko06).
1731	3/2⁻	1@	0.056	C²S: 0.06 (2013Sc06,2013ScZZ), 0.06 (1976Ko06).
2015	7/2⁻	3@	0.092	C²S: 0.09 (1976Ko06).
2125	9/2⁺	4+1	0.22	L=4+1 and J=(1/2⁻,9/2⁺) for a 2120 group quoted in 1976Ko06. C²S: for L=4, 9/2⁺. Others: 0.04 for L=1, 1/2⁻ component (2013Sc06, 2013ScZZ); 0.25, 0.021 (1976Ko06).
2476	7/2⁻	3@	0.13	C²S: 0.23 (1976Ko06).
2609	7/2⁻	3	0.061	
2640		1	0.011	E(level),L,C²S: from 2013Sc06, 2013ScZZ.
2734	(7/2⁻)	(3)	(0.033)	
2902	7/2⁻	3@	0.57	C²S: 0.8 (1976Ko06).
3053&				L=0 and J=1/2⁺ for a 3068 keV level from 1976Ko06. C²S: 0.03 (1976Ko06).
3140	7/2⁻	3	0.086	
3295	7/2⁻	3@	0.72	C²S: 0.98 (1976Ko06).
3483	9/2⁺	4	0.12	
3652	7/2⁻	3	0.083	
3768	7/2⁻	3	0.071	
3932	7/2⁻	3	0.084	C²S: 0.12 (1976Ko06).
4025	7/2⁻	3	0.078	
4144	7/2⁻	3	0.20	
4258	7/2⁻	3	0.038	
4378	7/2⁻	3	0.067	
4487	7/2⁻	3	0.11	
4586	7/2⁻	3@	0.14	C²S: 0.18 (1976Ko06).
4655	7/2⁻	3	0.058	
4729	7/2⁻	3	0.061	
4791	7/2⁻	3	0.075	
4880	7/2⁻	3	0.23	
4956	7/2⁻	3@	0.24	C²S: 0.33 (1976Ko06).
5031	(7/2⁻)	(3)	(0.041)	
5079	7/2⁻	3	0.059	
5174	(1/2⁺)	(0)	(0.048)	
5232	7/2⁻	3	0.057	
5333&				
5407&				
5460&				
5596	1/2⁺	0@	0.22	C²S: 0.16 (1976Ko06).
5652	(3/2⁺)	(2)	(0.20)	

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^{62}Ni(p,d),(pol p,d) 1996Ma11,2013Sc06,1976Ko06 (continued)

^{61}Ni Levels (continued)

E(level)[†]	Jπ[‡]	L[#]	C^{2}S[#]	Comments
5706	1/2$^+$	0[@]	0.14	C^{2}S: 0.12 (1976Ko06).
5761[&]				
5954	3/2$^+$	2	0.20	
6200[&]				
9550	7/2$^-$	3	0.37	E(level): identified as IAS of ^{61}Co g.s. (1996Ma11,1965Sh06). L: same value in 1965Sh06.

[†] Uncertainties not given by authors.

[‡] From $\sigma(\theta)$ and $A_y(\theta)$ in (pol p,d).

[#] Extracted from DWBA analysis of angular distributions (1996Ma11). Values from 1976Ko06 for about 20 levels are in general agreement with those from 1996Ma11. Neutron orbitals : $2p_{3/2}$ for L=1,L+1/2, $2p_{1/2}$ for L=1,L−1/2, $1f_{7/2}$ for L=3,L+1/2, $1f_{5/2}$ for L=3, L-1/2 : $3s^{-1}_{1/2}$ for L=0, $2d^{-1}_{3/2}$ for L=2, $1g^{-1}_{9/2}$ for L=4.

[@] L value is the same in 1976Ko06.

[&] $\sigma(\theta)$ and $A_y(\theta)$ inconclusive for J^π determination.