^{62}Ni(d,p),(pol d,p) 1970An25,1963Fu04,1974Hu04

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 196,17 (2024)	30-Sep-2023

(d,p) measurements:

1970An25: E=7.5 MeV deuteron beam was produced from the MIT-ONR Van de Graaff accelerator. Target was 13.6 μg/cm^2 96.79% enriched ^{62}Ni. Reaction products were momentum-analyzed with the MIT multi-gap spectrograph (FWHM≈10 keV). Measured σ(E$_p$,θ). Deduced levels, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with shell-model calculations and available data. See also 1961En03 for a preliminary report from the same lab.

1970Li03: E=2.8 MeV deuteron beam was produced from a Van de Graaff accelerator at the Leningrad State University, St.Petersburg, Russia. Target was 0.2 mg/cm^2 95% enriched ^{62}Ni. Reaction products were momentum-analyzed with a many-angle magnetic analyzer (FWHM=15 keV). Measured σ(E$_p$,θ). Deduced levels, L-transfers, spectroscopic factor ratios from DWBA analysis.

1963Fu04: E=15 MeV deuteron beam was produced from University of Pittsburgh cyclotron. Target was about 2 mg/cm^2 thick foil of ^{62}Ni. Reaction products were momentum-analyzed with a magnetic spectrograph (FWHM=45 keV). Measured σ(E$_p$,θ). Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

2013Sc06,2013ScZZ: E=10 MeV deuteron beam was produced from Yale tandem accelerator of WNSL facility. Target was 219 μg/cm^2 ^{64}Ni (96.5% enriched). Reaction products were momentum-analyzed with a split-pole Enge spectrograph (FWHM≈33 keV). Measured σ(E$_p$,θ). Deduced levels, J, π, spectroscopic factors from DWBA analysis. Comparison with shell-model calculations.

1977St07: E=2.8 MeV deuteron beam was from the 4-MV cascade generator at University of Basel. Target was 100 μg/cm^2 99.02% enriched ^{62}Ni. Reaction products were detected by silicon detectors (FWHM=18-20 keV). Measured σ(E$_p$,θ). Deduced levels, L-transfers, spectroscopic factors from DWBA analysis. Comparisons with available data.

1970Tu02: E=11.5 MeV deuteron beam was produced from the Saclay Van de Graaff accelerator. Targets were 100-200 μg/cm^2 99.02% enriched ^{62}Ni on carbon backings. Reaction products were momentum-analyzed with a magnetic spectrograph (FWHM≈25-30 keV). Measured σ(E$_p$,θ). Deduced levels, L-transfers, spectroscopic factors from DWBA analysis.

(pol d,p) measurements:

1974Hu04: E=10 MeV polarized deuteron beam was produced from a Lamb-shift polarized-ion source and was a tandem accelerator at University of Notre Dame. Target was 200 μg/cm^2 98.8% enriched ^{62}Ni on a carbon backing. Reaction products were detected with an array of 8 Si(Li) detectors (FWHM≈60 keV). Measured σ(E$_p$,θ), analyzing powers. Deduced levels, J, π, L-transfers, spectroscopic factors from DWBA analysis.

^{63}Ni Levels

E(level)[†]	J$^\pi$[‡]	L[#]	(2J+1)C^{2}S[#]	Comments
0	1/2$^-$	1	0.74	L: also from 1977St07, 1970Li03, 1963Fu04, 1970Tu02. (2J+1)C^{2}S: others: 0.83 (2013Sc06), 0.747 (1963Fu04), 0.414 (1977St07), 0.85 (1970Tu02).
87 *5*	5/2$^-$	3	3.38	E(level): other: 88 (1963Fu04,1970Tu02,1977St07). (2J+1)C^{2}S: others: 3.55 (2013Sc06), 2.39 (1963Fu04), 2.32 (1977St07), 3.40 (1970Tu02).
155 *5*	3/2$^-$	1	1.10	E(level): others: 158 (1970Li03,1963Fu04), 155 (1970Tu02,1977St07). (2J+1)C^{2}S: others: 1.11 (2013Sc06), 1.07 (1963Fu04), 0.567 (1977St07), 1.15 (1970Tu02).
515 *5*	3/2$^-$	1	0.32	E(level): others: 518 (1970Li03,1970Tu02,1977St07), 526 (1963Fu04). (2J+1)C^{2}S: others: 0.34 (2013Sc06), 0.306 (1963Fu04), 0.276 (1977St07), 0.32 (1970Tu02).
1003 *5*	1/2$^-$	1	0.66	E(level): others: 1000 (1970Li03,1970Tu02), 1008 (1963Fu04). (2J+1)C^{2}S: others: 0.68 (2013Sc06), 0.663 (1963Fu04), 0.82 (1970Tu02).
1064 *10*				
1256 *10*				
1294 *10*	(9/2)$^+$	4	7.5	E(level): others: 1292 (1970Li03,1970Tu02,1977St07), 1306 (1963Fu04). (2J+1)C^{2}S: others: 3.21 (2013Sc06), ≈6.1 (1963Fu04), 3.376 (1977St07), 6.72 (1970Tu02).

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^{62}Ni(d,p),(pol d,p) 1970An25,1963Fu04,1974Hu04 (continued)

^{63}Ni Levels (continued)

E(level)†	Jπ‡	L#	(2J+1)C^{2}S#	Comments
1327 *10*	3/2$^-$	1	0.25	(2J+1)C^{2}S: other: 0.13 (2013Sc06).
1454 *10*				
1657 *10*				
1677 *10*			0.24	E(level): other: 1686 (1963Fu04). (2J+1)C^{2}S: from 2013Sc06 for J^π=(7/2$^-$).
1787 *10*				
1899 *10*		(1)	0.036	
2149 *10*		(1)	0.016	E(level): other: 2152 (1963Fu04). (2J+1)C^{2}S: others: 0.03 (2013Sc06), 0.037 (1963Fu04).
2259 *10*			0.04	(2J+1)C^{2}S: from 2013Sc06 for J^π=(1/2$^-$,3/2$^-$).
2297 *10*	5/2$^+$	2	0.85	E(level): others: 2291 (1970Li03,1970Tu02,1977St07), 2302 (1963Fu04). (2J+1)C^{2}S: others: 1.66 (1963Fu04), 1.99 (1970Tu02), 1.245 (1977St07).
2346 *10*				
2519 *10*	(9/2)$^+$	4	3.4	E(level): others: 2529 (1963Fu04), 2514 (1977St07,1970Tu02). (2J+1)C^{2}S: others: 1.75 (2013Sc06), 2.70 (1963Fu04), 1.606 (1977St07), 2.58 (1970Tu02).
2573 *10*		(4)	0.26	
2675 *10*		(2)	0.03	
2700 *10*	1/2$^-$	1	0.09	E(level): others: 2701 (1963Fu04), 2692 (1977St07,1970Tu02). (2J+1)C^{2}S: others: 0.07 (2013Sc06), 0.10 (1970Tu02), for L=1; ≈0.16 for L=2 and ≈0.7 for L=3 (1963Fu04); 0.08 for L=2 (1977St07).
2822 *10*		(1)	0.03	E(level): other: 2824 (1963Fu04).
2953 *10*	1/2$^+$	0	0.38	E(level): others: 2941 (1970Li03,1970Tu02,1977St07), 2960 (1963Fu04). (2J+1)C^{2}S: others: 0.375 (1963Fu04), 0.275 (1977St07), 0.23 (1970Tu02).
3013 *10*				
3022 *10*				
3075 *10*				
3104 *10*		2	0.08	E(level): others: 3100 (1963Fu04), 3092 (1970Tu02). L: other: 1 from 1963Fu04 and 1970Tu02. (2J+1)C^{2}S: other: 0.061 (1963Fu04), 0.04 (1970Tu02), for L=1.
3179 *10*		3	0.16	E(level): other: 3173 (1963Fu04).
3254 *10*				
3292 *10*	5/2$^+$	2	0.32	E(level): others: 3283 (1970Li03,1970Tu02,1977St07), 3291 (1963Fu04). (2J+1)C^{2}S: others: 3.96 (1963Fu04), 0.213 (1977St07), 0.43 (1970Tu02).
3336 *10*		2	0.08	
3427 *10*		(1)	0.042	E(level): other: 3428 (1963Fu04). (2J+1)C^{2}S: other: 0.027 (1963Fu04).
3471 *10*				
3522 *10*		2	0.12	
3551 *10*		2	0.10	E(level): other: 3553 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
3594 *10*				
3608 *10*				
3638 *10*		(2)	0.05	E(level): other: 3657 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
3680 *10*				
3694 *10*				
3723 *10*		2	0.16	E(level): others: 3731 (1970Li03), 3726 (1963Fu04), 3709 (1977St07). (2J+1)C^{2}S: others: 0.213 (1963Fu04), 0.096 (1977St07).
3769 *10*				
3780 *10*				
3792 *10*				
3804 *10*				
3836 *10*		2	0.018	E(level): other: 3800 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.

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^{62}Ni(d,p),(pol d,p) 1970An25,1963Fu04,1974Hu04 (continued)

^{63}Ni Levels (continued)

E(level)†	Jπ‡	L#	(2J+1)C^{2}S#	Comments
3889 *10*				
3932 *10*	5/2$^+$	2	0.35	E(level): other: 3912 (1977St07). (2J+1)C^{2}S: other: 0.159 (1977St07).
3951 *10*	5/2$^+$	2	0.60	E(level): others: 3964 (1970Li03,1970Tu02), 3959 (1963Fu04), 3939 (1977St07). (2J+1)C^{2}S: other: 0.739 (1963Fu04), 0.302 (1977St07), 0.81 (1970Tu02).
4022 *10*				
4033 *10*		(1)	0.038	L,(2J+1)C^{2}S: for the 4022+4033 (1970An25).
4063 *10*	(1/2$^+$)	(0)		L: see comments for 4074 level.
4074 *10*	(1/2$^+$)	(0)	0.16	E(level): others: 4083 (1963Fu04), 4052 (1977St07). L,(2J+1)C^{2}S: for the 4063 and 4074 states together (1970An25); however, L=2, (2J+1)C^{2}S=0.418 reported by 1977St07; L=2, (2J+1)C^{2}S=0.258 in 1963Fu04.
4106 *10*		2		E(level): other: 4096 (1970Li03). L: from 1970Li03.
4267 *10*	1/2$^+$	0	0.18	E(level): others: 4279 (1970Li03,1970Tu02,1963Fu04), 4258 (1977St07). (2J+1)C^{2}S: others: 0.18 (1963Fu04), 0.137 (1977St07), 0.10 (1970Tu02).
4313 *10*		(1)	0.02	
4358 *10*				
4387 *10*	5/2$^+$	2	0.37	E(level): other: 4415 (1963Fu04), 4376 (1977St07,1970Tu02). (2J+1)C^{2}S: other: 0.309 (1963Fu04), 0.194 (1977St07), 0.40 (1970Tu02).
4449 *10*		2	0.10	E(level),L: other: L=2 for a doublet of 4415+4473 in 1970Li03; 4473 with L=2 (1963Fu04). (2J+1)C^{2}S: other: 0.087 (1963Fu04).
4488 *10*		(1)	0.042	
4555 *10*				E(level): other: 4544 (1977St07). (2J+1)C^{2}S: other: 0.145 for L=2 (1977St07).
4586 *10*		2	0.166	E(level): other: 4578 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
4622 *10*		2	0.33	E(level): others: 4642 (1970Li03,1970Tu02), 4636 (1963Fu04). (2J+1)C^{2}S: other: 0.396 (1963Fu04), 0.41 (1970Tu02).
4692 *10*		0	0.38	E(level): others: 4718 (1970Li03,1970Tu02), 4717 (1963Fu04). (2J+1)C^{2}S: other: 0.306 (1963Fu04), 0.30 (1970Tu02).
4722 *10*				
4799 *10*				
4812 *10*				
4828 *10*		2	0.106	E(level): other: 4841 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
4876 *10*		0	0.04	E(level): other: 4907 (1963Fu04). (2J+1)C^{2}S: other: 0.028 (1963Fu04).
4919 *10*		(2)	0.02	E(level): other: 4933 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
4957 *10*		0	0.09	E(level): other: 4983 (1970Li03), 4972 (1963Fu04). (2J+1)C^{2}S: other: 0.073 (1963Fu04).
5026 *10*				
5060 *10*		(2)	0.06	
5093 *10*				
5123 *10*		2	≈0.07	E(level): other: 5110 (1963Fu04). L,(2J+1)C^{2}S: from 1963Fu04.
5142 *10*		(3)	0.33	E(level): other: 5160 with L=2 (1963Fu04). (2J+1)C^{2}S: other: ≈0.07 for L=2 (1963Fu04).
5178 *10*		0	0.20	E(level): other: 5200 with L=0 (1963Fu04). L: from 1963Fu04. Other: L=(0) from 1970An25. (2J+1)C^{2}S: other: ≈0.1 (1963Fu04).
5240		2	≈0.14	
5372		2	0.585	

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^{62}Ni(d,p),(pol d,p) 1970An25,1963Fu04,1974Hu04 (continued)

^{63}Ni Levels (continued)

E(level)†	L#	(2J+1)C^{2}S#	E(level)†	L#	(2J+1)C^{2}S#	E(level)†	L#	(2J+1)C^{2}S#
5445	2	0.743	5930	2	0.118	6280	2	0.178
5595	2	0.320	6000			6320		
5711	2	0.081	6070	2	≈0.10	6440	0	0.15
5863			6160			6500	2	0.2

† From 1970An25 up to 5178 level and from 1963Fu04 above that, unless otherwise noted.
‡ From vector-analyzing power (1974Hu04). Their analysis relies on L-transfer values in 1970An25 as stated by the authors.
# From DWBA analysis of $\sigma(\theta)$ in 1970An25 up to 5178 level and from 1963Fu04 above that, unless otherwise noted.