^{58}Ni(d,p), (pol d,p) 1973Ch11,1994Iw01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 151, 1 (2018)	1-Apr-2018

Others: 1961Da06, 1961Sc17, 1964Bj01, 1964Fu04, 1966Co11, 1967Ro05, 1968Gr18, 1968Si03, 1972Li10, 1973Ay01, 1977St07, 1980Ta05, 1983ScZL, 1984Ha26, 2013Sc06, 2013ScZZ. Also (α,^{3}He), ^{60}Ni(p,d),(^{3}He,α) were studied by 2013Sc06, 2013ScZZ.

1964Fu04: E(d)=12 MeV; θ(C.M.)≈7.5°−42°; measured $\sigma(\theta)$ with magnetic spectrograph; DWBA analysis.

1966Co11: E(d)=7 MeV; θ(lab)=7.5°−172.5° (7.5° steps), magnetic spectrograph + photographic plates, 99.6% ^{58}Ni target, FWHM≤10 keV; measured E(p), $\sigma(\theta)$; DWBA analysis.

1973Ch11: E(d)=10 MeV; measured $\sigma(\theta)$ using magnetic spectrograph, θ(lab)=5°−175°, 99.5% ^{58}Ni target.

1973Ay01: E(pol d)=10 MeV; measured $\sigma(\theta)$, A(θ); semi or magnetic spectrograph, 99.9% ^{58}Ni target, θ(lab)=2.5°−85°.

1980Ta05: E(pol d)=10 MeV; measured $\sigma(\theta)$, A(θ). Semi, 99.93% ^{58}Ni target, θ(lab)=25°−80° in 5° steps, FWHM=30-50 keV.

1994Iw01: E(pol d)=56 MeV; 99.89% ^{58}Ni target, FWHM=45 keV, θ(lab)=5° −45°, magnetic spectrograph; measured $\sigma(\theta)$, A(θ); DWBA analysis.

For Coulomb stripping see 1972Li10, 1977St07.

Polarization data: 1967Ro05, 1973Ay01, 1980Ta05, 1984Ha26, 1994Iw01.

^{59}Ni Levels

E(level)[†]	J$^\pi$[d]	L[f]	(2J$_f$+1)C^{2}S[e]	Comments
0.0	3/2$^-$	1	3.263[h]	
341 *5*	5/2$^-$	3	4.060[i]	
466 *5*	1/2$^-$	1	1.240	
880 *5*	3/2$^-$	1	0.286[h]	
1193 *5*	(5/2$^-$)	(3)[g]	0.090	L,(2J$_f$+1)C^{2}S: from 1994Iw01.
1307 *5*	1/2$^-$	1	0.572	
1345 *5*		3	0.159	
1685 *5*	5/2$^-$	3	0.557[i]	
1737 *5*	3/2$^-$	1	0.034[h]	J$^\pi$: from 1980Ta05.
1748 *5*		[g]		
1776 *5*		[g]		
1953 *5*	7/2$^-$	3	0.297	(2J$_f$+1)C^{2}S=0.096 in 1994Iw01.
2418 *5*	(3/2)$^-$	1	0.032	
2428 *5*		[g]		
2533 *5*		[g]		
2633 *5*	7/2$^-$	3	0.314	(2J$_f$+1)C^{2}S=0.112 in 1994Iw01.
2683[#] *5*	5/2$^-$	3	0.132	L,(2J$_f$+1)C^{2}S: from 1994Iw01; however, 2692 level probably not resolved from 2683 level, so evaluator adopts J$^\pi$=(5/2$^-$).
2692[#] *5*				
2705 *5*		[g]		
2718 *5*		[g]		
2901 *5*		1	0.009	(2J$_f$+1)C^{2}S=0.025 in 1966Co11.
3035 *5*		1+3	0.032+0.12[i]	
3060 *10*	9/2$^+$	4	8.400	
3132 *10*		(1)	0.006	
3186[@] *10*	3/2$^{(-)}$			J$^\pi$: Suggested by 2013Sc06 from cross section ratio in (d,p) and (α,^{3}He).
3196[@] *10*				
3310 *10*		[g]		E(level): 3298 in 1994Iw01.
3324 *10*		[g]		
3356 *10*		[g]		
3372 *10*		[g]		
3386 *10*		[g]		
3418[&]				

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^{58}Ni(d,p), (pol d,p) 1973Ch11,1994Iw01 (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[d]	L[f]	$(2J_f+1)C^2S$[e]	Comments
3429[&]				
3461 *10*	$3/2^-$[j]	1	0.135[j]	E(level): 3448 in 1994Iw01.
3544 *10*	$5/2^+$	2	0.182	E=3553 in 1994Iw01; $(2J_f+1)C^2S$=0.117, 0.114 (respectively) in 1966Co11, 1994Iw01.
3573 *10*		1	0.093	
3600 *10*		[g]		
3648 *10*	$5/2^-$	3[g]	0.126	L,$(2J_f+1)C^2S$: from 1994Iw01.
3696 *10*		(2)	0.023	
3728 *10*		[g]		
3745 *10*		[g]		
3791 *10*		[g]		
3807		[g]		
3818		[g]		
3866 *10*	$3/2^-$[j]	1	0.100[j]	Jπ: from 1980Ta05.
3898 *10*		[g]		
3910 *10*		[g]		
3944 *10*		[g]		
4005 *10*		[g]		
4015 *10*		[g]		E(level): reported only by 1966Co11.
4036 *10*	$(3/2)^-$	1	0.048	
4087 *10*		[g]		L: (2) in 1966Co11, (0) in 1964Fu04, but non-stripping $\sigma(\theta)$ in 1973Ch11.
4120 *10*		[g]		
4133 *10*		[g]		
4154 *10*		1	0.068	$(2J_f+1)C^2S$=0.272, J=(3/2) for E=4160 in 1994Iw01.
4177 *10*		(1)	0.012	
4213 *10*		(2)	0.010	L=(3), 2, (2) and $(2J_f+1)C^2S$=0.398, 0.064, 0.010 respectively in 1966Co11, 1964Fu04, 1973Ch11.
4264 *10*		(1)	0.110	
4293 *10*		[g]		L: L=(1&4), Jπ=(1/2−&9/2+), $(2J_f+1)C^2S$=0.218 & 0.250 at E=4295 reported in 1994Iw01; possibly for 4264+4293+4328 multiplet.
4328 *10*		[g]		
4356 *10*		[g]		L,$(2J_f+1)C^2S$: L=2, $(2J_f+1)C^2S$=0.086 from 1966Co11. However, 1973Ch11 report non-stripping $\sigma(\theta)$.
4407 *10*		[g]		L=(0), $(2J_f+1)C^2S$=0.013 (1966Co11) for 4407+4419 doublet.
4419 *10*		[g]		L=(0), $(2J_f+1)C^2S$=0.013 (1966Co11) for 4407+4419 doublet.
4470 *10*		[g]		L=(0), 4 and $(2J_f+1)C^2S$=0.008, 0.408 from 1966Co11 and 1964Fu04, respectively.
4506 *10*	$5/2^+$	2	1.403	
4543 *10*		[g]		
4557 *10*		[g]		
4616 *10*		[g]		L=2 reported in 1964Fu04.
4650 *10*		[g]		E(level): 4664 in 1973Ch11.
4709 *10*	$9/2^+$	4	0.978	E(level): E=4689, $(2J_f+1)C^2S$=0.370 in 1994Iw01.
4728 *10*		1	0.090	
4769		[g]		
4799 *10*	$5/2^+$	2	0.210	E=4817 in 1994Iw01.
4822 *10*		[g]		
4856 *10*		[g]		
4869 *10*		[g]		
4887 *10*		[g]		L=1 in 1964Fu04.
4920 *10*		[g]		
4939 *10*		[g]		
4960 *10*		1	0.054	1994Iw01 report L=1, J=(3/2), $(2J_f+1)C^2S$=0.284 for E=4965; this is probably for a multiplet.

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^{58}Ni(d,p), (pol d,p) 1973Ch11,1994Iw01 (continued)

^{59}Ni Levels (continued)

E(level)[†]	Jπ[d]	L[f]	$(2J_f+1)C^2S$[e]	Comments
4980 *10*		1	0.050	
5029		g		
5044		g		
5062		g		
5080 *10*		1	0.033	
5119		g		E(level): reported only by 1973Ch11.
5149 *10*	$1/2^+$	0	0.186	
5213 *10*	$5/2^+$	2	0.155	E(level): 5248 in 1994Iw01.
5258 *10*		g		
5269		g		E(level): reported only by 1973Ch11.
5292 *10*		(1)[g]	0.028	L,$(2J_f+1)C^2S$: from 1966Co11. Evaluator shows L as tentative because 1973Ch11 report non-stripping $\sigma(\theta)$.
5372 *10*		g		
5395 *10*		2	0.075	
5429 *10*	$(9/2^+)$	4	0.980	L=(2+4), $J^\pi=(9/2^+{+}5/2^+)$ at 5439 in 1994Iw01 for 5429+5458 doublet.
5458 *10*	$(5/2^+)$	2	0.297	See comment on 5429 level.
5508 *10*		g		L=(1), $(2J_f+1)C^2S$=0.061 (1966Co11) for 5508+5528 doublet.
5528 *10*		g		See comment on 5508 level.
5569 *10*	$(1/2^+)$	0	0.047	E=5541, $(2J_f+1)C^2S$=0.218 in 1994Iw01. $(2J_f+1)C^2S$=0.092 in 1966Co11.
5608 *10*		g		
5629 *10*		1	0.033	
5648 *10*		g		
5692 *10*	$1/2^+$	0	0.252	
5747 *10*		g		
5762[a] *10*				
5771[a]				E(level): reported only by 1973Ch11.
5783 *10*		g		
5805 *10*		(2)[g]	0.076	L,$(2J_f+1)C^2S$: from 1966Co11. Evaluator shows L as tentative because 1973Ch11 report non-stripping $\sigma(\theta)$.
5821 *10*		g		
5844 *10*		(2)	0.023	
5872 *10*		g		
5894 *10*	$(5/2^+)$	2	0.126	E(level): 5908 in 1994Iw01, possibly for multiplet ($(2J_f+1)C^2S$=0.288).
5924 *10*		g		
5946 *10*		g		
5967 *10*		0	0.195	L: 1966Co11, however, report L=2.
5988 *10*		1	0.024	
6013 *10*		g		
6034 *10*		1	0.047	
6071 *10*		g		
6114 *10*		2	0.026	
6149 *10*		1	0.084	E(level): 6134 in 1994Iw01.
6189 *10*		g		
6206 *10*	$(5/2)^+$	2	0.068	J^π: 5/2 for 6206 level in 1994Iw01, but 6206 and 6225 levels may not have been resolved ($(2J_f+1)C^2S$=0.138).
6225 *10*		2	0.050	Other L: 2 (1964Fu04), 1 (1966Co11).
6245 *10*		g		L=2 in 1964Fu04, (1) in 1966Co11.
6269 *10*		g		
6284 *10*		g		
6305 *10*	$(5/2)^+$	2	0.228	E(level): 6281 in 1994Iw01.
6339 *10*		2	0.038	L=(2) in 1964Fu04, 1 in 1966Co11 for 6339+6354 doublet.
6354 *10*				See comment on 6339 level.
6380 *10*		0	0.156	E=6375, J=(1/2), $(2J_f+1)C^2S$=0.426 in 1994Iw01.

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^{58}Ni(d,p), (pol d,p) 1973Ch11,1994Iw01 (continued)

^{59}Ni Levels (continued)

E(level)[†]	L[f]	$(2J_f+1)C^2S$[e]	Comments
6434 *10*	*g*		
6454 *10*	2	0.016	
6481 *10*	2	0.032	
6507 *10*	(2)	0.068	
6521 *10*			
6535 *10*	*g*		
6567 *10*	*g*		
6583 *10*	*g*		
6605 *10*	(2)	0.032	
6648 *10*	2	0.236	
6679 *10*	(0)	0.007	L: non-stripping $\sigma(\theta)$ reported in 1966Co11.
6690 *10*	(2)	0.008	L: 1966Co11 assign L=0 to this level instead of to the 6679 level.
6709 *10*	2	0.120	
6726 *10*	2	0.077	
6749 *10*	2	0.155	
6771 *10*	*g*		
6788 *10*	*g*		
6806 *10*	*g*		
6834 *10*	2	0.054	
6859 *10*			
6880 *10*	*g*		E(level): 6874 in 1973Ch11.
6895	*g*		Reported only by 1973Ch11.
6919 *10*	0	0.040	
6955 *10*	0	0.064	
6978	*g*		
6994 *10*	*g*		
7023[b] *10*			
7042[b] *10*			
7073 *10*	0+2	0.058+0.07	
7092 *10*	*g*		
7111 *10*	*g*		
7124 *10*	*g*		
7141 *10*	*g*		
7160 *10*	0	0.011	
7187 *10*	*g*		
7204 *10*	0+2	0.038+0.07	
7237 *10*	2	0.063	
7263 *10*	*g*		
7282 *10*	2	0.040	
7304 *10*	3	0.132	
7324 *10*	*g*		
7353 *10*	2	0.039	J=5/2, $(2J_f+1)C^2S$=0.264 at E=7347 in 1994Iw01; this is presumably for a multiplet.
7384 *10*	2	0.027	
7408 *10*	2	0.028	
7434 *10*	2	0.032	
7455 *10*	2	0.090	
7478 *10*	*g*		
7491 *10*	*g*		
7504 *10*	*g*		
7521 *10*	*g*		
7539 *10*	2	0.022	
7564	0	0.009	
7574	*g*		

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^{58}Ni(d,p), (pol d,p) 1973Ch11,1994Iw01 (continued)

^{59}Ni Levels (continued)

E(level)[†]	L[f]	$(2J_f+1)C^2S$[e]	E(level)[†]	L[f]	$(2J_f+1)C^2S$[e]	E(level)[†]	L[f]	$(2J_f+1)C^2S$[e]
7584	g		8055	2	0.155	8808[‡]	2	0.069
7604	2	0.115	8183	2	0.067	8839[‡]	2	0.043
7626	2	0.064	8216	2	0.055	8855[‡]	2	0.052
7654	2	0.047	8240	2	0.050	8871[‡]	(2)	0.072
7684	2	0.046	8269	2	0.051	8895[‡]	2	0.109
7707	g		8296	2	0.124	8923[‡]	2	0.051
7733	g		8337	2	0.050	8950[‡]	(2)	0.076
7753	g		8377	2	0.192	8984[‡]		
7775	g		8417	2	0.136	9028[‡]	2	0.095
7802	2	0.048	8469	2	0.076	9062[‡]	(2)	0.052
7825	2	0.075	8512[‡]	2	0.046	9113[‡]	2	0.093
7845	g		8536[‡]			9167[‡]		
7865	0	0.014	8578[‡]	2	0.160	9206[‡]	(2)	0.072
7884	2	0.039	8649[‡]	2	0.069	9247[‡]	(2)	0.077
7914[c]			8684[‡]	2	0.035	9276[‡]	(2)	0.058
7930[c]			8713[‡]	2	0.039	9299[‡]	(2)	0.097
7972	2	0.139	8728[‡]	(2)	0.056			
8019	2	0.103	8768[‡]	2	0.041			

[†] For E≤7950, data are from 1973Ch11 if ΔE is not stated and from 1966Co11 if ΔE=5 or 10 keV (authors quote ΔE=5 for low excitation, ΔE=10 for high excitation). For E>7950, data are from 1964Fu04; ΔE≤50 keV. For an additional 13 levels between 9.3 and 10.12 MeV, see 1983ScZL. Note that in 1966Co11, for calibration Eα(^{210}Po)=5299 keV *5* was used. Current adopted value is 5304.33 keV *7*.

[‡] Uncertainty≤50 keV (1964Fu04). Adjacent levels may be overlapped due to large uncertainty. Level not tabulated in the Adopted Levels.

[#] L=3, $(2J_f+1)C^2S$=0.182 (1973Ch11) for unresolved group.

[@] L=1, $(2J_f+1)C^2S$=0.032 (1973Ch11) for unresolved group.

[&] L=0, $(2J_f+1)C^2S$=0.036 (1973Ch11) for unresolved group.

[a] L=1, $(2J_f+1)C^2S$=0.058 (1973Ch11) for unresolved group.

[b] L=2, $(2J_f+1)C^2S$=0.145 (1973Ch11) for unresolved group.

[c] L=2, $(2J_f+1)C^2S$=0.087 (1973Ch11) for unresolved group.

[d] From measured vector analyzing power, assuming L from $\sigma(\theta)$. Data are from 1994Iw01, except as noted. For a number of levels, J^π has been determined by 1973Ay01 and 1980Ta05 also.

[e] From 1973Ch11 for E≤7950; from 1964Fu04 for E>7950. Note that values of $(2J_f+1)C^2S$ from different authors can vary significantly.

[f] From 1973Ch11, except otherwise noted. L values and spectroscopic factors are from comparisons of $\sigma(\theta)$ with DWBA calculations. Unless indicated to the contrary, the following orbitals have been assumed, based on shell model or on J dependence of $\sigma(\theta)$: $p_{1/2}$, $d_{5/2}$, $f_{7/2}$, $g_{9/2}$ for L=1, 2, 3, 4, respectively.

[g] Non-stripping $\sigma(\theta)$ reported (1973Ch11).

[h] $p_{3/2}$ orbital assumed for L=1 transfer (1973Ch11).

[i] $f_{5/2}$ orbital assumed for L=3 transfer (1973Ch11).

[j] 1973Ch11 assume $p_{1/2}$ orbital in conflict with conclusive $p_{3/2}$ assignment from (pol d,p) (1980Ta05).