^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Caroline D. Nesaraja, Scott D. Geraedts and Balraj Singh	NDS 111,897 (2010)	12-Jan-2010

1987Me16: E=39-57 MeV. Measured σ(E(e′)), $\sigma(\theta)$. FWHM=24-47 keV. Deduced M1 transition probabilities. DWBA and PWBA analyses. Comparisons with shell model calculations.
Additional information 1.
1983Kl09: E=124, and 180 MeV, FWHM=110 keV; measured inelastic scattering DWBA form factor analysis.
1978Li02: E=131.1-263.9 MeV, measured inelastic scattering at θ(lab)=120°, 160°. PWBA analysis for 8^- states at 7937, 8808, 10190, 11240 and 12500.
1976Li23: E=40, 50, 60, and 75 MeV, FWHM≈160 keV; measured inelastic scattering at backward angles for low momentum transfer to excite M1 states. DWBA analysis.
Others:
2002Re15: E=65.4 MeV. Evidence of magnetic quadrupole excitations.
1991Do10: (e,e′α) E=137, 183 MeV. Measured $\sigma(\theta)$ for giant dipole and quadrupole resonances. Nucleon decay is found to be dominant.
1984Bl19: E=90-361 MeV, FWHM=12-30 keV; measured inelastic scattering, form factor analysis for two 0^+ states at 3530 and 4540.
1980Pi02: E=102 MeV, FWHM=500 keV; measured inelastic scattering at θ=45°−105°, at 15° intervals. Extracted giant resonance parameters.
1978Li25: E=120.4-263.9 MeV, measured inelastic scattering at θ(lab)=120°, 160°. PWBA analysis for 5125, 6^+ state.
1974Gu16: E=150-200 MeV, measured inelastic scattering, extracted giant resonance parameters.
1973It01: E=183, 250 MeV, FWHM=0.12%, measured inelastic scattering.
1969Af01: E=150, and 225 MeV, FWHM=0.6-0.7%, measured inelastic scattering at θ(lab)=40°−95°. Data for first 2^+ and 3^- levels.
1967Du07: E=65 MeV, measured inelastic scattering, form factor analysis.
1961Cr01: E=183 MeV. Measured $\sigma(\theta)$ for 1450,2^+; 2500,4^+; 3050,2^+ and 4500, 3^- levels.

^{58}Ni Levels

B(EL)′s are from 1983Kl09, unless indicated otherwise, B(M1) values are from 1987Me16, where the uncertainties are stated to be statistical only.
Additional information 2.

E(level)[†]	J$^\pi$[&]	T$_{1/2}$[b]	Comments
0.0	0^+		
1454 *5*	2^+	0.73 ps *4*	B(E2)↑=0.060 *3* B(E2): average of 0.059 *4* (1983Kl09), 0.055 *3* (1969Af01), 0.0657 *11* (1967Du07); all uncertainties are statistical. 1967Du07 state a systematic uncertainty of 15%. Other: 0.098 *13* (1961Cr01). Additional information 3.
2459 *5*	4^+		B(E4)↑=0.00170 *12*
2775 *5*	2^+	57 fs *+25−13*	B(E2)↑=0.0013 *4*
2940[@]	[@]		
3038 *5*	2^+	66 fs *6*	B(E2)↑=0.0067 *6* Other B(E2)=0.0083 *3* (1967Du07).
3264 *5*	2^+	33 fs *3*	B(E2)↑=0.0138 *11* B(E2): weighted average of 0.0130 *11* (1983Kl09) and 0.0153 *15* (1967Du07).
3530[@]	0^+[@]		%EWSR=0.6 (1984Bl19); E0 matrix element given by 1984Bl19.
3620 *5*	4^+		B(E4)↑=0.00186 *10*
3898 *5*	2^+	34 fs *+8−6*	B(E2)↑=0.0022 *4*
4020[@]	[@]		
4108 *5*	2^+	0.14 ps *+9−4*	B(E2)↑=0.0008 *3*
4295 *5*	4[+][a]		B(E4)↑=0.00070 *9*

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^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02 (continued)

^{58}Ni Levels (continued)

E(level)†	Jπ&	Comments
4470 *5*	3^-	B(E3)↑=0.0191 *8* Other B(E3)=0.019 *3* (1967Du07), 0.0130 *12* (1969Af01). Additional information 4.
4540@	0^+@	%EWSR=1.0 (1984Bl19); they also give E0 matrix element.
4750 *5*	4^+	B(E4)↑=0.00331 *25*
5125 *10*	6^+	E(level): from 1978Li25, this state studied in detail by 1978Li25 who assign E6 excitation.
5430 *15*	4[+]a	B(E4)↑=0.00081 *8*
5585 *15*	4^+	B(E4)↑=0.00137 *9*
5909 *8*	2,1	E(level): 5903 (1983Kl09) and 5909 (1987Me16) are considered as the same level. It is possible that the level in (e,e′) is a doublet corresponding to a 1^+ level in (γ,γ′) and 2^+ in (p,p′). Jπ: 2 from 1987Me16, tentative $1^{(-)}$ from E1 assignment in 1983Kl09 with B(E1)=0.0068 *4*. Additional information 5.
5934 *8*		
5967 *8*	$2^+,3^-$	
6017‡ *15*	‡	B(E3)↑=0.00140 *15*
6031 *8*	$2^+,(1^-)$	
6145‡ *15*	3[−]‡a	B(E3)↑=0.00052 *8*
6182 *8*	$2^+,3^-$	
6235 *8*	$2^+,(1^-)$	
6280‡ *15*	4[+]‡a	B(E4)↑=0.00067 *7*
6310 *8*	$1^-,2^+$	
6417 *8*	2^+	E(level): a 6420 *15* level in 1983Kl09 assigned $3^{(-)}$ with B(E3)(↑)=0.00129 *18* is possibly the same as 6417 *8* in 1987Me16. Additional information 6.
6475 *8*	$1^+,(2^-)$	B(M1)↑=0.17 *5*
6729 *8*	3^-	B(E3)↑=0.00067 *10* E(level): 6695 *15* in 1983Kl09 is possibly the same level as 6729 *8* in 1987Me16. Jπ: $2^+,3^-$ in 1987Me16.
6768 *8*		
6816 *8*	$2^+,(1^-)$	
6851 *8*	3^-	B(E3)↑=0.0052 *3* Jπ: tentative assignment of E6 excitation (1978Li25). Additional information 7.
6930‡ *15*	4^+‡a	B(E4)↑=0.00047 *8*
6981 *8*	2^+	
7051 *8*		
7109 *8*	(2^+)	Jπ: 1983Kl09 suggest $4^{(+)}$ for a 7100 level. Additional information 8. B(E4)=0.00097 *9*.
7209 *8*	3^-	E(level): a 7200 *15* level in 1983Kl09 assigned 4^+ with B(E4)(↑)=0.00423 *25* is possibly the same as 7209 *8* in 1987Me16.
7255 *8*	2^+	
7290 *8*		
7388 *8*	1^+	B(M1)↑=0.33 *7*
7470 *8*	$1^+,(2^-)$	B(M1)↑=0.25 *5*
7500 *8*	3^-	B(E3)↑=0.00194 *18* Additional information 9.
7560 *8*	1^+	B(M1)↑=0.15 *4*
7603 *8*	(1^-)	
7684 *8*	1^-	
7715 *8*	1^+	B(M1)↑=0.74 *5* Jπ: 1983Kl09 suggest $4^{(+)}$ for a 7724 level. B(E4)=0.00060 *10*.
7746 *8*	$(1^+,2^-)$	

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^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02 (continued)

^{58}Ni Levels (continued)

E(level)†	Jπ&	Comments
7820 *8*	4[+][a]	B(E4)↑=0.00077 *8* E(level): probably the same as 7848 *15* in 1983Kl09.
7937# *25*	8−#	T=1
8100‡ *15*	4[+]‡[a]	B(E4)↑=0.00089 *9*
8240 *8*	1+	B(M1)↑=1.27 *20* Additional information 10.
8276 *8*	1+,(2−)	B(M1)↑=0.26 *3*
8395 *8*	2+	
8475 *8*	2−	
8516 *8*	1+	B(M1)↑=1.04 *15* Additional information 11.
8601 *8*	1+	B(M1)↑=0.44 *5*
8680 *8*	1+	B(M1)↑=0.47 *3*
8780 *8*	2−	
8808# *25*	8−#	T=1
8817 *8*	1+,(2−)	B(M1)↑=0.19 *2*
8854 *8*	2+,3−	
8875 *8*	1+	B(M1)↑=0.51 *4*
8926 *8*	(1−)	
8967 *8*	1+,(2−)	B(M1)↑=0.23 *6* Jπ: 1+ in 'Adopted Levels'.
9037 *10*	1+,(2−)	B(M1)↑=0.30 *4*
9073 *10*	1+	B(M1)↑=0.26 *5*
9113 *10*		
9163 *10*	1+	B(M1)↑=0.23 *3*
9260 *10*		
9298 *10*		
9368 *10*	1+,(2−)	B(M1)↑=0.34 *4*
9407 *10*	2−,(1+)	
9468 *10*		
9513 *10*	1+,(2−)	B(M1)↑=0.22 *15*
9552 *10*	(2−)	
9643 *10*	2−,(1+)	
9667 *10*	2−	
9755 *10*	1+,(2−)	B(M1)↑=0.32 *5*
9799 *10*		
9846 *10*	1+	B(M1)↑=0.54 *7* E(level): possible IAS of 1050,1+ in ^{58}Co. Additional information 12.
9870 *10*	(2−)	
9941 *10*	2+,(1−)	
10036 *10*	(2−)	
10073 *10*	1+	B(M1)↑=0.35 *3*
10105 *10*	1+	B(M1)↑=0.21 *2*
10157 *10*	1+	B(M1)↑=0.37 *4* E(level): possible IAS of 1377,1+ in ^{58}Co. Additional information 13.
10190# *25*	8−#	T=1
10218 *10*	1+	B(M1)↑=0.56 *4* E(level): possible IAS of 1435,1+ in ^{58}Co.
10266 *10*	1+	B(M1)↑=0.22 *4*
10355 *10*	1+	B(M1)↑=0.24 *3*
10385 *10*	1+,(2−)	B(M1)↑=0.15 *3*
10438 *10*	2+,(1−)	

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^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02 (continued)

^{58}Ni Levels (continued)

E(level)†	Jπ&	Comments
10514 *10*	1^+	B(M1)↑=0.40 *3* E(level): possible IAS of 1729,1^+ in ^{58}Co. Additional information 14.
10550 *10*	$(1^+,2^-)$	
10582 *10*	$1^+,(2^-)$	B(M1)↑=0.22 *3*
10633 *10*	1^+	B(M1)↑=0.32 *12*
10670 *10*	1^+	B(M1)↑=1.25 *6* E(level): possible IAS of 1868,1^+ in ^{58}Co.
10720 *10*	$(3^-,4^+)$	
10743 *10*		
10806 *10*	$1^+,2^-$	B(M1)↑=0.12 *4*
10856 *10*	$(1^-,2^+)$	
10891 *10*	2^+	
10950 *10*	1^+	B(M1)↑=0.20 *4*
11013 *10*	1^+	B(M1)↑=0.57 *3* E(level): possible IAS of 2249,1^+ in ^{58}Co. Additional information 15.
11041 *10*	(2^+)	
11080 *10*	$1^+,(2^-)$	B(M1)↑=0.22 *7*
11135 *10*	$(3^-,4^+)$	
11160 *10*	$2^+,3^-$	
11240# *25*	8^-#	T=1
11265 *10*	$1^+,(2^-)$	B(M1)↑=0.11 *2*
11297 *10*	2^+	
11330 *10*	$1^-,2^+$	
11363 *10*	$2^-,(1^+)$	
11410 *10*	$(2^+,3^-)$	
11450 *25*	(6^+)	E(level): from 1978Li25, uncertainty assumed to be the same as in 1978Li02. Jπ: tentative assignment of E6 excitation (1978Li25).
11470 *10*	$2^-,(1^+)$	
11536 *10*	$2^-,(1^+)$	
11597 *10*	2^+	
11639 *10*	$2^+,3^-$	
11680 *10*	1^+	B(M1)↑=0.17 *3*
11734 *10*	2^+	
11800 *10*	(2^+)	
11860 *10*	1^+	B(M1)↑=0.4 *3*
11890 *10*	$2^-,(1^+)$	
11933 *10*	$(3^-,4^+)$	
11990 *10*	$1^+,(2^-)$	B(M1)↑=0.32 *6*
12040 *10*	2^+	
12090 *10*		
12141 *10*	$1^-,2^+$	
12197 *10*	(2^+)	
12249 *10*		
12280 *10*	(1^-)	
12330 *10*	$2^-,(1^+)$	
12386 *10*	(2^+)	
12447 *10*	(2^+)	
12482 *10*	$(2^+,4^+)$	
12500# *25*	8^-#	T=2
12573 *10*	$2^+,3^-$	
12613 *10*	2^+	
12647 *10*	$2^+,(4^+)$	
12700 *10*	$2^-,(1^+)$	

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^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02 (continued)

^{58}Ni Levels (continued)

E(level)†	Jπ&	$T_{1/2}$b	Comments
12746 *10*	(2^+)		
12796 *10*	$1^+,(2^-)$		B(M1)↑=0.47 *9*
12837 *10*	(2^+)		
12858 *10*	2^+		
12931 *10*	$2^+,3^-$		
12971 *10*	2^+		
13022 *10*	$2^+,4^+$		
13057 *10*	2^+		
13125 *10*			
13176 *10*	$1^+,(2^-)$		B(M1)↑=0.37 *6*
13233 *10*	2^+		
13260 *10*	2^+		
13305 *10*	(2^+)		
13345 *10*	2^+		
13411 *10*	1^+		B(M1)↑=0.14 *3*
13448 *10*	2^+		
13492 *10*			
13556 *10*	$2^+,(1^-)$		
13590 *10*	$(1^+,2^-)$		
13649 *10*	2^+		
13685 *10*	(2^+)		
13.7×10^3 *3*		4.7 MeV *3*	E(level): GQR (1974Gu16). Other: 14.8 MeV *3*, Γ=3.0 MeV *3* (1991Do10).
13716 *10*	1^+		B(M1)↑=0.30 *2*
13765 *10*	$1^+,(2^-)$		B(M1)↑=0.33 *6*
13814 *10*	2^+		
13902 *10*	$2^+,(3^-)$		
13929 *10*	(2^+)		
13955 *10*	(2^+)		
14000 *10*	2^+		
14045 *10*	(2^+)		
14081 *10*	1^+		B(M1)↑=0.22 *5*
14138 *10*			
14180 *10*	$1^+,(2^-)$		B(M1)↑=0.22 *2*
14213 *10*	(2^+)		
14272 *10*	$1^-,2^+,3^-$		
14303 *10*	$1^-,2^+,3^-$		
14337 *10*	2^+		
14383 *10*	2^+		
14441 *10*	$2^+,(3^-)$		
14504 *10*	2^+		
14542 *10*	$2^+,(1^-,3^-)$		
14598 *10*			
14630 *10*	$2^+,3^-$		
14692 *10*			
14736 *10*	(2^+)		
14823 *10*	2^+		
14852 *10*	$1^+,(2^-)$		B(M1)↑=0.20 *4*
14894 *10*	$1^-,2^+$		
14940 *10*	(2^+)		
17.3×10^3 *2*		5.0 MeV *3*	E(level): GDR (1974Gu16). Other: 16.0 MeV *2*, Γ=3.5 MeV *3* (1991Do10).
28.3×10^3 *3*			E(level): giant resonance (1974Gu16).

† From 1983Kl09 for levels below 5900, from 1987Me16 for levels above this energy, unless indicated otherwise. 1987Me16 assign energy uncertainty of 5-8 keV is assigned for levels from 5.9 to to 9 MeV, and 8-10 keV for higher energy levels. The evaluators

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^{58}Ni(e,e′) 1987Me16,1983Kl09,1978Li02 (continued)

^{58}Ni Levels (continued)

assign the higher uncertainty in each case.

‡ From 1983Kl09.

From 1978Li02.

@ From 1984Bl19.

& From analysis of form factors in (e,e′). The assignments for levels above 5900 are from 1987Me16 and from 1983Kl09 for levels of E<5900, except when noted otherwise.

[a] Natural parity is assumed in 1983Kl09.

[b] Half-lives are from B(E2) and branchings as given in adopted γ′s.