^{58}Ni(α,α') 1972Br25,1967Ja08

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

GQR: giant quadrupole resonance.
GMR: giant monopole resonance.
GDR: giant dipole resonance.
2009Hu13: E=386 MeV. Measured proton decay from the isoscalar-giant giant dipole resonance (ISGDR), σ, $\sigma(\theta)$, αp coin, DWBA analysis.
2006Lu01: E=240 MeV. Measured $\sigma(\theta)$ for first 2^+ and 3^- states, isoscalar giant resonances at 16.64, 17.42, 18.43, 34.06 MeV.
2006Na17: E=386 MeV. Measured $\sigma(\theta)$ and parameters for GDR, GMR and GQR.
2006Sa26: ($\alpha,\alpha'\gamma$) E=136 MeV. Measured Eγ, Eα, $\gamma\gamma$, $\alpha\gamma$ coin. Several high-energy peaks present in the γ-ray spectrum, but no numerical data available.
2003Ga04: (α,α) E=82-288 MeV, methodology.
2000Lu09: E=240 MeV, $\sigma(\theta)$, giant monopole strength.
1996Yo03 (also 1996Yo02): E=240 MeV; measured σ(E′,θ) for θ=0°−6°; DWBA and optical model analysis; extracted GMR parameters.
1995Cl03: E=240 MeV, $\sigma(\theta)$ and deduced deformations for low-lying states.
1992Yo01: E=129 MeV; measured σ(E′,θ) for θ(lab)=3.77°−16.77°; extracted GQR parameters.
1992Po02: E=120 MeV; measured inelastic scattering in coincidence with γ to g.s. At 0° for α', and 90 and 135° for γ. Extracted %EWSR to various excited states from 6.05 MeV to ≥10 MeV for a total %EWSR of 5.0 *2* for isoscalar dipole excitation.
1992Ra21: E=24.7-85.6 MeV, measured σ(E,θ), strong absorption model analysis to extract β_L.
1991Yo03: E=129 MeV; measured σ(E′,θ) for θ(lab)=0°−8 ‘; DWBA analysis, extracted GQR and GMR parameters.
1988Du17: E=152 MeV, FWHM=300 keV; measured σ(E′,θ) for θ(lab)=1.30°−12°; extracted GQR and GMR parameters.
1977Gu03: E=30 MeV, measured $\sigma(\theta)$ from θ(lab)=5°; DWBA analysis.
1976Yo02: E=115 MeV, FWHM=100-400 keV; measured σ(E′,θ); DWBA analysis; extracted GQR parameters.
1972Br25: E=30 MeV, FWHM≈45 keV; measured $\sigma(\theta)$, DWBA analysis.
1968In03: E=34.4 MeV, FWHM=70 keV; measured $\sigma(\theta)$, DWBA analysis.
1967Ja08: E=50.2 MeV, FWHM≈80 keV; measured $\sigma(\theta)$, DWBA analysis.
Others: 1974Co28, 1986GrZJ.
Additional information 1.
Total isoscalar monopole strength in the region Ex=12-25 MeV is <50% of the E0 EWSR, and the centroid of the E0 strength is >24.8 MeV (1996Yo03,1996Yo02).

^{58}Ni Levels

E(level)[†]	J$^\pi$[b]	L[a]	β_L[a]	Comments
0.0	0^+			
1456 *8*	2^+	2	0.206 *10*	β_L: 0.175 at E=28 MeV; 0.156 at 21 MeV (1992Ra21). Deformation length β_2R=0.85 *8* (1995Cl03).
2462 *8*	4^+	4	0.084 *10*	
2771 *8*	2^+	2		
2920[#]				E(level): a weakly excited state in 1967Ja08 to which they assign a doublet of levels 2900 and 2940, known from (p,p′).
3035 *8*	2^+	2	0.053 *5*	
3266 *8*	2^+	2	0.065 *7*	
3414[#]	3^+			
3527 *8*	4^+	4	0.035 *5*	
3588[#]	$(1,2^+)$			E(level): 3558 as given by 1967Ja08 in table 4 is an error; both 1967Ja08 and 1966Sw03 give EL=3588 in other figures and text.
3618 *8*	4^+	4	0.050 *5*	
3773[#]	3^+			
3908 *8*	2^+	2	0.035 *5*	E(level): 3895 in 1967Ja08.

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^{58}Ni(α,α') 1972Br25,1967Ja08 (continued)

^{58}Ni Levels (continued)

E(level)[†]	Jπ[b]	$T_{1/2}$	L[a]	β_L[a]	Comments
4105 *8*	2^+				
≈4350[#@]					
4383[#]					
4405	4^+		4	0.08 *1*	
4444[#]	$1^+,2^+$				
4472 *8*	3^-		3	0.17	β_L: 0.15 *1* (1967Ja08); 0.24 (1992Ra21). Deformation length β_3R=0.71 *7* (1995Cl03).
≈4530[#]	0^+				
4750 *8*	4^+		4	0.076	β_L: 0.08 *1* (1967Ja08).
5122[@] *8*	6^+				
≈5408[@]					E(level): from 1972Br25.
5582 *8*	2^+		2	0.067	E(level),L: reported only in 1972Br25, 1977Gu03 cannot rule out possibility of this level with L=2.
5590	(5^-)		5		E(level): possible doublet. L: from 1977Gu03, L=4 in (1967Ja08), L=4+5 (1968In03).
6024 *8*	1^-		1		L: from 1977Gu03, L=3 in 1972Br25. β_L: 0.059 for L=3 (1972Br25).
6318[@] *8*	3^-				
6463[@] *8*	4^+				
6742 *8*	3^-		3	0.061	
6847 *15*	3^-		3	0.073	
7056[@] *15*					
7212 *15*			4	0.082	L: L=4 is in disagreement with L=3 in (^{3}He,^{3}He′) (1968Bi04).
7521 *15*	3^-		3	0.063	
7734[@] *15*					
8108[@] *15*	$4^{(+)}$				
8493 *15*	$(3^-,1^-)$		(3,1)	0.052	β_L: for L=3.
8662 *15*	$(3^-,1^-)$		(3,1)	0.057	β_L: for L=3.
9290[@] *15*	1^+				
16.64×10^3[‡] *12*		5.81 MeV *+16−11*	2[‡]		Isoscalar giant-quadrupole resonance. %EWSR=76 *10* (2006Lu01), 58 *12* (1992Yo01), 52 *8* (1991Yo03), 38 *8* (1988Du17), 55 *15* (1976Yo02). E(level): from 2006Lu01. Others: 16.3×10^3 *+8−9* (2006Na17), 16.5×10^3 *3* (1992Yo01), 16.1×10^3 *2* (1991Yo03), 16.4E3 2 (1988Du17), 16.4E3 3 (1976Yo02). Γ from 2006Lu01. Others: 5.4 MeV *3* (1992Yo01), 4.7 MeV *2* (1991Yo03), 4.3 MeV *2* (1988Du17), 4.9 MeV *2* (1976Yo02).
17.42×10^3[‡] *25*		3.9 MeV *4*	1[‡]		%EWSR=4% *2* (2006Lu01), 19 *10* (1991Yo03), 23 *5* (1988Du17). E(level): from 2006Lu01. OTHERs: 17.0×10^3 *3* (1991Yo03), 17.3×10^3 *2* (1988Du17). Γ from 2006Lu01. Others: 4.0 MeV *3* (1991Yo03), 3.1 MeV *2* (1988Du17).
18.43×10^3[‡] *15*		7.41 MeV *13*	0[‡]		Isoscalar giant-monopole resonance. Additional information 2. E(level): from 2006Lu01. OTHERs: 20.4×10^3 *3* (1991Yo03), 20.2E3 2 (1988Du17). Γ from 2006Lu01. Other: 4.4 MeV *2* (1991Yo03), 3.8 MeV *8* (1988Du17).

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^{58}Ni(α,α') 1972Br25,1967Ja08 (continued)

^{58}Ni Levels (continued)

E(level)[†]	$T_{1/2}$	L[a]	Comments
24.0×10^3‡& *19*	4.3 MeV *26*	1+3‡&	Fraction of EWSR=0.90% *17*.
31.1×10^3‡& *14*	7.8 MeV *27*	1+3‡&	Fraction of EWSR=2.5% *4*.

† Values with uncertainties are from 1972Br25. These authors state that the uncertainties are 8 keV for levels up to 6742, and increase up to, at most, 15 keV for the higher levels. The other energies are those quoted in figure 4 of 1967Ja08, taken from (p,p′) work of Brown and Middleton as quoted in a private communication to 1966Sw03.

‡ Giant resonance (1992Yo01,1991Yo03,1988Du17).

Very weak group, angular distribution data not obtained.

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& ISGDR from 2009Hu13, from αp coin data, analyzed as double-Gaussian. Energy of a single Gaussian is 29.6 MeV *11*, Γ=10.8 MeV *19* in αp coin experiment and 32.9 MeV *4*, Γ=11.9 MeV *10* in singles data. Others: 30.8 MeV *+17−11* (2006Na17), 34.1 MeV *3*, Γ=19.5 MeV *4* (2006Lu01) for a single peak.

[a] From 1967Ja08 up to E=4405; and 1972Br25 for higher levels, unless indicated otherwise.

[b] From 'Adopted Levels'.