

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 115, 1 (2014)	31-Jul-2013

Q(β^-)=5758 4; S(n)=4586 5; S(p)=1534 \times 10¹ 15; Q(α)=-11182 8 2012Wa38

2012Ga06: Summary and compilation of the discovery of the Ni isotopes.

2010RaZY: Large scale shell model calculation using NR78 interaction to estimate energies of the lowest excited states in nickel isotopes.

2007Gu09: High precision measurement with triple-trap mass spectrometer ISOLTRAP at ISODLE/CERN. Mass excess= -59978.6 3.7.

2002Kr13: Produced from ²³⁸U(p,f) reaction at E= 30 MeV with resonant laser-ionization and mass separation at Louvain-la Neuve cyclotron facility. Production rate was 23 atoms/ μ C 4.

2001Fr21: ⁶⁹Co produced from 30 MeV proton induced fission reaction on ²³⁸U. Extracted selectively by resonant laser ionization and mass separator (LIGIS-LISOL) facility at Leuven. Measured $\beta\gamma$ and $\gamma\gamma$ coincidence spectra with high purity Ge detectors and plastic scintillators. Measured T_{1/2} from timing of β delayed γ intensity.

1999Pr10,1998PrZY: ⁶⁹Ni produced by fragmentation of 70 MeV/nucleon ⁷⁶Ge beam on Be target using the A1200 separator at NSCL, MSU. β delay γ measured with two thin plastic scintillators and two large-volume Ge detectors. Isomer identified with T_{1/2} of 3.4 s 7 at E=321 keV with $\nu p_{1/2}^{-1} \nu g_{9/2}^2$ configuration.

1985Bo49: ⁶⁹Ni produced and identified in W(⁷⁶Ge,X) reaction at 11.5 MeV/nucleon followed by mass separation at GSI facility. Measured γ , β , $\beta\gamma$ coin, isotopic half-life using Ge and Si detectors and plastic scintillators. T_{1/2} from $\beta\gamma$ coincidence data on the decay of 205 γ , 680 γ and 1213 γ .

1985Ru05: ⁶⁹Ni produced by irradiation of W target with 11.4 MeV/nucleon ⁷⁶Se beam followed by on-line mass separation. Measured E γ , I γ , T_{1/2}, $\beta\gamma$ coincidences using 4 π plastic β and Ge detectors.

1984De33: Production of neutron rich nuclei from ⁷⁰Zn(¹⁴C,¹⁵O) reaction at E(¹⁴C)=72 MeV. Measured spectra, differential cross sections and ⁶⁹Ni mass excess.

⁶⁹Ni Levels

Cross Reference (XREF) Flags

- A ⁶⁹Co β^- decay (227 ms)
- B ⁶⁹Ni IT decay (0.439 μ s)
- C ²H(⁶⁸Ni,P)

E(level) [†]	J π [†]	T _{1/2}	XREF	Comments
0.0	(9/2 ⁺)	11.4 s 3	ABC	% β^- = 100; % β^- n=? T _{1/2} : weighted average from 11.2 s 9 (2001Fr21,1998Fr15) and 11.4 s 3 (1985Bo49). Other: 10 s 3 (1985Ru05).
321 2	(1/2 ⁻)	3.5 s 4	AB	% β^- \approx 100; %IT<0.01 %IT: from RUL, BM4W<30. T _{1/2} : weighted average of 3.5 s 5 (1999Mu17) and 3.4 s 7 (1999Pr10). T _{1/2} : From IT decay.
915.3	(5/2 ⁻)	120 ps 34	AB	
1517.4	(5/2 ⁻)		A	
1821.0			A	
1959	(9/2 ⁻)		B	
2241	(13/2 ⁺)		B	
2552	(13/2 ⁻)	519 ps 24	BC	T _{1/2} : From IT decay.
2700	(17/2 ⁻)	0.439 μ s 3	B	%IT=100 T _{1/2} : From γ (t) in Ni(⁸⁶ Kr,X γ) (1998Gr14).

[†] Tentative assignments from level systematics in 1998Gr14 which are in good agreement with large scale shell model calculation

Adopted Levels, Gammas (continued) ^{69}Ni Levels (continued)

using NR78 interaction (2010RaZY).

‡ From least-square fit to the $E\gamma$'s, except for the 321 level which is from IT decay.

$E_i(\text{level})$	J_i^π	E_γ @	I_γ ‡	$\gamma(^{69}\text{Ni})$				Comments
				E_f	J_f^π	Mult. #	α^\dagger	
915.3	(5/2 ⁻)	594.3		321	(1/2 ⁻)	[E2]	0.000975 14	$\alpha=0.000975$ 14; $\alpha(\text{K})=0.000876$ 13; $\alpha(\text{L})=8.67\times 10^{-5}$ 13; $\alpha(\text{M})=1.220\times 10^{-5}$ 17; $\alpha(\text{N}+..)=5.15\times 10^{-7}$ $\alpha(\text{N})=5.15\times 10^{-7}$ 8 B(E2)(W.u.)=3.8 11 (2003Ma50) E_γ : Doublet as confirmed by $\gamma\gamma$ coincidence data in 1998Gr14.
1517.4	(5/2 ⁻)	602.4	79 9	915.3	(5/2 ⁻)			
		1196.5	100 11	321	(1/2 ⁻)			
1821.0		303.6		1517.4	(5/2 ⁻)			
1959	(9/2 ⁻)	1044		915.3	(5/2 ⁻)			
		1959		0.0	(9/2 ⁺)			
2241	(13/2 ⁺)	2241		0.0	(9/2 ⁺)			
2552	(13/2 ⁻)	311	39	2241	(13/2 ⁺)	[E1]	0.001729 25	$\alpha=0.001729$ 25; $\alpha(\text{K})=0.001554$ 22; $\alpha(\text{L})=0.0001521$ 22; $\alpha(\text{M})=2.14\times 10^{-5}$ 3; $\alpha(\text{N}+..)=9.06\times 10^{-7}$ $\alpha(\text{N})=9.06\times 10^{-7}$ 13 B(E1)(W.u.)= 7.2×10^{-6}
		593	100	1959	(9/2 ⁻)	[E2]	0.000981 14	$\alpha=0.000981$ 14; $\alpha(\text{K})=0.000881$ 13; $\alpha(\text{L})=8.73\times 10^{-5}$ 13; $\alpha(\text{M})=1.228\times 10^{-5}$ 18; $\alpha(\text{N}+..)=5.18\times 10^{-7}$ $\alpha(\text{N})=5.18\times 10^{-7}$ 8 B(E2)(W.u.)=0.63 3 (2003Ma50)
2700	(17/2 ⁻)	148		2552	(13/2 ⁻)	[E2]	0.1285	$\alpha(\text{K})=0.1145$ 16; $\alpha(\text{L})=0.01224$ 18; $\alpha(\text{M})=0.001706$ 24; $\alpha(\text{N}+..)=6.39\times 10^{-5}$ 9 $\alpha(\text{N})=6.39\times 10^{-5}$ 9 B(E2)(W.u.)=0.96 4

† Additional information 1.

‡ Relative photon branching from each level. Data for the 1517 level are from β^- decay and for the 2552 level are from IT decay.

From ΔJ^π .

@ Values quoted to the tenths of keV are from β^- decay. The others are from IT decay.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

