

(HI,xnγ) 2000Is01

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

2012Di03: Multinucleon transfer reaction in inverse kinematics. E(²³⁸U)=6.33 MeV/nucleon bombarded a 1.3 mg/cm² thick target. The target-like reaction products were detected and identified in the VAMOS spectrometer at GANIL facility. Atomic number of fragments determined by energy loss information in several ionization chambers and Si detectors. Mass was determined from the total kinetic energy and the time-of-flight information. Prompt γ rays were measured using 11 Clover Ge detectors from the EXOGAM array in coincidence with recoils identified in VAMOS. Delayed γ rays were detected at the VAMOS focal plane by four high-purity Ge detectors. Measurement of half-life from γ(t) of 13/2⁺ isomer. Six delayed γ rays emitted by this isomer are shown by blue diamonds in figure 1 of **2012Di03**.

2002Ge16,2004Ge11,2002Ne07: ⁶⁹Cu produced by fragmentation of 61.4 MeV/nucleon beam on Be target and selected with LISE spectrometer at GANIL. g factor (0.225 25) measured from Time Dependent Perturbed Angular Distribution (TDPAD) in combination with correlation technique. Ge Clover detectors and BaF₂ heavy ion gamma fast scintillators were used to measure E_γ and γ(t). **2002Ge16:** Deduced T_{1/2} of isomer.

2000Is01: Deep inelastic collisions with ⁷⁰Zn beam at 566 MeV produced at the JAERI tandem booster facility on a ¹⁹⁸Pt target. Measured E_γ, γγ, I_γ, fragment-γ coin and deduced T_{1/2} of isomeric states using improved isomer scope instrument consisting of Si and Ge detectors and γ-ray absorbers. Anisotropies γ(θ) of fragment-γ rays measured by Ge detectors placed in plane (θ=90°) and out of plane (θ=0°).

1998Gr14: Ni(⁸⁶Kr,Xγ). E(⁸⁶Kr)=60.3 MeV/nucleon on natural Ni target using Alpha and LISE3 spectrometers at GANIL. Measured E_γ, γγ, γ(t) fragment-γ coincidence with Si planar and HPGe detectors. Two isomeric states at E=321 keV and 2701 keV observed. Deduced T_{1/2} of isomer.

1998BrZS (Supersedes **1998BrZU**): ⁶⁹Cu produced by deep inelastic collision of 350 MeV ⁶⁴Ni and 345 MeV ⁵⁸Ni on ²⁰⁸Pb target, and 275 MeV ⁶⁴Ni on ¹³⁰Te target. Measured E_γ, projectile-γγ coincidence and T_{1/2}.

1997Is13,2001Is02: Deep inelastic collisions with ⁷⁶Ge beam at E=635 MeV produced at the JAERI tandem booster facility on a ¹⁹⁸Pt target at θ_{grazing}= 35°. Measured E_γ, γγ, fragment-γ coin and deduced T_{1/2} of isomeric states using isomer scope instrument consisting of Si and Ge detectors and γ-ray absorbers.

Complete configuration for band member denoted with π²π⁻¹ is π(p_{3/2}²·p_{3/2}f_{5/2}²·f_{5/2}²)π(f_{7/2}⁻¹).

Complete configuration for band member denoted with πν²ν⁻² is πp_{3/2}νg_{9/2}²νp_{1/2}⁻².

⁶⁹Cu Levels

E(level) [†]	J ^π	T _{1/2}	Comments
0	3/2 ⁻		
1212.8 8	(5/2) ⁻		
1710.7 [‡] 9	7/2 ⁻		
1870.9 [#] 7	7/2 ⁻		
2181.1 [‡] 10	9/2 ⁻		
2551.4 8	9/2 ⁺		
2667.3 [‡] 9	11/2 ⁻		J ^π : Authors in 1997Is13 have assigned 9/2 ⁺ for this level in ¹⁹⁸ Pt(⁷⁶ Ge,Xγ).
2741.4 9	13/2 ⁺	357 ns 2	g=0.225 25 (2002Ge16) T _{1/2} : From 2002Ge16 . Others: 360 ns 20 (2012Di03), 330 ns 80 (1999BrZS), 0.36 μs 5 (1998Gr14), and 360 ns 30 (1997Is13). Configuration=πνν ⁻¹ . g: measured using the Time Dependant Perturbed Distribution in combination with heavy ion gamma correlation technique (2002Ge16).
2867.3 [#] 10	11/2 ⁻		
3213.7 [‡] 10	13/2 ⁽⁻⁾		
3482.6 [#] 10	15/2 ⁻		
3691.4 [#] 14	19/2 ⁻	22 ns 1	Configuration=πp _{3/2} ν(g _{9/2} ²)ν(p _{1/2} ⁻²). T _{1/2} : 22 ns 6 in 1999BrZS .
3827.3 11	(17/2 ⁺)	39 ns 6	Configuration=πp _{3/2} πg _{9/2} π(f _{7/2} ⁻¹).

Continued on next page (footnotes at end of table)

(HI,xn γ) 2000Is01 (continued) ^{69}Cu Levels (continued)

† From least-square fit to $E\gamma$'s.

‡ Band(A): Member of band with $\pi^2\pi^{-1}$ configuration.

Band(B): Member of band with $\pi\nu^2\nu^{-2}$ configuration.

 $\gamma(^{69}\text{Cu})$

$E\gamma$ †	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡
74.0	28	2741.4	13/2 ⁺	2667.3	11/2 ⁻	
189.9	100	2741.4	13/2 ⁺	2551.4	9/2 ⁺	Q@
208.8	100	3691.4	19/2 ⁻	3482.6	15/2 ⁻	
268.9	9	3482.6	15/2 ⁻	3213.7	13/2 ⁽⁻⁾	
470.4	74	2181.1	9/2 ⁻	1710.7	7/2 ⁻	D#
485.9	68	2667.3	11/2 ⁻	2181.1	9/2 ⁻	D#
546.2	21	3213.7	13/2 ⁽⁻⁾	2667.3	11/2 ⁻	D#
613.6	13	3827.3	(17/2 ⁺)	3213.7	13/2 ⁽⁻⁾	
615.3	39	3482.6	15/2 ⁻	2867.3	11/2 ⁻	Q@
657.8	6	1870.9	7/2 ⁻	1212.8	(5/2) ⁻	
680.2	103	2551.4	9/2 ⁺	1870.9	7/2 ⁻	D#
741.1	38	3482.6	15/2 ⁻	2741.4	13/2 ⁺	D#
815.3	19	3482.6	15/2 ⁻	2667.3	11/2 ⁻	Q@
956.7	6	2667.3	11/2 ⁻	1710.7	7/2 ⁻	
996.3	36	2867.3	11/2 ⁻	1870.9	7/2 ⁻	Q@
1032.9	6	3213.7	13/2 ⁽⁻⁾	2181.1	9/2 ⁻	
1085.8	11	3827.3	(17/2 ⁺)	2741.4	13/2 ⁺	
1212.5	7	1212.8	(5/2) ⁻	0	3/2 ⁻	
1710.8	75	1710.7	7/2 ⁻	0	3/2 ⁻	Q@
1870.9	139	1870.9	7/2 ⁻	0	3/2 ⁻	Q@
2551.6	2	2551.4	9/2 ⁺	0	3/2 ⁻	

† All data are from 2000Is01. No uncertainties are given by the authors.

‡ From ratio of γ ray intensities measured at in plane ($\theta=90^\circ$) and out of plane ($\theta=0^\circ$). $W(\text{in})/W(\text{out}) < 1$ suggests stretched dipole ($\Delta J=1$). $W(\text{in})/W(\text{out}) > 1$ suggests stretched quadrupole ($\Delta J=2$).

From $W(\text{in})/W(\text{out}) < 1$.

@ From $W(\text{in})/W(\text{out}) > 1$.

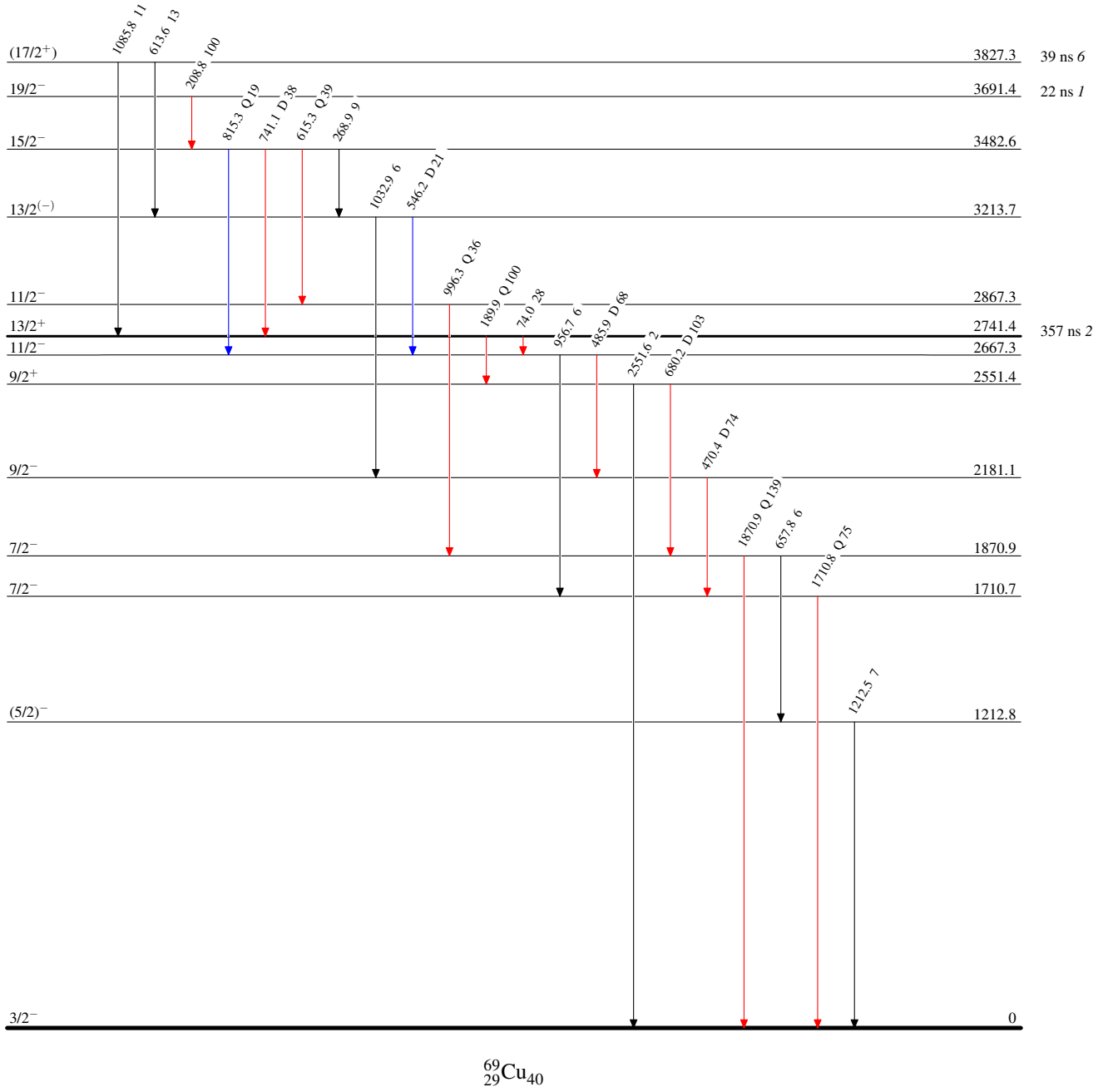
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Level Scheme

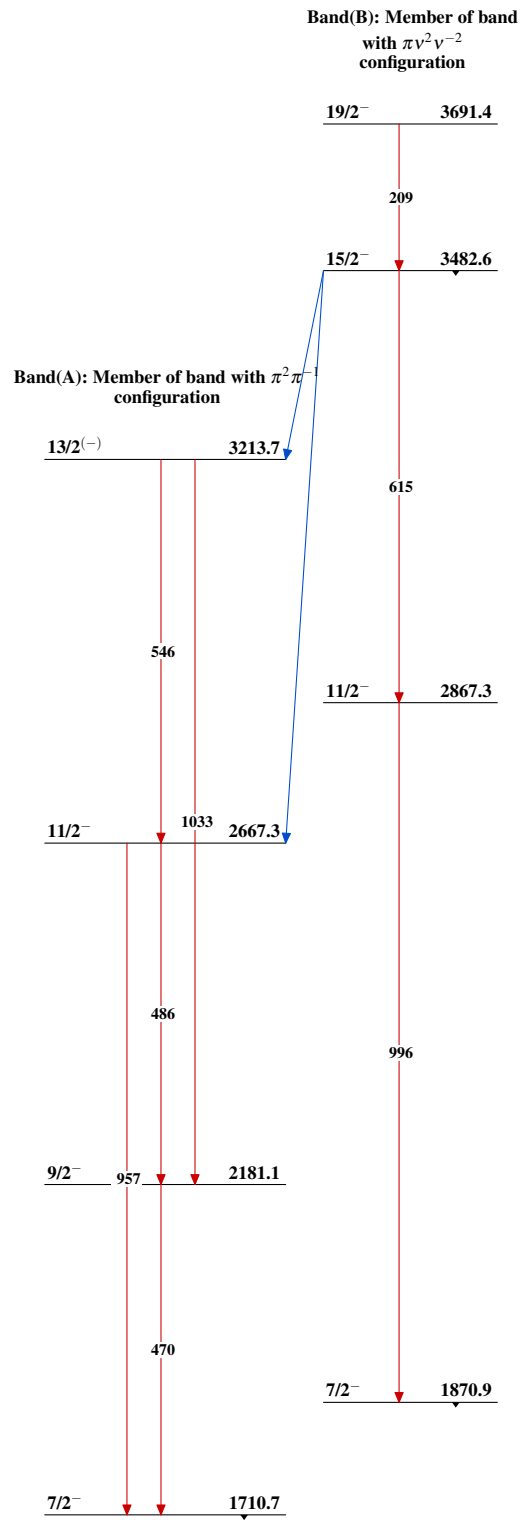
Intensities: Relative I_{γ}

Legend

- \longrightarrow $I_{\gamma} < 2\% \times I_{\gamma}^{max}$
- \longrightarrow $I_{\gamma} < 10\% \times I_{\gamma}^{max}$
- \longrightarrow $I_{\gamma} > 10\% \times I_{\gamma}^{max}$



$^{69}_{29}\text{Cu}_{40}$

(HI,xn γ) 2000Is01 ${}^{69}_{29}\text{Cu}_{40}$