^{238}U(^{64}Ni,Xγ) 2009St05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 188,1 (2023)	17-Jan-2023

Includes ^{238}U(^{76}Ge,Xγ) from 2015Sa09.

2009St05: E=430 MeV ^{64}Ni beam produced by ATLAS-ANL facility. The γ rays were detected using Gammasphere array, consisting of 100 Compton-suppressed HPGe detectors. Coincidence data were sorted into cubes combining prompt and delayed γ rays for analysis. Measured Eγ, Iγ, $\gamma\gamma$-coin. Comparison with shell-model calculations.

2015Sa09 (also 2013Do04): ^{238}U(^{76}Ge,Xγ),E=577 MeV. Neutron-rich Cu isotopes were populated via multinucleon transfer reactions using ^{76}Ge beam from the Tandem-XTU and the ALPI superconducting LINAC accelerators at LNL-Legnaro, bombarding a thin, metallic ^{238}U target of 1.5 mg/cm^2 thickness evaporated onto a ^{181}Ta backing of 1.4 mg/cm^2 thickness. Reaction products were separated according to the measured ΔE-E matrix by the PRISMA magnetic spectrometer. The γ rays were detected by the AGATA Demonstrator array of four triple clusters, each consisting of three 36-fold segmented HPGe detector. Measured Eγ, Iγ, particle-γ(t), lifetime of 981 level using differential recoil-distance Doppler-shift method (RDDS). Deduced transition probabilities. Comparison with shell-model calculations.

^{71}Cu Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0[#]	3/2$^-$		
534.30[@] *14*	5/2$^-$		
981.51[@] *15*	7/2$^-$	14 ps *6*	T$_{1/2}$: From 2015Sa09 using the differential recoil-distance Doppler-shift method (RDDS).
1189.21[#] *15*	7/2$^-$		
1453.41[@] *22*	9/2$^-$		
1786.52 *20*	(9/2$^-$)		
1974.01[@] *25*	(11/2$^-$)		
2128.32[#] *19*	(11/2$^-$)		
2623.42[#] *24*	(15/2$^-$)		
2756.2[#] *3*	(19/2$^-$)	0.275 μs *14*	T$_{1/2}$: from 1998Gr14. Other: 0.25 μs *3* (1998Is11).
4776.6 *6*	(23/2$^-$)		Configuration=$\pi p_{3/2}\otimes\nu((fp)^{10}g^4_{9/2})$.
5330.8 *8*	(27/2$^-$,25/2)		

[†] From a least-squares fit to Eγ data.
[‡] As proposed in 2009St05, based on earlier assignments for low-lying levels, and band structures for high-lying states.
[#] Band(A): g.s. band.
[@] Band(B): Band based on 5/2$^-$.

γ(^{71}Cu)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	α[#]	Comments
132.8 *2*	15 *2*	2756.2	(19/2$^-$)	2623.42	(15/2$^-$)	[E2]	0.209	α(K)=0.185 *3*; α(L)=0.0206 *4*; α(M)=0.00286 *5*; α(N)=7.32×10^{-5} *11*
341.8 *2*	8 *1*	2128.32	(11/2$^-$)	1786.52	(9/2$^-$)			
447.2 *2*	12 *2*	981.51	7/2$^-$	534.30	5/2$^-$			
471.9 *2*	51 *3*	1453.41	9/2$^-$	981.51	7/2$^-$			
495.1 *2*	100	2623.42	(15/2$^-$)	2128.32	(11/2$^-$)			
520.6 *2*	48 *3*	1974.01	(11/2$^-$)	1453.41	9/2$^-$			
534.3 *2*	21 *5*	534.30	5/2$^-$	0.0	3/2$^-$			
554.2 *5*		5330.8	(27/2$^-$,25/2)	4776.6	(23/2$^-$)			
649.4 *2*	52 *4*	2623.42	(15/2$^-$)	1974.01	(11/2$^-$)			

Continued on next page (footnotes at end of table)

^{238}U(^{64}Ni,Xγ) 2009St05 (continued)

γ(^{71}Cu) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
654.9 *2*	10 *1*	1189.21	$7/2^-$	534.30	$5/2^-$		
674.9 *5*	1.3 *4*	2128.32	$(11/2^-)$	1453.41	$9/2^-$		
939.1 *2*	69 *4*	2128.32	$(11/2^-)$	1189.21	$7/2^-$		
981.5 *2*	42 *4*	981.51	$7/2^-$	0.0	$3/2^-$	[E2]	B(E2)↓=0.0034 *15*; B(E2)(W.u.)=2.0 *9* B(E2) deduced by evaluators. 2015Sa09 give B(E2)=0.0044 *20* without accounting for branching of 447-keV transition from 981 level.
1189.2 *2*	96 *4*	1189.21	$7/2^-$	0.0	$3/2^-$		
1252.2 *2*	9 *1*	1786.52	$(9/2^-)$	534.30	$5/2^-$		
2020.3 *5*		4776.6	$(23/2^-)$	2756.2	$(19/2^-)$		

† Uncertainties of 0.2 keV for Iγ>5 and 0.5 keV for others have been assigned, based on a general comment by 2009St05.

‡ From delayed γ-ray data.

Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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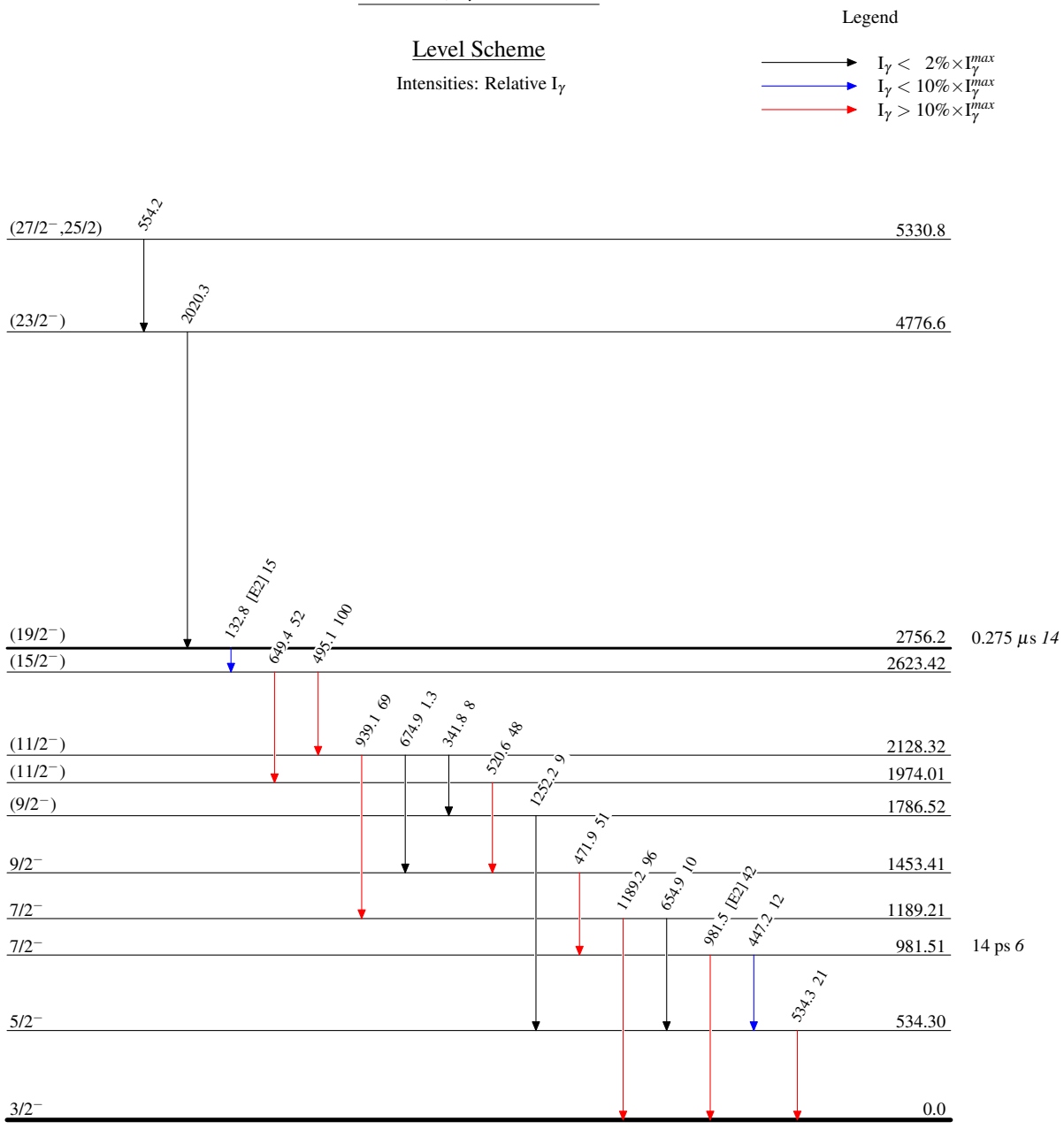
Level Scheme

Intensities: Relative I_γ



$^{71}_{29}Cu_{42}$

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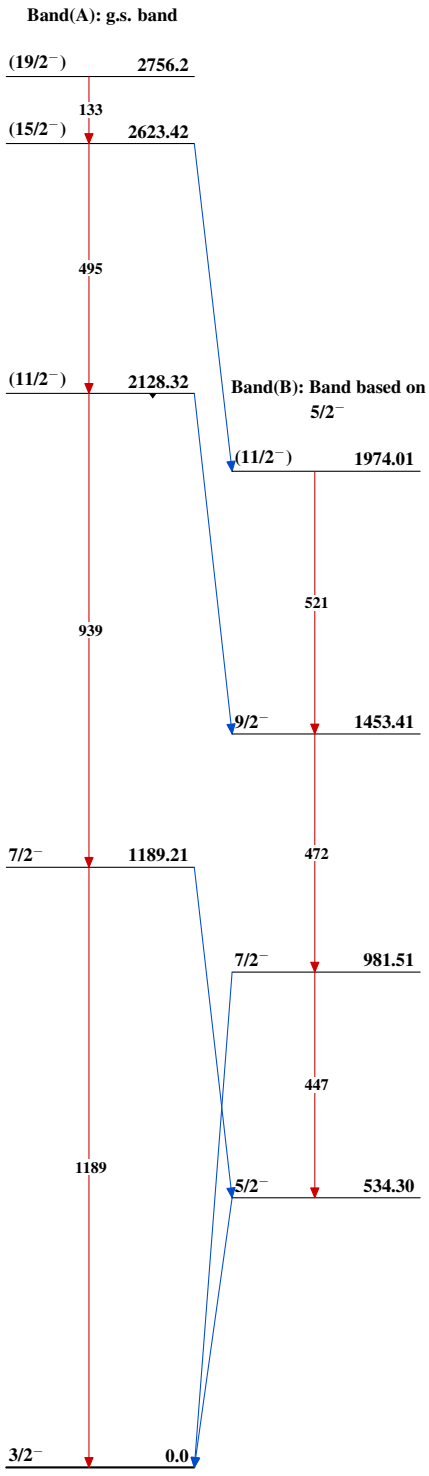

$^{71}_{29}Cu_{42}$