^{63}Cu(p,γ) E=2050 keV 1980Er08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 178, 41 (2021).	12-Nov-2021

1980Er08: E(p)=2050 keV. Measured Eγ, Iγ values of secondary γ rays. See also 1980Er05 (E(p)=2.1-3.1 MeV) (from the same group) for measurement of primary γ rays and deduction of relative intensities and E1 γ-ray strength functions. Energies and intensities of secondary γ rays are given in 1979ErZR.

Other studies:

1990Ku21: E=1.3-3.2 MeV, cross sections measured for g.s., 991, 1799, 2307, 2610 and 2980 levels through detection of primary γ rays.

1975Hs04: see ^{63}Cu(p,γ) E(p)=2098 keV res.

1976Fo06: see ^{63}Cu(p,γ) E(p)=3217 and 3251 keV res.

1986Sz04: E=6.5-11.0 MeV. Measured capture cross sections by γ-ray detection. Spectroscopic factors deduced and compared with those from (^{3}He,d) reaction.

1983Se19: E=1.05-4.7 MeV. Measured capture cross sections and comparison with statistical theory. See also 1983Sa30.

1983Ne05: E=1-3 MeV. Measured cross sections.

1978Sw03: E=1.2-4.6 MeV. Measured excitation functions, comparison with calculations.

1977RoZH: E=1.65-2.75 MeV. Measured 8 resonances from E(p)=1731 to 2479 keV, identified as IAS of ^{64}Cu (from g.s. to 739). See also 1977RoZE by the same group.

1973Dr02: E=8-22 MeV. Measured capture cross sections and comparison with theory.

1971Pa30: E=2-18 MeV. Measured GDR (at 15.8 and 18.9 MeV).

1956We17: E=2.0-3.2 MeV. Measured γ, $\gamma\gamma$ (secondary transitions).

^{64}Zn Levels

E(level)	J$^\pi$[#]	Comments
0.0	0^+	C^2S=1.43 (value from (^{3}He,d) reaction) used for normalization (1986Sz04).
991.55 *15*	2^+	C^2S=0.72 (1986Sz04) for $\pi 2p_{3/2}$.
1799.5 *2*	2^+	C^2S=0.18 (1986Sz04) for $\pi 2p_{3/2}$.
1910.3 *2*	0^+	C^2S=0.18 (1986Sz04) for $\pi 2p_{3/2}$.
2306.9 *2*	4^+	C^2S=0.70 (1986Sz04) for $\pi 1f_{5/2}$.
2609.7 *2*	0^+	C^2S=0.30 (1986Sz04) for $\pi 2p_{3/2}$.
2736.7 *2*	4^+	C^2S=0.71 (1986Sz04) for $J^\pi=4^+$ and $\pi 1f_{5/2}$.
2793.6 *4*	2^+	C^2S=0.24 (1986Sz04) for $J^\pi=2^+$ and $\pi 2p_{3/2}$.
2980.1 *2*	3^+	
2998.8 *2*	3^-	
3005.9 *2*	2^+	C^2S=0.57 for $J^\pi=2^+$ ($\pi 2p_{3/2}$) and 3.2 for $J^\pi=3^-$ ($\pi 1g_{9/2}$) (1986Sz04).
3078.3 *2*	4^+	
3094.9 *3*	$(3)^+$	C^2S=1.45 for $J^\pi=4^+$ ($\pi 1f_{5/2}$) and 1.9 for $J^\pi=3^-$ ($\pi 1g_{9/2}$) (1986Sz04).
3187.1 *2*	1^+	
3197.5 *4*	(2,3)	
3206.2 *3*	$(3)^+$	J$^\pi$: $(3)^+$ inconsistent with possible 1295.1γ to 0^+.
3262.2 *3*	1	
3297.3 *2*	$(2)^+$	
3307.1 *3*	(4^+)	
3366.2 *3*	1^+	
3370.2 *2*	3^+	
3425.0 *4*	1^+	
3459.0[‡] *3*	(2,3)	
3547.2[‡] *3*		
3597.2 *3*		J$^\pi$: 1980Er05 assign 4^+ from excitation function and comparison with theory.
3627[†]	$(0^+,6^-)$	J$^\pi$: from excitation function and comparison with theory (1980Er05).
3701.4 *4*	1^-	
3718.6 *4*		

Continued on next page (footnotes at end of table)

^{63}Cu(p,γ) E=2050 keV 1980Er08 (continued)

^{64}Zn Levels (continued)

E(level)	Jπ#	E(level)	Jπ#	E(level)	Jπ#
3796.2 *4*	1^+	3898.5 *5*		4040.0 *5*	
3819.7 *3*		3925†	5^-	4154†	
3853.3‡ *4*	5^+	4020.5 *7*	$(2)^+$	4159†	1
				4205.2 *4*	$(4,3)^+$

† Level from summed primary γ-ray spectrum (1980Er05).
‡ Possible doublet.
# From the Adopted Levels for selected levels for which the the J^π assignments are limited to at the most two choices. Exceptions are noted in comments.

γ(^{64}Zn)

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π
341.3 *5*	0.4 *1*	3078.3	4^+	2736.7	4^+
429.8 *5*	0.7 *1*	2736.7	4^+	2306.9	4^+
633.40 *15*	0.4 *1*	3370.2	3^+	2736.7	4^+
x726.1 *2*	0.8 *1*				
771.25 *15*	1.2 *1*	3078.3	4^+	2306.9	4^+
807.90 *15*	28.8 *21*	1799.5	2^+	991.55	2^+
860.5 *3*	0.4 *1*	3597.2		2736.7	4^+
899.6 *3*	0.4 *1*	3206.2	$(3)^+$	2306.9	4^+
918.75 *15*	3.4 *3*	1910.3	0^+	991.55	2^+
937.25 *15*	5.0 *4*	2736.7	4^+	1799.5	2^+
991.55 *15*	100 *7*	991.55	2^+	0.0	0^+
1000.15 *15*	1.8 *2*	3307.1	(4^+)	2306.9	4^+
1116.5 *3*	0.7 *1*	3853.3	5^+	2736.7	4^+
1162.5 *5*	0.3 *1*	3898.5		2736.7	4^+
1180.70 *15*	2.7 *2*	2980.1	3^+	1799.5	2^+
x1198.7 *3*	0.5 *1*				
1206.3 *2*	1.4 *1*	3005.9	2^+	1799.5	2^+
x1247.2 *2*	0.7 *1*				
1276.8 *2*	0.8 *1*	3187.1	1^+	1910.3	0^+
1283.4 *2*	0.5 *1*	4020.5	$(2)^+$	2736.7	4^+
1290.3 *2*	0.7 *1*	3597.2		2306.9	4^+
1295.1& *2*	0.5& *1*	3094.9	$(3)^+$	1799.5	2^+
1295.1& *2*	0.5& *1*	3206.2	$(3)^+$	1910.3	0^+
1315.30 *15*	14.0 *10*	2306.9	4^+	991.55	2^+
1387.5 *2*	1.1 *1*	3187.1	1^+	1799.5	2^+
1397.8 *5*	0.5 *1*	3197.5	(2,3)	1799.5	2^+
1406.70 *15*	3.4 *3*	3206.2	$(3)^+$	1799.5	2^+
x1445.1 *3*	0.3 *1*				
1456.7 *4*	0.2 *1*	3366.2	1^+	1910.3	0^+
1461.2	#	3262.2	1	1799.5	2^+
1566.7 *4*	0.4 *1*	3366.2	1^+	1799.5	2^+
1570.7 *2*	1.6 *1*	3370.2	3^+	1799.5	2^+
1618.15 *15*	2.2 *2*	2609.7	0^+	991.55	2^+
1625.6 *5*	1.5 *1*	3425.0	1^+	1799.5	2^+
1659.4 *3*	0.9 *1*	3459.0	(2,3)	1799.5	2^+
1747.65&a *15*	2.1&@ *2*	2736.7	4^+	991.55	2^+
1747.65&a *15*	2.1& *2*	3547.2		1799.5	2^+

Continued on next page (footnotes at end of table)

^{63}Cu(p,γ) E=2050 keV 1980Er08 (continued)

γ(^{64}Zn) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π
1799.9 *2*	9.6 *10*	1799.5	2^+	0.0	0^+	2375.3 *5*	0.7 *1*	3366.2	1^+	991.55	2^+
1802.1 *4*	2.9 *10*	2793.6	2^+	991.55	2^+	2378.9 *5*	0.8 *2*	3370.2	3^+	991.55	2^+
1988.3 *3*	2.3 *2*	2980.1	3^+	991.55	2^+	2467.5 *3*	1.3 *1*	3459.0	(2,3)	991.55	2^+
1996.7 *3*	0.7 *1*	3796.2	1^+	1799.5	2^+	2727.0 *4*	1.5 *2*	3718.6		991.55	2^+
2007.20 *15*	4.7 *4*	2998.8	3^-	991.55	2^+	2906.9 *5*	1.5 *2*	3898.5		991.55	2^+
2014.4 *2*	1.8 *2*	3005.9	2^+	991.55	2^+	3006.1 *5*	1.3 *2*	3005.9	2^+	0.0	0^+
2020.2[a] *2*	1.0 *1*	3819.7		1799.5	2^+	3028.9 *7*	0.5 *1*	4020.5	$(2)^+$	991.55	2^+
[x]2052.3 *3*	0.6 *1*					3048.4[a] *5*	1.3 *2*	4040.0		991.55	2^+
2087.10 *15*	1.7 *1*	3078.3	4^+	991.55	2^+	3213.6[a] *4*	0.9 *2*	4205.2	$(4,3)^+$	991.55	2^+
2103.3 *2*	2.9 *2*	3094.9	$(3)^+$	991.55	2^+	[x]3324.3 *10*	0.9 *2*				
2195.65 *15*	1.3 *1*	3187.1	1^+	991.55	2^+	3365.6 *3*	1.6 *2*	3366.2	1^+	0.0	0^+
2206.4 *4*	0.4 *1*	3197.5	(2,3)	991.55	2^+	3424.9 *4*	2.1 *2*	3425.0	1^+	0.0	0^+
2270.6 *3*	1.5 *1*	3262.2	1	991.55	2^+	[x]3564.1 *5*	1.3 *2*				
2305.70 *15*	2.4 *2*	3297.3	$(2)^+$	991.55	2^+	3701.3 *4*	1.8 *2*	3701.4	1^-	0.0	0^+

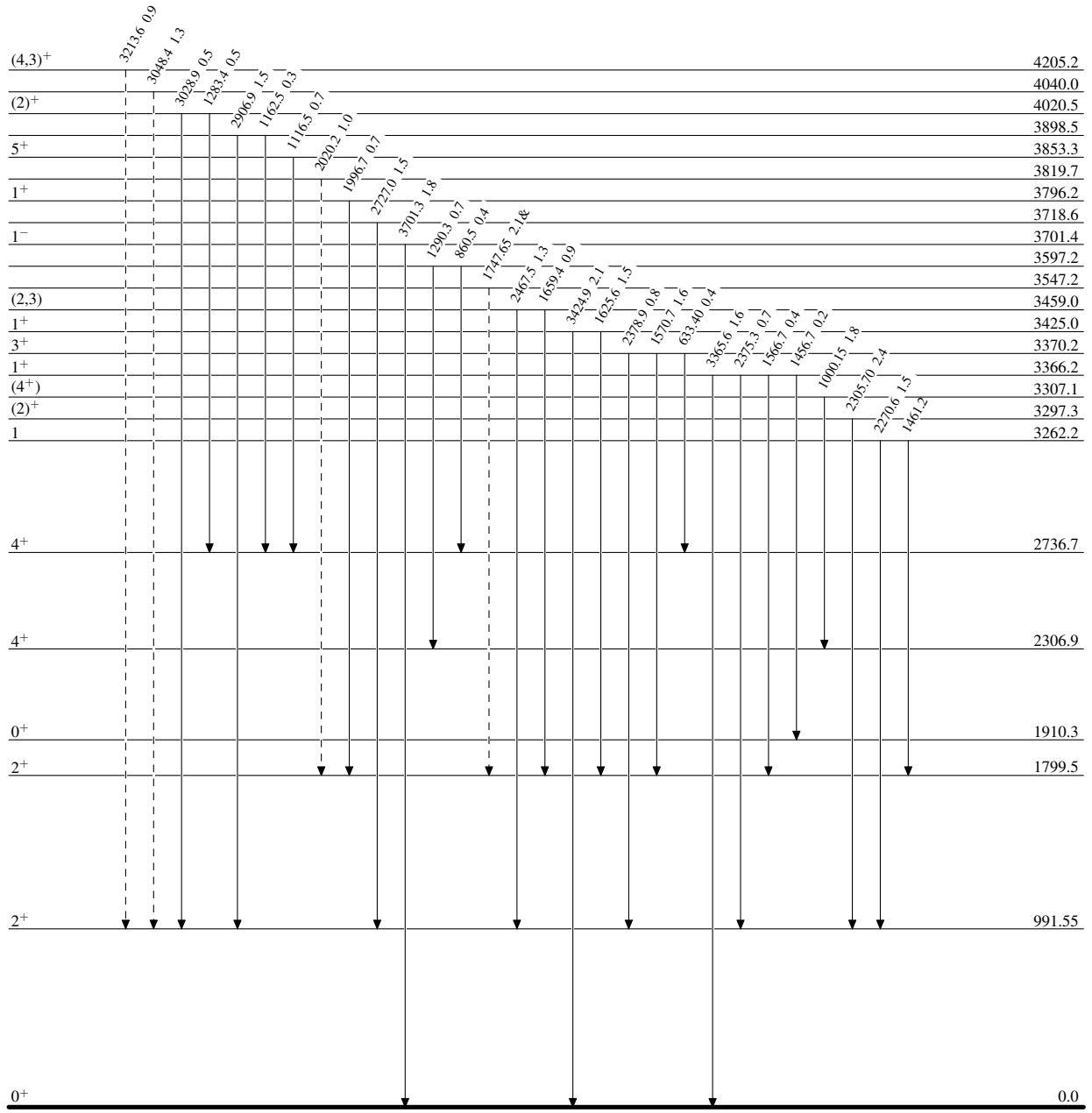
† From 1979ErZR.
‡ From 1980Er08, at 55°.
# Interference from ^{40}K at 1462.
@ From the Adopted Gammas, expected Iγ≈0.25.
& Multiply placed with undivided intensity.
a Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{63}Cu(p,γ) E=2050 keV 1980Er08

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



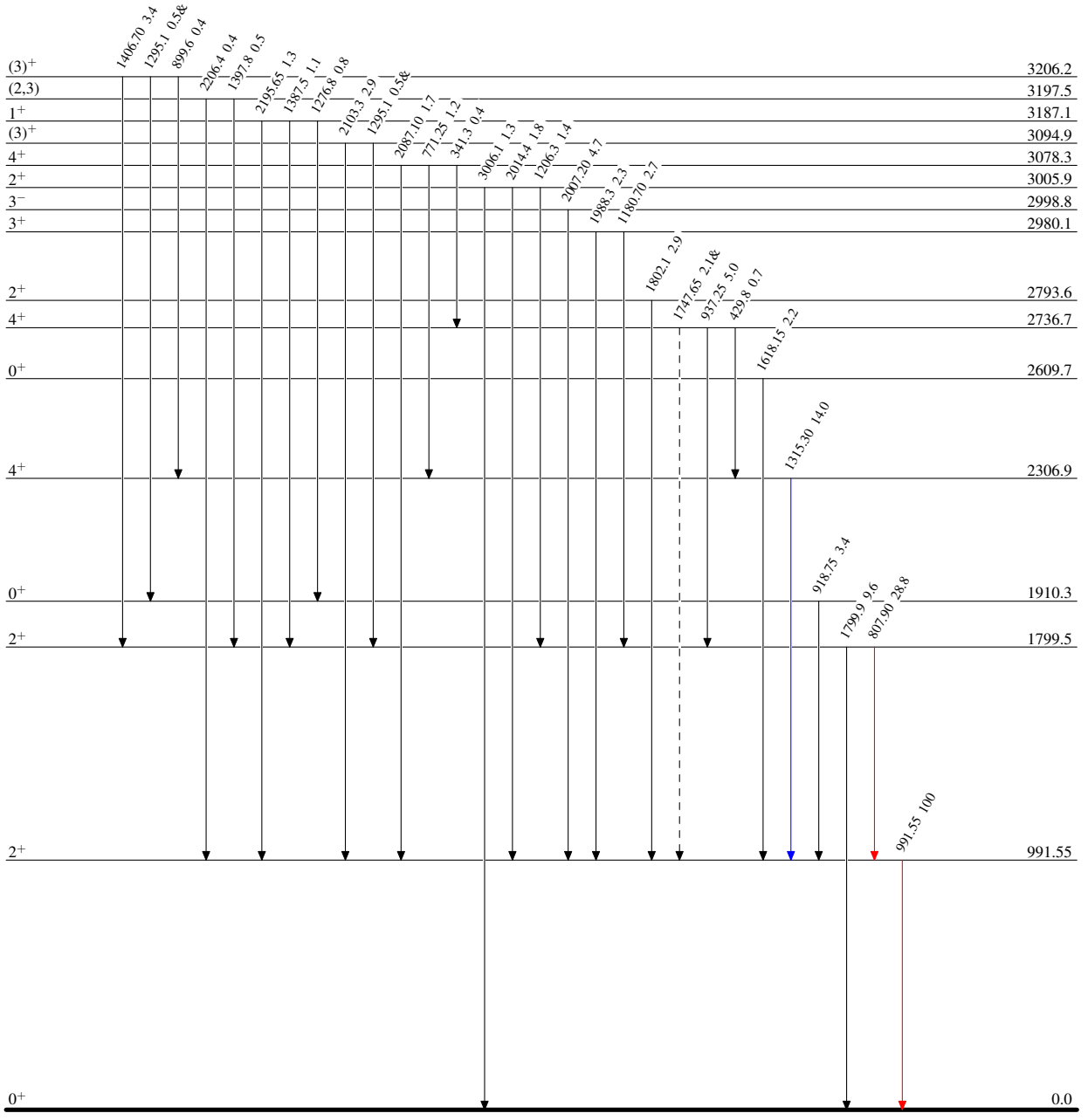
$^{64}_{30}Zn_{34}$

^{63}Cu(p,γ) E=2050 keV 1980Er08

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{64}_{30}Zn_{34}$