

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. A. McCutchan	NDS 113,1735 (2012)	1-Mar-2012

Q(β⁻)=4439.8 19; S(n)=6319.6 20; S(p)=9113 4; Q(α)=-8200 20 [2012Wa38](#)
 Note: Current evaluation has used the following Q record 4439.8 19 6319.6 20 9113 3 -8200 20 [2011AuZZ](#).
 S(2n) = 15451.7 17, S(2p) = 23736 14, Q(β⁻n) = -5758.3 18.
 α: [Additional information 1](#).

⁶⁸Cu Levels

Cross Reference (XREF) Flags

A	⁶⁸ Ni β ⁻ decay	D	⁶⁸ Zn(t, ³ He)
B	⁶⁸ Cu IT decay (3.75 min)	E	¹⁹⁸ Pt(⁷⁶ Ge,Xγ)
C	Coulomb excitation		

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
0.0	1 ⁺	30.9 s 6	ABCDE	Q=-0.082 13; μ=+2.3933 6 J ^π : measured through collinear laser spectroscopy (2010Vi07). T _{1/2} : weighted average of 32 s 2 (1953Fi10), 30 s 1 (1964Ba13), 31.6 s 10 (1969Va16), 30 s 3 (1971Si19), and 30 s 3 (1974Ar22). μ: Collinear laser spectroscopy (2010Vi07). Other: +2.48 8 (2002We03). Q: Collinear laser spectroscopy (2010Vi07). %β ⁻ =100.
84.11 6	2 ⁺	7.84 ns 8	ABCDE	T _{1/2} : from γγ(t) in ⁶⁸ Cu IT decay. J ^π : the 637γ-84γ cascade from 6 ⁻ to 1 ⁺ , along with T _{1/2} of the 6 ⁻ level and mult(84γ)=D, is consistent only with J ^π (84 level)=2 ⁺ , mult(84γ)=M1, and mult(637γ)=M4.
610.53 7	3 ⁺	<40 ps	B DE	XREF: D(606). T _{1/2} : from γγ(t) in ⁶⁸ Cu IT decay. J ^π : the 110γ-610γ cascade from 6 ⁻ to 1 ⁺ , along with mult(110γ)=E3 or M3 and T _{1/2} of the 610 level, is consistent only with J ^π (610 level)=3 ⁺ , mult(610γ)=E2 and mult(110γ)=E3.
721.26 [‡] 8	6 ⁻	3.75 min 5	BCD	Q=-0.440 19; μ=+1.1548 6 XREF: D(716). J ^π : measured through collinear laser spectroscopy (2010Vi07). T _{1/2} : from γ(t) in ⁶⁸ Cu IT decay (1971Si19). Others: 3.8 min 1 (1969Wa22), 3.8 min 1 (1974Ar22). μ: Collinear laser spectroscopy (2010Vi07). Other: +1.24 8 (2002We03). Q: Collinear laser spectroscopy (2010Vi07). %IT=86 2, %β ⁻ =14 2.
777.1 [‡] 7	(3 ⁻)	2.4 ns 17	CDE	XREF: D(772). T _{1/2} : from γ(t) in ¹⁹⁸ Pt(⁷⁶ Ge,Xγ). Symmetrized from 0.7 ns<T _{1/2} <4 ns. J ^π : 693γ to 2 ⁺ , 179γ from 4 ⁻ , and member of π2p _{3/2} ν1g _{9/2} multiplet from large σ in ⁶⁸ Zn(t, ³ He).
864 [#] 6			D	
956.3 [‡] 12	4 ⁻		CDE	XREF: D(950). T _{1/2} : Expected to be on the order of ps, based on observation of Doppler broadened lineshape of 179γ (2007St03). B(E2; 721(6 ⁻) to 956(4 ⁻))=0.0068 6 (2007St03). J ^π : Coulomb excitation from 6 ⁻ isomer.
1042 [#] 6			D	
1145 [#] 6			D	

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Adopted Levels, Gammas (continued)

⁶⁸Cu Levels (continued)

<u>E(level)[†]</u>	<u>J^π</u>	<u>XREF</u>	<u>Comments</u>
1350 [‡] # 6	(5 ⁻)	D	J ^π : member of π2p _{3/2} ν1g _{9/2} multiplet from large σ in ⁶⁸ Zn(t, ³ He).
1586 [#] 6		D	
1631 [#] 6		D	
1723 [#] 6		D	
1829 [#] 6		D	
1870 [#] 6		D	
1908 [#] 6		D	
2014 [#] 6		D	
2098 [#] 6		D	
2211 [#] 6		D	
2364 [#] 6		D	

[†] From a least-squares fit to Eγ's by evaluator, except where noted; ΔE=1keV assumed when not stated.

[‡] Multiplet of states from π2p_{3/2}ν1g_{9/2} configuration.

From ⁶⁸Zn(t,³He).

γ(⁶⁸Cu)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[†]</u>	<u>I_γ[†]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[†]</u>	<u>α</u>	<u>Comments</u>
84.11	2 ⁺	84.12 6	100	0.0	1 ⁺	M1	0.0856	α(K)=0.0765 11; α(L)=0.00795 12; α(M)=0.001117 16; α(N+..)=3.30×10 ⁻⁵ 5 B(M1)(W.u.)=0.00435 5 α(exp)=0.05 4. α(exp): deduced from intensity balance in ⁶⁸ Cu IT decay. Mult.: α(exp) allows E1 or M1. See J ^π argument for the 84 level in the Adopted Levels.
610.53	3 ⁺	526.44 6 610.3 3	100 0.5 2	84.11 2 ⁺ 0.0 1 ⁺		E2	0.000991 14	α(K)=0.000889 13; α(L)=8.92×10 ⁻⁵ 13; α(M)=1.252×10 ⁻⁵ 18; α(N+..)=3.74×10 ⁻⁷ B(E2)(W.u.)>0.050 Mult.: see J ^π argument for the 610 level in the Adopted Levels.
721.26	6 ⁻	110.74 6	100 3	610.53 3 ⁺		E3	3.69	α(K)=3.11 5; α(L)=0.504 8; α(M)=0.0694 10; α(N+..)=0.001172 17 B(E3)(W.u.)=0.0180 9 α(exp)=3.53 15. α(exp): deduced from intensity balance in ⁶⁸ Co IT decay. Mult.: α(exp) allows E3 or M3; placement in the level scheme requires Δπ=yes.
		637.14 6	64.4 18	84.11 2 ⁺		M4	0.01077	α(K)=0.00958 14; α(L)=0.001041 15; α(M)=0.0001468 21; α(N+..)=4.26×10 ⁻⁶ 6 B(M4)(W.u.)=1.42 6 Mult.: see J ^π argument for the 84 level in the Adopted Levels.
777.1	(3 ⁻)	166.8		610.53 3 ⁺				E _γ : from ¹⁹⁸ Pt(⁷⁶ Ge,Xγ).

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Adopted Levels, Gammas (continued)

$\gamma(^{68}\text{Cu})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Comments
777.1	(3 ⁻)	692.7		84.11	2 ⁺	E_γ : from $^{198}\text{Pt}(^{76}\text{Ge}, X\gamma)$.
956.3	4 ⁻	179.2	100	777.1	(3 ⁻)	E_γ, I_γ : from $^{198}\text{Pt}(^{76}\text{Ge}, X\gamma)$.

† From ^{68}Cu IT decay, except where noted.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

