^{65}Zn ε decay

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 111, 2425 (2010)	1-Aug-2009

Parent: ^{65}Zn: E=0; $J^\pi=5/2^-$; $T_{1/2}$=243.93 d *9*; Q(ε)=1352.1 *3*; %ε+%$β^+$ decay=100.0

Additional information 1.

1991Sy01: Measurements include: K-shell ionization probability 2.2×10^{-3} *4* using a triple coincidence spectrometer.

1990Ku11: K/$β^+$ ratio using single and coincidence counting, Ge(Li), Si(Li), NaI detectors.

1990Sc08, 1996Gr13: Eγ, Iγ, x-ray emission probabilities with 4πβγ coincidences, Ge(Li).

1972De24, 2006Bo01: Iγ, I$β^+$, $T_{1/2}$ and γ-Auger, $β^+γ$ coincidences, proportional counter, NaI, Ge(Li).

1968St05: Iγ, γγ coincidences, NaI, Ge(Li).

1970Me27: Eγ, Iγ, Ice, magnetic spectrometer.

1949Ma57: Eβ+, Eγ, magnetic spectrometer.

1966Ha07: α(exp), α(K)exp, magnetic spectrometer.

1979Da20: γ(θ,t), NaI.

1984Bu34: ce; magnetic spectrometer.

1986Ca08: Kα x ray, Kβ x ray, intensity ratio, Si(Li) detector intensity ratio, Si(Li) detector.

1988Av02,1982Le31: search for axions.

1994Al53: Measured γ-ray emission probability, Cd-Te detector. Others: 1993Ko54, 1993Na11.

^{65}Cu Levels

E(level)	J^π†
0.0	$3/2^-$
770.64 *9*	$1/2^-$
1115.549 *2*	$5/2^-$

† From ^{65}Cu Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	I$β^+$ †	Iε†	Log *ft*	I(ε+$β^+$)†	Comments
(236.6 *3*)	1115.549		50.04 *10*	5.8938 *25*	50.04 *10*	εK=0.8797; εL=0.1023; εM+=0.01800
1347 *2*	0.0	1.421 *7*	48.54 *7*	7.4502 *10*	49.96 *10*	av Eβ=142.5 *3*; εK=0.8605; εL=0.09458; εM+=0.01652 E(decay): from endpoint of $β^+$ spectrum=325 *2* (1949Ma57). I$β^+$: from the measured Iγ(511)=2.842% *13* which includes correction for annihilation in flight (2006Be34); others: $I_{β+}$ = 1.70 *10* (1959Gl55), 1.2 *3* (2006Be34), and 1.46 *2* (1972De24), 1.40 *2* (2006Ko31). K/$β^+$ ratio = 30.15 from theory; measured 30.3 *10* (1990Ku11), 30.7 *11* (1984ScZP), 31.3 *20* (1977Bo10), 28.8 *5* (1972De24), 27.7 *15* (1968Ha47).

† Absolute intensity per 100 decays.

^{65}Zn ε decay (continued)

γ(^{65}Cu)

E_γ ‡	I_γ @&ab	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α†	Comments
344.95 *20*	0.00253 *18*	1115.549	5/2⁻	770.64	1/2⁻	[E2]		0.00621 *9*	α=0.00621 *9*; α(K)=0.00556 *8*; α(L)=0.000569 *8*; α(M)=7.97×10^{-5} *12*; α(N+..)=2.31×10^{-6} *4* α(N)=2.31×10^{-6} *4* Additional information 3. I_γ: From Iγ(344)/Iγ(1115)= 5.07×10^{-05} *37* (2006Be34).
770.6 *2*	0.00268 *22*	770.64	1/2⁻	0.0	3/2⁻	M1+E2	0.097 *3*	0.000384 *6*	α=0.000384 *6*; α(K)=0.000345 *5*; α(L)=3.41×10^{-5} *5*; α(M)=4.80×10^{-6} *7*; α(N+..)=1.470×10^{-7} *21* α(N)=1.470×10^{-7} *21* I_γ: From Iγ(771)/Iγ(1115)= 5.36×10^{-05} *44* (2006Be34). Additional information 2.
1115.539 *2*	50.04 *10*	1115.549	5/2⁻	0.0	3/2⁻	M1+E2	−0.450 *16*	0.000185 *3*	α=0.000185 *3*; α(K)=0.0001655 *24*; α(L)=1.631×10^{-5} *23*; α(M)=2.29×10^{-6} *4*; α(N+..)=1.058×10^{-6} α(N)=7.04×10^{-8} *10*; α(IPF)=9.88×10^{-7} *15* Additional information 4. I_γ: Weighted average of: 50.22 *11*, from nine values of an international exercise (EUROMET 721), 4 πβγ coincidence (2006Be34), and 51.3 *30* (1959Gl55), 50.7 *5* (1963Ta19), 51.3 *15* (1966Ra21), 49.3 *8* (1973Po10); 50.15 *28* 4 πβγ coincidence (2006Ko31); 49.71 *16* 4 πβγ coincidence (2005Iw01); 49.76 *21* absolute γ-ray intensity measurement using a source of known activity (2003Lu06). Others: 1992Ra09, 1990Sc08, 1972De24, 1968Ha47, and 1946Go06. α: From the theoretical tables of 1979Sc31, the internal pair formation coefficients are α_π(M1) ≈ 1.2x10^{-6} and α_π(E2) ≈ 1.6x10^{-6}, so

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^{65}Zn ε decay (continued)

γ(^{65}Cu) (continued)

E_γ ‡	E_i(level)	Comments
		$\alpha_\pi(1115) \approx 1.3\text{x}10^{-6}$. This value is only 1% of the conversion coefficient, so it is negligible.

† Additional information 5.
‡ From 2000He14 for 1115 γ ray, from Adopted Gammas for 770G, and from level energy difference for 344G.
# From ^{65}Cu Adopted Gammas, unless noted otherwise.
@ Additional information 6.
& I K x ray=38.87% 22, weighted average from several measurements (2006Be34). I Kα x ray=34.6% 3, BESSY electron storage ring (1994Ar22). I Kβ x ray/I axb= 0.1385 *16* or 0.1407 *16* depending on the modeling (1994Le29). Other values: I K x ray=39.4% 6 (1963Ta19), I K x ray=38.70% 26 (1968Ha47).
[a] I(annih.) = 2.842 *13* (2006Be34); others: 3.40 *20* (1959Gl55), 2.4 *6* (1962Be28), 2.88 *15* (1968Ha47), 2.92 *4* (1972De24), 2.84 *4* (1990Sc08), 2.81 *3* (2006Ko31).
[b] Absolute intensity per 100 decays.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays