^{68}Ga ε decay 1999BeZQ,1999BeZS

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

Parent: ^{68}Ga: E=0.0; $J^\pi=1^+$; $T_{1/2}$=67.71 min *8*; Q(ε)=2921.1 *12*; %ε+%β^+ decay=100.0

1994Vo15: ^{68}Ga activity in equilibrium with the parent ^{68}Ge. Measured Eγ, Iγ, $\gamma\gamma$, and $\gamma\gamma(\theta)$ using high energy resolution array (HERA) consisting of 20 Compton suppressed Ge detectors and a 4π, 40 element BGO inner ball.

1994Sc44: ^{68}Ga activity in equilibrium with the parent ^{68}Ge. Measured Eγ, Iγ, Ex, Ix, β-γ coincidence using Si(Li), Ge(Li), HPGe detectors; deduced γ-emission probability.

1973La01: Source preparation method not given. Measured Eγ, Iγ, and $\gamma\gamma(\theta)$ using NaI(Tl) and Ge(Li) detectors.

1972Sl03: ^{68}Ga activity prepared from ^{68}Zn(p,n) and ^{69}Ga(p,2n) reactions. Measured Eγ, Iγ, Eβ+, and Ice using double focusing β spectrometer and Ge(Li) detector.

1968Ca15: ^{68}Ga activity prepared from the parent activity of ^{68}Ge by chemical separation. Measured Eγ, Iγ, $\gamma\gamma$-coin, and $\gamma\gamma(\theta)$ using NaI(Tl) and Ge(Li) detectors.

^{68}Ga decay scheme is mainly from 1994Vo15.

Others: 2001Ko07,1996Sk03,1996Vo10, 1993Os06, 1992Os07, 1991Ka35, 1984Sc35, 1969Va16, 1967Ta01, 1965He08, 1965Ba36, 1963Ta03, 1962Ko01, 1960Ra06, 1959Ho85, 1959Ra04.

α: Additional information 1.

^{68}Zn Levels

E(level)†	J^π‡	$T_{1/2}$‡
0.0	0^+	stable
1077.36 *4*	2^+	
1655.87 *7*	0^+	
1883.16 *5*	2^+	
2338.48 *5*	2^+	
2821.86 *6*	2^+	

† From a least-squares fit to Eγ's, by evaluator.
‡ From the Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I($\varepsilon+\beta^+$)†‡	Comments
(99.2 *12*)	2821.86		0.0104 *5*	5.113 *24*	0.0104 *5*	εK=0.8655 *3*; εL=0.11381 *23*; εM+=0.02067 *5*
(582.6 *12*)	2338.48		0.0955 *22*	5.754 *11*	0.0955 *22*	εK=0.8825; εL=0.09975; εM+=0.01780
(1037.9 *12*)	1883.16		0.230 *4*	5.879 *8*	0.230 *4*	εK=0.8838; εL=0.09862; εM+=0.01757
(1265.2 *12*)	1655.87	0.000258 *14*	0.0328 *17*	6.898 *23*	0.0331 *17*	av Eβ=107.53 *51*; εK=0.8772 *2*; εL=0.09760 *2*; εM+=0.017382 *3*
(1843.7 *12*)	1077.36	1.19 *1*	1.80 *2*	5.489 *5*	2.99 *3*	av Eβ=352.59 *52*; εK=0.5314 *11*; εL=0.05887 *12*; εM+=0.010480 *21*
2912 *10*	0.0	87.72 *9*	8.92 *8*	5.1942 *13*	96.64 *3*	av Eβ=836.02 *56*; εK=0.08167 *15*; εL=0.009017 *16*; εM+=0.001604 *3* E(decay): Eβ+(max)=1890 *10* from 2001Ko07 (Ge(HP) detectors).

† From I(γ+ce) imbalance at each level.
‡ Absolute intensity per 100 decays.

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γ(^{68}Zn)

Iγ normalization, I(γ+ce) normalization: Decay-scheme normalization is based on measured absolute intensity of 3.22% *3* for 1077-keV γ ray (1994Sc44).

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[@]	α[‡]	$I_{(\gamma+ce)}$[&]	Comments
227.31 *15*	0.0037 *15*	1883.16	2^+	1655.87	0^+	(E2)		0.0300		α(K)=0.0268 *4*; α(L)=0.00286 *4*; α(M)=0.000406 *6*; α(N+..)=1.476×10^{-5} *21*
483.35 *16*	0.0082 *9*	2821.86	2^+	2338.48	2^+	M1+E2		0.0017 *5*		α(K)=0.0015 *5*; α(L)=0.00016 *5*; α(M)=2.2×10^{-5} *7*; α(N+..)=9.E−7 *3*
										δ: −0.12 *16* or −1.7 *9* (1994Vo15).
578.52 *13*	1.04 *5*	1655.87	0^+	1077.36	2^+	E2		0.001272 *18*		α=0.001272 *18*; α(K)=0.001139 *16*; α(L)=0.0001160 *17*; α(M)=1.659×10^{-5} *24* α(N+..)=6.50×10^{-7} *10*
682.63[#] *7*	0.0097 *6*	2338.48	2^+	1655.87	0^+	(E2)		0.000789 *11*		α=0.000789 *11*; α(K)=0.000707 *10*; α(L)=7.16×10^{-5} *10*; α(M)=1.025×10^{-5} *15*; α(N+..)=4.04×10^{-7}
805.83 *8*	2.92 *7*	1883.16	2^+	1077.36	2^+	M1+E2	−1.55 *5*	0.000471 *7*		α=0.000471 *7*; α(K)=0.000422 *6*; α(L)=4.24×10^{-5} *7*; α(M)=6.08×10^{-6} *9*; α(N+..)=2.43×10^{-7} *4*
										δ: Others: −1.46 *14* (1973La01) +4 *+3−2* (1962Ko01).
938.73[#] *6*	0.0055 *5*	2821.86	2^+	1883.16	2^+	M1+E2	−0.7 *3*	0.000304 *12*		α=0.000304 *12*; α(K)=0.000272 *11*; α(L)=2.72×10^{-5} *11*; α(M)=3.90×10^{-6} *16* α(N+..)=1.57×10^{-7} *6*
1077.34 *5*	100	1077.36	2^+	0.0	0^+	E2		0.000247 *4*		α=0.000247 *4*; α(K)=0.000221 *4*; α(L)=2.22×10^{-5} *4*; α(M)=3.18×10^{-6} *5*; α(N+..)=1.273×10^{-7} *18*
										%Iγ=3.22 *3* (1994Sc44).
1165.92 *15*	0.0005 *3*	2821.86	2^+	1655.87	0^+	E2		0.000211 *3*		α=0.000211 *3*; α(K)=0.000185 *3*; α(L)=1.85×10^{-5} *3*; α(M)=2.65×10^{-6} *4*; α(N+..)=4.67×10^{-6} *7*
1261.08 *9*	2.93 *6*	2338.48	2^+	1077.36	2^+	M1+E2	−0.15 *2*	0.0001725 *25*		α=0.0001725 *25*; α(K)=0.0001418 *20*; α(L)=1.409×10^{-5} *20*; α(M)=2.02×10^{-6} *3* α(N+..)=8.19×10^{-8} *12*
										δ: Others: −0.14 *4* (1973La01), −2.25 *30* (1963Ta03), −1.8 *2* (1960Ra06).
1659 *7*		1655.87	0^+	0.0	0^+	E0			4.2×10^{-4} *10*	α(exp)>75×10^{-4} (1972Sl03); ce(K)/(γ+ce)=0.54 *13*
										E_γ: from ce (1972Sl03).
										Mult.: from α(exp) (1972Sl03).
										$I_{(\gamma+ce)}$: includes pair production. From relative ce intensities of 1972Sl03, the Iγ of 1973La01 and the theoretical calculations of 1986PaZM for the K conversion to pair production ratio. The K conversion has been increased by 10% to allow for L conversion.
										Ice(K)(1659)/Ice(K)(1077γ)=0.010 *2* (1972Sl03).

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γ(^{68}Zn) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[@]	α[‡]	Comments
1744.42 *13*	0.295 *15*	2821.86	2^+	1077.36	2^+	M1+E2	+0.27 *2*	0.000241 *4*	α=0.000241 *4*; α(K)=7.70×10^{-5} *11*; α(L)=7.63×10^{-6} *11*; α(M)=1.094×10^{-6} *16*; α(N+..)=0.0001550 δ: Other: +0.29 *5* (1973La01).
1883.16 *6*	4.24 *8*	1883.16	2^+	0.0	0^+	(E2)		0.000333 *5*	α=0.000333 *5*; α(K)=6.97×10^{-5} *10*; α(L)=6.91×10^{-6} *10*; α(M)=9.91×10^{-7} *14*; α(N+..)=0.000255 *4*
2338.44 *8*	0.035 *5*	2338.48	2^+	0.0	0^+	(E2)		0.000529 *8*	α=0.000529 *8*; α(K)=4.71×10^{-5} *7*; α(L)=4.67×10^{-6} *7*; α(M)=6.69×10^{-7} *10*; α(N+..)=0.000476 *7*
2821.73 *14*	0.0144 *11*	2821.86	2^+	0.0	0^+	(E2)		0.000740 *11*	α=0.000740 *11*; α(K)=3.43×10^{-5} *5*; α(L)=3.39×10^{-6} *5*; α(M)=4.86×10^{-7} *7*; α(N+..)=0.000702 *10*

† Values recommended by 1999BeZQ and 1999BeZS, except where noted.
‡ From the Adopted Gammas, except as noted.
# From 1994Vo15.
@ From γγ(θ) in 1994Vo15.
& For absolute intensity per 100 decays, multiply by 0.0322 *3*.

$^{68}_{30}Zn_{38}$-3

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Decay Scheme

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