^{62}Zn ε decay (9.193 h) 1974Jo11,1967An01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alan L. Nichols, Balraj Singh, Jagdish K. Tuli	NDS 113, 973 (2012)	15-Apr-2012

Parent: ^{62}Zn: E=0.0; J$^{\pi}$=0^{+}; T$_{1/2}$=9.193 h *15*; Q(ε)=1619.5 *7*; %ε+%β^{+} decay=100.0
^{62}Zn-T$_{1/2}$: From ^{62}Zn Adopted Levels.
^{62}Zn-Q(ε): From 2011AuZZ. Other: 1626 *11* (2003Au03).
1982Gr10: ^{62}Zn from Cu(p,2n), E=15-70 MeV, Ge(Li) singles.
1975Ro25: ^{62}Zn from Cu(p,2n), E=25 MeV, T$_{1/2}$ by delayed coincidences.
1974Jo11: ^{62}Zn from Cu(p,2n), E=25 MeV, Ge(Li) singles and $\gamma\gamma$ coincidences.
1974Wa09: ^{62}Zn from Ni(α,2n), E not stated, Ge(Li) singles, deduced Iβ^{+}.
1973Gi01: ^{62}Zn from Cu(p,2n), E=25 MeV, Ge(Li) singles.
1970BoZE: ^{62}Zn from Ni(α,Zn), E=27 MeV, $\gamma\gamma(\theta)$, g-factor for 41 level.
1969Ho01: ^{62}Zn from Ni(^{3}He,n), E<10 MeV, $\gamma\gamma$ coincidences, Ge(Li).
1967An01: ^{62}Zn from Cu(p,2n), Ge(Li) for γ singles, β spectrometer for conversion electrons and positrons.
1974Jo11 point out that there is no need for the 1142 level proposed by 1973Gi01 since the 1142γ is in coincidence with the 247γ. Other experiments show that 1142 level does exist, but appropriate decay γ rays (1977Ch04) are not observed in any studies of ^{62}Zn decay − concluded that feeding of the 1142 level by ^{62}Zn decay is negligible.
Total decay energy of 1622 keV *78* deduced (by RADLIST code) from proposed decay scheme is in agreement with the expected value of 1619.5 keV *7*, indicating that decay scheme is complete.

^{62}Cu Levels

E(level)†	J$^{\pi}$‡	T$_{1/2}$	Comments
0.0	1^{+}		
40.80 *5*	2^{+}	4.57 ns *18*	g=+0.67 *6* (PAC,1970BoZE). T$_{1/2}$: by delayed coincidence (1975Ro25).
243.42 *4*	2^{+}		
287.78 *6*	2^{+}		
426.13 *8*	3^{+}		
548.29 *6*	1^{+}		
637.45 *5*	1^{+}		
644.82 *6*	(2^{+})		
698.33 *15*	(3)$^{+}$		Decay by unreported γ ray(s) is probable since Iγ of incoming gammas exceeds Iγ of outgoing gammas. Other branches are known in ^{59}Co(α,nγ) and ^{62}Ni(p,nγ).
915.31 *7*	2^{+}		
1221.5 *2*	+		
1429.57 *7*	1^{+}		
1525.92 *19*	1^{+}		

† From least-squares fit to Eγ data.
‡ From Adopted Levels.

ε,β^{+} radiations

E(decay)	E(level)	Iε†	Log *ft*	I(ε+β^{+})†	Comments
(93.6 *7*)	1525.92	0.0091 *16*	5.98 *8*	0.0091 *16*	εK=0.8673 *2*; εL=0.11260 *15*; εM+=0.02006 *3*
(189.9 *7*)	1429.57	0.102 *9*	5.59 *4*	0.102 *9*	εK=0.8778; εL=0.10385 *3*; εM+=0.018306 *6*
(704.2 *7*)	915.31	0.036 *4*	>7.2	0.036 *4*	εK=0.8845; εL=0.09828; εM+=0.01719 Log *ft*: given as a lower limit because of possible feeding of 915 level by a 514γ that would be obscured by $\gamma^{\pm}$.
(982.0 *7*)	637.45	28.6 *22*	4.60 *4*	28.6 *22*	εK=0.8852; εL=0.09772; εM+=0.01708
(1071.2 *7*)	548.29	31 *3*	4.64 *5*	31 *3*	εK=0.8853; εL=0.09761; εM+=0.01706

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ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(1619.5 *7*)	0.0	8.2 *10*	32 *4*	4.99 *6*	40 *5*	av Eβ=255.44 *30*; εK=0.7052 *6*; εL=0.07736 *7*; εM+=0.01351 *2* Eβ+=660 *10* (1950Ha65). Iβ^+: from Iγ of 1974Jo11, if 97.43% β^+ occurs in decay of ^{62}Cu. Most accurate direct measurement appears to be that of 1974Wa09: 7.3%.

† Absolute intensity per 100 decays.

γ(^{62}Cu)

Iγ normalization: from Σ Ti(to g.s.)+(Iβ^++Iε)(to g.s.)=100. Using theoretical value Iε/Iβ^+(to g.s.)=3.74 *25*, %Iβ^+(62CU decay)=97.43 *4*, and I($\gamma^\pm$)=824 *41*, for the combined decays of ^{62}Zn and ^{62}Cu I(ε+β^+ to g.s.)=40% 5.

α(K)exp in comments are from 1969Ho01, calculated from Ice of 1967An01 and Iγ of 1969Ho01, normalized to 0.59 and 0.0058 for the 41- and 597-keV transitions.

E$_\gamma$†	I$_\gamma$†#	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.‡	α@	Comments
40.85 *6*	98 *5*	40.80	2$^+$	0.0	1$^+$	M1	0.646 *10*	α(K)= 0.577; α(L)= 0.0609; α(M)=0.00856; α(N)=0.000250 α(K)exp=0.52 *8*, K/LM=8.0 *15* (1954Nu27); L1/(L2+L3)>10 (1967An01). Mult.: must be dipole from K/LM ratio; α(K) and L subshell ratio establish M1 character.
202.67 *6*	0.042 *5*	243.42	2$^+$	40.80	2$^+$			
243.36 *6*	9.7 *5*	243.42	2$^+$	0.0	1$^+$	M1	0.00539	α(K)= 0.00483; α(L)= 0.000488; α(M)=6.87×10^{-5}; α(N)=2.07×10^{-6} α(K)exp=0.0045 *3*.
246.95 *6*	7.3 *4*	287.78	2$^+$	40.80	2$^+$	M1	0.00520	α(K)= 0.00466; α(L)= 0.000471; α(M)=6.62×10^{-5}; α(N)=2.00×10^{-6} α(K)exp=0.0037 *1*.
260.43 *7*	5.2 *3*	548.29	1$^+$	287.78	2$^+$	M1	0.00457	α(K)= 0.00409; α(L)= 0.000413; α(M)=5.81×10^{-5}; α(N)=1.76×10^{-6} α(K)exp=0.0034 *3*.
304.88 *9*	1.11 *6*	548.29	1$^+$	243.42	2$^+$			
349.60 *13*	1.73 *11*	637.45	1$^+$	287.78	2$^+$	[M1]	0.00225	α(K)exp=0.0042 *6*.
385.31 *9*	0.067 *6*	426.13	3$^+$	40.80	2$^+$			
394.03 *6*	8.60 *4*	637.45	1$^+$	243.42	2$^+$	M1+E2	0.00170	α(K)exp=0.0023 *2*. Mult.: assigned pure E2 by 1967An01, although α(K)exp falls between M1 and E2 values of α(K). Based on T$_{1/2}$=0.15 ps *+28−8* measured in ^{62}Ni(p,nγ) studies, pure E2 would lead to B(E2)(W.u.)=2070, which is unreasonably large.
489.17 *7*	0.061 *6*	915.31	2$^+$	426.13	3$^+$			
507.60 *10*	57 *3*	548.29	1$^+$	40.80	2$^+$	M1	0.00095	α(K)exp=0.00076 *19*.
548.35 *11*	59 *3*	548.29	1$^+$	0.0	1$^+$	M1	0.00080	α(K)exp=0.00083 *5*.
596.56 *13*	100	637.45	1$^+$	40.80	2$^+$	M1	0.00066	α(K)exp=0.00058 *4*. Mult.: also from 1967An01, since 637 level is populated by an allowed transition from 0$^+$ parent and Iγ deduced from Iε with theoretical M1 α agrees with direct measurements of Iγ.
627.8 *4*	0.003 *1*	915.31	2$^+$	287.78	2$^+$			
637.41 *7*	0.98 *6*	637.45	1$^+$	0.0	1$^+$			

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^{62}Zn ε decay (9.193 h) 1974Jo11,1967An01 (continued)

γ(^{62}Cu) (continued)

E_γ [†]	I_γ [†#]	E_i(level)	J^π_i	E_f	J^π_f	E_γ [†]	I_γ [†#]	E_i(level)	J^π_i	E_f	J^π_f
644.82 *6*	0.055 *3*	644.82	(2$^+$)	0.0	1$^+$	1141.91 *11*	0.133 *8*	1429.57	1$^+$	287.78	2$^+$
657.5 *5*	0.005 *1*	698.33	(3)$^+$	40.80	2$^+$	1186.2 *3*	0.015 *5*	1429.57	1$^+$	243.42	2$^+$
671.84 *9*	0.017 *2*	915.31	2$^+$	243.42	2$^+$	1221.5 *2*	0.0058 *9*	1221.5	$^+$	0.0	1$^+$
731.23 *15*	0.0088 *12*	1429.57	1$^+$	698.33	(3)$^+$	[x]1321.3 *7*	<0.005				
792.03 *7*	0.034 *3*	1429.57	1$^+$	637.45	1$^+$	1389.1 *4*	0.045 *3*	1429.57	1$^+$	40.80	2$^+$
827.59 *14*	0.0115 *14*	1525.92	1$^+$	698.33	(3)$^+$	1429.7 *7*	0.106 *10*	1429.57	1$^+$	0.0	1$^+$
881.4 *3*	0.056 *4*	1429.57	1$^+$	548.29	1$^+$	1485.1 *5*	0.002 *1*	1525.92	1$^+$	40.80	2$^+$
915.44 *16*	0.059 *4*	915.31	2$^+$	0.0	1$^+$	1525.9 *6*	0.022 *5*	1525.92	1$^+$	0.0	1$^+$

† From 1974Jo11.

‡ From 1969Ho01, based on α(K)exp, except as noted.

\# For absolute intensity per 100 decays, multiply by 0.26 *2*.

@ 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.

^{x} γ ray not placed in level scheme.

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Decay Scheme

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