^{70}Cu β^- decay (33 s) 2004Va08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal, E. A. Mccutchan	NDS 136, 1 (2016)	1-Jul-2016

Parent: ^{70}Cu: E=101.1 *3*; J$^\pi$=3$^-$; T$_{1/2}$=33 s *2*; Q(β^-)=6588.3 *22*; %β^- decay=52 *9*

^{70}Cu-%β^- decay: %IT=48 *9* (2004Va08).

2004Va08,2004Va07: ^{70}Cu activity produced in proton (E(p)= 1 GeV) and neutron induced fission of uranium carbide and separated with the RILIS ion source followed by mass separation. Measured Eγ, Iγ, γ(t), $\beta\gamma$ and $\gamma\gamma$ coincidences using three thin plastic ΔE detectors and two HPGe detectors. See also thesis, 2002VaZX.

1983Ru06: ^{70}Cu activity from ^{nat}W(^{76}Ge,X) with E(^{76}Ge)=9 MeV/nucleon. Reaction products stopped in graphite catcher of FEBIAD-E ion source then mass separated in on-line mass separator. Measured Eγ, Iγ, γ(t), $\gamma\gamma$, $\beta\gamma$ coincidences using 2 Ge detectors and a plastic scintillator. The 208γ, 708γ, 1072γ, and 1654γ previously assigned to ^{67}Ni decay by 1975Re09 and 1971Ta03 were assigned to the ^{70}Cu decay. This assignment was confirmed by 2004Va08.

Others: 1971Ta03, 1975Re09.

A total energy release of 3500 keV *300* for this decay scheme is calculated by the code RADLST, in agreement with the effective Q value of 3500 keV *600*. However, there is a 3.3 MeV energy difference between the highest observed energy level and the Q value, suggesting that the decay scheme is incomplete.

α: Additional information 1.

^{70}Zn Levels

E(level)†	J$^\pi$‡	T$_{1/2}$‡	Comments
0.0	0$^+$	≥3.8×10^{18} y	
884.95 *8*	2$^+$	3.65 ps *21*	
1759.31 *10*	2$^+$	1.32 ps *21*	
1786.86 *11*	4$^+$	2.9 ps *8*	
2538.44 *12*	(2$^+$)	0.21 ps *+28−8*	J$^\pi$: (3$^+$) in 2004Va08 is in conflict with adopted value which is based on 2538γ (not reported here) to 0$^+$ and direct population in Coulomb Excitation.
2693.50 *13*	4$^+$	0.28 ps *+35−14*	
2859.60 *12*	3$^-$	0.201 ps *14*	
2978.37 *23*	4$^+$		
3038.23 *13*	5$^-$	1.04 ps *7*	
3246.81 *12*	(3$^-$,4$^+$)		J$^\pi$: (4$^-$) in 2004Va08 is in conflict with adopted value.

† From least-squares fit to Eγ, by evaluators.
‡ From the Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(3442.6 *22*)	3246.81	24 *5*	5.4 *2*	av Eβ=1494.5 *11*
(3711.0 *22*)	2978.37	1.7 *5*	6.7 *2*	av Eβ=1623.6 *11*
(3829.8 *22*)	2859.60	13 *3*	5.9 *1*	av Eβ=1680.9 *11*
(3995.9 *22*)	2693.50	5.3 *12*	6.4 *1*	av Eβ=1761.1 *11*
(4151.0 *22*)	2538.44	1.7 *9*	7.0 *3*	av Eβ=1836.0 *11*
(4902.5 *22*)	1786.86	6 *3*	6.7 *2*	av Eβ=2200.2 *11*

† Deduced by the evaluators from γ-ray intensity balance. Total β feeding sums to 52%. Note that corresponding values quoted in 2004Va08 add up to 100%.
‡ Absolute intensity per 100 decays.

^{70}Cu β^- decay (33 s) 2004Va08 (continued)

$\gamma(^{70}Zn)$

Iγ normalization: From Σ(I(γ+ce) to g.s.)=52 *9*. No ground state β feeding is expected since ΔJ=3, $\Delta\pi$=yes.
Iγ(101.1γ, IT)/Iγ(884.88γ)=0.98 *16* (2004Va08).

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ ‡	α	Comments
208.75 *7*	10.4 *7*	3246.81	$(3^-,4^+)$	3038.23	5^-	[E1]		0.00653	α(K)=0.00586 *9*; α(L)=0.000588 *9*; α(M)=8.40×10^{-5} *12*; α(N)=3.28×10^{-6} *5*
387.10 *5*	10.2 *7*	3246.81	$(3^-,4^+)$	2859.60	3^-	[E1]		1.14×10^{-3}	α(K)=0.001023 *15*; α(L)=0.0001023 *15*; α(M)=1.464×10^{-5} *21*; α(N)=5.81×10^{-7} *9*
553.2 *1*	5.4 *7*	3246.81	$(3^-,4^+)$	2693.50	4^+				
708.42 *7*	19 *1*	3246.81	$(3^-,4^+)$	2538.44	(2^+)	[E2]		7.12×10^{-4}	α(K)=0.000638 *9*; α(L)=6.45×10^{-5} *9*; α(M)=9.24×10^{-6} *13*; α(N)=3.65×10^{-7} *6*
779.1 *2*	6.4 *7*	2538.44	(2^+)	1759.31	2^+				
874.33 *8*	7.9 *7*	1759.31	2^+	884.95	2^+	M1+E2	+0.75 *15*	3.58×10^{-4} *9*	α(K)=0.000321 *9*; α(L)=3.21×10^{-5} *9*; α(M)=4.61×10^{-6} *12*; α(N)=1.85×10^{-7} *5*
884.88 *9*	100 *5*	884.95	2^+	0.0	0^+	E2		3.97×10^{-4}	α(K)=0.000356 *5*; α(L)=3.58×10^{-5} *5*; α(M)=5.12×10^{-6} *8*; α(N)=2.04×10^{-7} *3*
901.7 *1*	51 *5*	1786.86	4^+	884.95	2^+	[E2]		3.78×10^{-4}	α(K)=0.000339 *5*; α(L)=3.41×10^{-5} *5*; α(M)=4.88×10^{-6} *7*; α(N)=1.95×10^{-7} *3*
906.5 *1*	5.2 *8*	2693.50	4^+	1786.86	4^+				
1072.2 *1*	15 *2*	2859.60	3^-	1786.86	4^+	[E1]		1.12×10^{-4}	α(K)=0.0001001 *14*; α(L)=9.94×10^{-6} *14*; α(M)=1.423×10^{-6} *20*; α(N)=5.74×10^{-8} *8*
1100.5 *2*	6.8 *8*	2859.60	3^-	1759.31	2^+	[E1]		1.15×10^{-4}	α(K)=9.54×10^{-5} *14*; α(L)=9.47×10^{-6} *14*; α(M)=1.356×10^{-6} *19*; α(N)=5.47×10^{-8} *8*
1191.5 *2*	3.5 *7*	2978.37	4^+	1786.86	4^+				
1251.7 *1*	10.4 *7*	3038.23	5^-	1786.86	4^+	[E1]		1.68×10^{-4}	α(K)=7.56×10^{-5} *11*; α(L)=7.49×10^{-6} *11*; α(M)=1.073×10^{-6} *15*; α(N)=4.34×10^{-8} *6*
1460.4 *2*	3.8 *8*	3246.81	$(3^-,4^+)$	1786.86	4^+				
1653.9 *2*	16 *1*	2538.44	(2^+)	884.95	2^+	M1+E2	−1.5 *3*	2.39×10^{-4} *5*	α(K)=8.78×10^{-5} *14*; α(L)=8.72×10^{-6} *14*; α(M)=1.250×10^{-6} *19*; α(N)=5.06×10^{-8} *8*
1759.6 *2*	5.4 *5*	1759.31	2^+	0.0	0^+	[E2]		2.86×10^{-4}	α(K)=7.92×10^{-5} *11*; α(L)=7.86×10^{-6} *11*; α(M)=1.127×10^{-6} *16*; α(N)=4.56×10^{-8} *7*

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^{70}Cu β^- decay (33 s) 2004Va08 (continued)

$\gamma(^{70}Zn)$ (continued)

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α	Comments
1809.1 *5*	11 *1*	2693.50	4^+	884.95	2^+	[E2]	3.04×10^{-4}	α(K)=7.51×10^{-5} *11*; α(L)=7.46×10^{-6} *11*; α(M)=1.069×10^{-6} *15*; α(N)=4.33×10^{-8} *6*
1975.0 *4*	14 *1*	2859.60	3^-	884.95	2^+	[E1]	6.56×10^{-4}	α(K)=3.61×10^{-5} *5*; α(L)=3.57×10^{-6} *5*; α(M)=5.11×10^{-7} *8*; α(N)=2.07×10^{-8} *3*

† From 2004Va08. Iγ are normalized to Iγ(885γ)=100.
‡ From the Adopted Gammas.
\# For absolute intensity per 100 decays, multiply by 0.49 *9*.

^{70}Cu β^- decay (33 s) 2004Va08

Decay Scheme

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