^{70}Cu β^- decay (44.5 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=0.0; $J^\pi=6^-$; $T_{1/2}$=44.5 s *2*; Q(β^-)=6588.3 *22*; %β^- decay=100.0

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.

1975Re09: ^{70}Cu activity from ^{70}Zn(n,p), E(n)=14 MeV. Measured Eγ, Iγ, γ(t), Eβ, Iβ, $\beta\gamma$ coincidences with a Ge(Li) detector, a NaI(Tl) detector and a β spectrometer consisting of a proportional counter backed by a plastic scintillator.

1971Ta03: ^{70}Cu activity from ^{70}Zn(n,p) with E(n)=14 MeV. Measured Eγ, Iγ, Eβ, Iβ, γ(t), $\beta\gamma$ and $\gamma\gamma$ coincidences using two Ge(Li) detectors, a NaI(Tl) detector and a plastic scintillator.

Other: 1983Ru06.

A total energy release of 6590 keV *100* is calculated for this decay scheme by the code RADLST, in good agreement with the Q value of 6588.3 keV *22*.

α: Additional information 1.

^{70}Zn Levels

E(level)†	J^π‡	$T_{1/2}$‡	Comments
0.0	0^+	≥3.8×10^{18} y	
884.89 *9*	2^+	3.65 ps *21*	
1786.62 *13*	4^+	2.9 ps *8*	
2693.24 *16*	4^+	0.28 ps *+35−14*	
2895.03 *16*	(6^+)		
3038.30 *16*	5^-	1.04 ps *7*	
3341.8 *3*	3^-		
3476.68 *17*			
3599.12 *18*			
3788.28 *24*			
3848.3 *6*	$(5,6^+)$		
3903.9 *4*	$(5,6^+)$		
4001.60 *19*	$(5,6,7^-)$		J^π: assigned as 2^+ in 2004Va08. However, direct feeding from 6^- parent and 963γ to 5^- makes J=2 unlikely.
4061.42 *19*	$(5,6,7^-)$		J^π: assigned as 4^+ in 2004Va08. However, direct feeding from 6^- parent makes J=4 unlikely.
4264.6 *7*	$(5,6,7^-)$		
4309.03 *21*	$(5,6,7^-)$		
4464.81 *20*	$(5,6,7^-)$		
4514.4 *3*	$(5,6,7^-)$		
4558.3 *3*	$(5,6^+)$		
4588.9 *3*	$(5,6,7^-)$		
4710.1 *5*	(5,6,7)		
4791.7 *10*	(5,6,7)		
4849.2 *3*	$(5,6^+)$		
5061.3 *5*	(5,6,7)		

† From a least-squares fit to Eγ, by evaluators.

‡ From the Adopted Levels.

^{70}Cu β^- decay (44.5 s) 2004Va08 (continued)

β^- radiations

E(decay)	E(level)	Iβ^-[†][‡]	Log *ft*	Comments
(1527.0 *23*)	5061.3	0.50 *5*	5.8 *1*	av Eβ=593.9 *12*
(1739.1 *22*)	4849.2	5.19 *20*	5.0 *1*	av Eβ=690.3 *12*
(1796.6 *24*)	4791.7	0.57 *6*	6.0 *1*	av Eβ=716.7 *13*
(1878.2 *23*)	4710.1	1.04 *8*	5.8 *1*	av Eβ=754.3 *12*
(1999.4 *22*)	4588.9	1.40 *10*	5.8 *1*	av Eβ=810.6 *12*
(2030.0 *22*)	4558.3	2.98 *15*	5.5 *1*	av Eβ=824.6 *12*
(2073.9 *22*)	4514.4	1.35 *10*	5.9 *1*	av Eβ=845.0 *12*
(2123.5 *22*)	4464.81	4.15 *18*	5.4 *1*	av Eβ=868.1 *12*
(2279.3 *22*)	4309.03	2.36 *13*	5.8 *1*	av Eβ=941.0 *12*
(2323.7 *23*)	4264.6	2.16 *12*	5.9 *1*	av Eβ=961.9 *13*
(2526.9 *22*)	4061.42	1.41 *10*	6.2 *1*	av Eβ=1057.7 *12*
(2586.7 *22*)	4001.60	0.74 *7*	6.5 *1*	av Eβ=1086.0 *12*
(2684.4 *22*)	3903.9	0.57 *6*	6.7 *1*	av Eβ=1132.3 *12*
(2740.0 *23*)	3848.3	4.9 *1*	5.8 *1*	av Eβ=1158.7 *13*
(2800.0 *22*)	3788.28	3.25 *15*	6.0 *1*	av Eβ=1187.2 *12*
(2989.2 *22*)	3599.12	1.03 *7*	6.7 *1*	av Eβ=1277.3 *12*
(3111.6 *22*)	3476.68	6.1 *3*	6.0 *1*	av Eβ=1335.9 *12*
(3246.5 *22*)	3341.8	0.94 *7*	6.9 *1*	av Eβ=1400.4 *13*
				Log *ft*: unrealistically low for a ΔJ=3 transition.
(3550.0 *22*)	3038.30	58 *3*	5.2 *1*	av Eβ=1546.2 *12*
(3693.3 *22*)	2895.03	1.4 *5*	6.9 *1*	av Eβ=1615.2 *12*

[†] From an intensity balance at each level, by evaluators.
[‡] Absolute intensity per 100 decays.

$\gamma(^{70}Zn)$

Iγ normalization: From Σ(I(γ+ce) to g.s.)=100. No ground state β feeding is expected since ΔJ=6.

E$_\gamma$[†]	I$_\gamma$[†#]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	α	Comments
438.2 *2*	1.40 *6*	3476.68		3038.30	5$^-$			
560.82 *8*	1.03 *7*	3599.12		3038.30	5$^-$			
584.7 *1*	0.83 *7*	4061.42	(5,6,7$^-$)	3476.68				
750.0 *2*	1.25 *8*	3788.28		3038.30	5$^-$			
783.1 *2*	0.49 *6*	3476.68		2693.24	4$^+$			
884.88 *9*	100.0 *4*	884.89	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* I$_\gamma$: other: 100 *5* (1971Ta03).
893.1 *6*	2.00 *9*	3788.28		2895.03	(6$^+$)			
901.7 *1*	99.7 *4*	1786.62	4$^+$	884.89	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* I$_\gamma$: other: 87 *4* (1971Ta03).
906.5 *1*	0.24 *3*	2693.24	4$^+$	1786.62	4$^+$			
963.3 *1*	0.74 *7*	4001.60	(5,6,7$^-$)	3038.30	5$^-$			
988.0 *3*	0.72 *7*	4464.81	(5,6,7$^-$)	3476.68				
1023.3 *2*	0.58 *6*	4061.42	(5,6,7$^-$)	3038.30	5$^-$			
1108.4 *1*	9.3 *1*	2895.03	(6$^+$)	1786.62	4$^+$	[E2]	2.32×10^{-4}	α(K)=0.000207 *3*; α(L)=2.08×10^{-5} *3*; α(M)=2.97×10^{-6} *5*; α(N)=1.193×10^{-7} *17* I$_\gamma$: other: 8 *2* (1971Ta03).
1226.3 *7*	2.16 *9*	4264.6	(5,6,7$^-$)	3038.30	5$^-$			
1251.7 *1*	73.3 *3*	3038.30	5$^-$	1786.62	4$^+$	[E1]	1.68×10^{-4}	α(K)=7.56×10^{-5} *11*; α(L)=7.49×10^{-6} *11*;

Continued on next page (footnotes at end of table)

^{70}Cu β^- decay (44.5 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
								α(M)=1.073×10^{-6} *15*; α(N)=4.34×10^{-8} *6* I_γ: other: 57 *4* (1971Ta03).
1270.8 *2*	1.65 *8*	4309.03	(5,6,7$^-$)	3038.30	5$^-$			I_γ: other: 1.0 *4* (1971Ta03).
1315 *1*	0.57 *6*	4791.7	(5,6,7)	3476.68				
1413.9 *2*	0.71 *7*	4309.03	(5,6,7$^-$)	2895.03	(6$^+$)			
1426.5 *2*	2.6 *1*	4464.81	(5,6,7$^-$)	3038.30	5$^-$			I_γ: other: 3 *1* (1971Ta03).
1476.1 *2*	1.35 *8*	4514.4	(5,6,7$^-$)	3038.30	5$^-$			I_γ: other: 1.3 *9* (1971Ta03).
1520.1 *3*	1.20 *9*	4558.3	(5,6$^+$)	3038.30	5$^-$			I_γ: other: 1.4 *4* (1971Ta03).
1550.6 *3*	1.40 *8*	4588.9	(5,6,7$^-$)	3038.30	5$^-$			
1555.2 *3*	0.94 *7*	3341.8	3$^-$	1786.62	4$^+$	[E1]	3.57×10^{-4}	α(K)=5.24×10^{-5} *8*; α(L)=5.18×10^{-6} *8*; α(M)=7.43×10^{-7} *11*; α(N)=3.01×10^{-8} *5*
1569.8 *2*	0.83 *7*	4464.81	(5,6,7$^-$)	2895.03	(6$^+$)			
1690.3 *2*	6.3 *1*	3476.68		1786.62	4$^+$			I_γ: other: 4.7 *9* (1971Ta03).
1809.1 *5*	0.26 *4*	2693.24	4$^+$	884.89	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*
1815.0 *5*	1.04 *7*	4710.1	(5,6,7)	2895.03	(6$^+$)			
1954.2 *3*	2.8 *1*	4849.2	(5,6$^+$)	2895.03	(6$^+$)			I_γ: other: 2.1 *4* (1971Ta03).
2061.6 *6*	4.9 *1*	3848.3	(5,6$^+$)	1786.62	4$^+$			I_γ: other: 3.7 *9* (1971Ta03).
2117.2 *4*	0.57 *6*	3903.9	(5,6$^+$)	1786.62	4$^+$			
2166.2 *5*	0.50 *5*	5061.3	(5,6,7)	2895.03	(6$^+$)			
2771.2 *6*	1.78 *8*	4558.3	(5,6$^+$)	1786.62	4$^+$			
3062.1 *6*	2.39 *9*	4849.2	(5,6$^+$)	1786.62	4$^+$			I_γ: other: 1.4 *5* (1971Ta03).

† From 2004Va08. Iγ are normalized to Iγ(885γ)=100.
‡ From the Adopted Gammas.
# For absolute intensity per 100 decays, multiply by 1.00 *4*.

^{70}Cu β^- decay (44.5 s) 2004Va08

Decay Scheme

Intensities: I_γ per 100 parent decays