^{72}Ni β^- decay　　　2006Th12

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni	NDS 111,1 (2010)	1-May-2009

Parent: ^{72}Ni: E=0.0; J^π=0$^+$; $T_{1/2}$=1.57 s 5; $Q(\beta^-)$=5557 3; %β^- decay=100.0

^{72}Ni isotope produced by proton induced fission of ^{238}U target with a 30-MeV proton beam at the LISOL facility of Louvain-La-Neuve, Belgium. The fission products were selectively ionized and mass separated.

Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\beta$ coin with four plastic scintillators for β detection with three of them associated with the HPGE γ-ray detectors. Comparisons with shell-model calculations.

^{72}Cu Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
0.0	(2)	6.63 s 3	J^π: assignment from 2006Th12, who also discuss shell-model predictions. $T_{1/2}$: from γ(t) (2006Th12).
137.32 8	(3$^-$)		
376.49 7	(1$^+$)		
451.54 7	(2)		
470.56 9	(1$^+$)		
476.01 10			
673.29 9			
987.31 10			
1517.43 10			
1709.01 21			
1762.22 20			
1894.54 18			
2060.49 8	(1$^+$)		
2196.78 12	(1$^+$)		
2596.8 7			

[†] from least-squares fit to Eγ's.
[‡] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log ft	Comments
(2960 3)	2596.8	0.90 24	5.24 12	av Eβ=1265.0 20
(3360 3)	2196.78	5.3 19	4.71 16	av Eβ=1456.6 20
(3497 3)	2060.49	10.8 12	4.48 5	av Eβ=1522.1 20
(3662 3)	1894.54	2.6 5	5.18 9	av Eβ=1602.0 20
(3795 3)	1762.22	1.5 7	5.49 21	av Eβ=1665.8 20
(3848 3)	1709.01	0.52 15	5.98 13	av Eβ=1691.5 20
(4040[#] 3)	1517.43	<1.9	>5.5	av Eβ=1784.0 20
(4570 3)	987.31	9.0 15	5.07 8	av Eβ=2040.8 20
(4884 3)	673.29	1.9 7	5.88 16	av Eβ=2193.2 20
(5081 3)	476.01	0.82 24	6.32 13	av Eβ=2289.0 20
(5086 3)	470.56	16 6	5.03 17	av Eβ=2291.6 20
(5105 3)	451.54	4.7 16	5.57 15	av Eβ=2300.9 20
(5181 3)	376.49	43 13	4.64 14	av Eβ=2337.4 20
(5420[#] 3)	137.32	<3	>5.9	av Eβ=2453.7 20

[†] Deduced by evaluators from intensity balance, assuming no direct feeding to the g.s. of ^{72}Cu. The values given in 2006Th12 are slightly different in some cases.

^{72}Ni β^- **decay**   **2006Th12 (continued)**

β^- radiations (continued)

‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{72}$Cu)

Iγ normalization: From Σ(I(γ+ce)) of γ's to g.s.=100.

E_γ	I_γ†#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α@	Comments
74.8 *1*	0.9 *3*	451.54	(2)	376.49	(1$^+$)			
94.0 *1*	27 *7*	470.56	(1$^+$)	376.49	(1$^+$)			
137.4 *1*	5 *2*	137.32	(3$^-$)	0.0	(2)	E1	0.0210	α(K)=0.0189 *3*; α(L)=0.00187 *3*; α(M)=0.000262 *4*;
								α(N)=7.65×10^{-6} *11*; α(N+..)=7.65×10^{-6} *11*
202.6 *1*	2.1 *6*	673.29		470.56	(1$^+$)			
297.0 *1*	2.2 *6*	673.29		376.49	(1$^+$)			
314.3 *1*	3.3 *6*	451.54	(2)	137.32	(3$^-$)			
376.4 *1*	100 *16*	376.49	(1$^+$)	0.0	(2)			
451.7 *1*	5 *2*	451.54	(2)	0.0	(2)			
476.0 *1*	1.4 *3*	476.01		0.0	(2)			
987.3 *1*	12 *2*	987.31		0.0	(2)			
1141.3 *5*	<2.2	1517.43		376.49	(1$^+$)			
1332.5 *2*	0.7 *2*	1709.01		376.49	(1$^+$)			
1387.5 *2*	1.8 *4*	2060.49	(1$^+$)	673.29				
1421.8 *9*	<0.6	1894.54		470.56	(1$^+$)			E_γ: poor fit, level-energy difference=1424.0.
1443.4 *9*	>0.5	1894.54		451.54	(2)			
1517.4 *1*	<1.3	1517.43		0.0	(2)			
1518.0 *2*	2.3 *4*	1894.54		376.49	(1$^+$)			
1590.0 *1*	<1.3	2060.49	(1$^+$)	470.56	(1$^+$)			
1684.0 *4*	6 *1*	2060.49	(1$^+$)	376.49	(1$^+$)			
1726.2 *1*	<4.6	2196.78	(1$^+$)	470.56	(1$^+$)			
1745.2 *3*	2.9 *5*	2196.78	(1$^+$)	451.54	(2)			
1762.2 *2*	2 *1*	1762.22		0.0	(2)			
1820.2 *7*	1.9 *8*	2196.78	(1$^+$)	376.49	(1$^+$)			
1895.0 *4*	0.9 *4*	1894.54		0.0	(2)			
2060.3 *1*	6 *1*	2060.49	(1$^+$)	0.0	(2)			
2120 *1*	0.3 *1*	2596.8		476.01				
2221 *1*	0.9 *3*	2596.8		376.49	(1$^+$)			

† Deduced from β-gated γ spectra.
‡ From Adopted Gammas.
# For absolute intensity per 100 decays, multiply by 0.75 *12*.
@ 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.

^{72}Ni β^- **decay**   **2006Th12**

Decay Scheme

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

Legend

→	$I_\gamma < 2\% \times I_\gamma^{max}$
→	$I_\gamma < 10\% \times I_\gamma^{max}$
→	$I_\gamma > 10\% \times I_\gamma^{max}$
●	Coincidence

$^{72}_{28}$Ni$_{44}$

$^{72}_{29}$Cu$_{43}$