^{71}Ni β^- decay (2.56 s) 2001Fr21,2021Pe08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 188,1 (2023)	17-Jan-2023

Parent: ^{71}Ni: E=0.0; J$^\pi$=(9/2$^+$); $T_{1/2}$=2.56 s *3*; Q(β^-)=7304.9 *27*; %β^- decay=100

^{71}Ni-J$^\pi$,$T_{1/2}$: From the Adopted Levels.

^{71}Ni-Q(β^-): From 2021Wa16.

2001Fr21 (also 1998Fr15): Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$-coin. ^{71}Ni obtained from fission of ^{238}U by 30-MeV protons followed by mass separation using LISE-3 separator at GANIL facility.

2021Pe08: ^{71}Ni produced in ^{9}Be(^{86}Kr,X),E=140 MeV/nucleon fragmentation reaction, followed by separation of ^{71}Ni ions using A1900 fragment separator, with specific mass and charge of implanted nuclei determined from the time-of-flight and energy deposit analysis at NSCL-MSU facility. Measured Eβ, Iβ, Eγ, Iγ, (implants)β-correlations, half-life of the decay of ^{71}Ni g.s., and total absorption γ spectrum (TAGS) using SuN detector (a Summing NaI(Tl) detector). Deduced B(GT) distribution. Comparison with shell-model and quasi-particle random-phase approximation (QRPA) calculations.

Additional information 1.

^{71}Cu Levels

E(level)†	J$^\pi$#	$T_{1/2}$#	E(level)†
0.0	3/2$^{(-)}$	19.4 s *16*	310×10^1‡ *5*
534.44 *7*	(5/2$^-$)		322×10^1‡ *5*
981.32 *8*	(7/2$^-$)	14 ps *6*	326×10^1‡ *5*
1189.46 *8*	(7/2$^-$)	1.15 ps *13*	330×10^1‡ *5*
1453.31 *11*	(9/2$^-$)		346×10^1‡ *5*
1786.30 *11*	(9/2$^-$)		362×10^1‡ *5*
1845.75 *13*	(7/2$^-$,9/2$^-$)		370×10^1‡ *5*
1895.16 *22*	(7/2$^-$)		390×10^1‡ *5*
1973.51 *15*	(11/2$^-$)		410×10^1‡ *5*
2128.65 *15*	(11/2$^-$)		430×10^1‡ *5*
2289.97? *14*			450×10^1‡ *5*
2551.5 *10*	(7/2$^+$)		460×10^1‡ *5*
2599.84 *11*			480×10^1‡ *5*
2686.51 *14*			490×10^1‡ *5*
2751.12 *23*			530×10^1‡ *5*
2805.90 *12*	(7/2$^+$,9/2$^+$,11/2$^+$)		540×10^1‡ *5*
2867.2 *8*	(7/2$^+$,9/2$^+$)		560×10^1‡ *5*
2925.21 *23*	(7/2$^+$,9/2$^+$,11/2$^+$)		600×10^1‡ *5*
3034.59 *12*	(7/2$^+$,9/2$^+$,11/2$^+$)		

† From a least-squares fit to Eγ data, for levels up to 3035 keV. Above this energy, energies are for pseudo-levels from TAGS measurement.

‡ Pseudo-level from total absorption gamma spectrum (TAGS) measurement. Uncertainty of 50 keV is assumed by evaluators, based on approximate bin size of TAGS spectrum.

\# From the Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†#	Comments
(1.31×10^3@ *5*)	6000	<1.8	Iβ^-: 0.6 *12* (2021Pe08).
(1.71×10^3 *5*)	5600	1.9 *9*	
(1.91×10^3@ *5*)	5400	<1.8	Iβ^-: 0.3 *15* (2021Pe08).
(2.01×10^3 *5*)	5300	2.7 *12*	

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β^- radiations (continued)

E(decay)	E(level)	Iβ^- [†#]	Log *ft*	Comments
(2.41×10^3 *5*)	4900	1.2 *9*		
(2.51×10^3 *5*)	4800	2.4 *9*		
(2.71×10^3 *5*)	4600	2.7 *10*		
(2.81×10^3 *5*)	4500	2.2 *9*		
(3.01×10^3 *5*)	4300	2.8 *7*		
(3.21×10^3 *5*)	4100	5.7 *10*		
(3.41×10^3 *5*)	3900	8.1 *13*		
(3.61×10^3 *5*)	3700	4.5 *12*		
(3.69×10^3 *5*)	3620	2.4 *12*		
(3.85×10^3 *5*)	3460	6.7 *13*		
(4.01×10^3 *5*)	3300	3.3 *21*		
(4.05×10^3 [@] *5*)	3260	<4.6		Iβ^-: 1.8 *28* (2021Pe08).
(4.09×10^3 *5*)	3220	3.3 *19*		
(4.21×10^3 *5*)	3100	5.1 *13*		
(4270.3 *27*)	3034.59	8.7 *16*	5.2 *1*	av Eβ=1895.7 *13*
(4379.7 *27*)	2925.21	3.1 *9*	5.7 *1*	av Eβ=1948.7 *14*
(4437.7 *28*)	2867.2	5.2 *10*	5.5 *1*	av Eβ=1976.8 *14*
(4499.0 *27*)	2805.90	10.0 *16*	5.2 *1*	av Eβ=2006.5 *14*
(4553.8 [@] *27*)	2751.12	‡		av Eβ=2033.1 *16*
(4618.4 [@] *27*)	2686.51	‡		av Eβ=2064.4 *16*
(4705.1 *27*)	2599.84	3.1 *7*	5.8 *1*	av Eβ=2106.5 *14*
(4753.4 *29*)	2551.5	8.3 *13*	5.4 *1*	av Eβ=2129.9 *14*
(5014.9 *27*)	2289.97?	0.9 *4*	6.5 *2*	av Eβ=2256.9 *14*
(5176.3 [@] *27*)	2128.65	‡		av Eβ=2335.3 *16*
(5331.4 [@] *27*)	1973.51	‡		av Eβ=2410.8 *16*
(5409.7 [@] *27*)	1895.16	<0.5	>6.9	av Eβ=2448.9 *14* Iβ^-: 0.1 *4* (2021Pe08).
(5459.2 [@] *27*)	1845.75	‡		av Eβ=2472.9 *16*
(5518.6 [@] *27*)	1786.30	‡		av Eβ=2501.8 *16*
(5851.6 [@] *27*)	1453.31	‡		av Eβ=2663.9 *16*
(6115.4 [@] *27*)	1189.46	‡		av Eβ=2792.4 *16*
(6323.6 [@] *27*)	981.32	<0.4	>7.3	av Eβ=2893.8 *14* Iβ^-: 0.1 *3* (2021Pe08).
(6770.5 *27*)	534.44	2.5 *4*	8.7^{1u} *1*	av Eβ=3113.3 *14*

† From total absorption gamma spectrum (TAGS) measurement (2021Pe08).
‡ 2021Pe08 mentioned in their Table II, that Iβ feedings below 0.001% were omitted, implying that this level is not fed significantly through a β transition.
\# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

γ(^{71}Cu)

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

Continued on next page (footnotes at end of table)

$^{71}Ni\ \beta^-$ decay (2.56 s) **2001Fr21,2021Pe08** (continued)

$\gamma(^{71}Cu)$ (continued)

E_γ	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f
161.4 *1*	2.9 *6*	2289.97?		2128.65	(11/2$^-$)
206.1 *1*	2.5 *6*	2805.90	(7/2$^+$,9/2$^+$,11/2$^+$)	2599.84	
348.1 *1*	3.2 *6*	3034.59	(7/2$^+$,9/2$^+$,11/2$^+$)	2686.51	
446.9 *1*	9.7 *7*	981.32	(7/2$^-$)	534.44	(5/2$^-$)
472.0 *1*	22.5 *9*	1453.31	(9/2$^-$)	981.32	(7/2$^-$)
520.2 *1*	2.7 *6*	1973.51	(11/2$^-$)	1453.31	(9/2$^-$)
534.4 *1*	100.0	534.44	(5/2$^-$)	0.0	3/2$^{(-)}$
655.1 *1*	3.2 *6*	1189.46	(7/2$^-$)	534.44	(5/2$^-$)
705.7 *2*	1.8 *6*	1895.16	(7/2$^-$)	1189.46	(7/2$^-$)
744.7 *1*	2.2 *6*	3034.59	(7/2$^+$,9/2$^+$,11/2$^+$)	2289.97?	
939.5 *2*	4.6 *7*	2128.65	(11/2$^-$)	1189.46	(7/2$^-$)
981.3 *1*	32.1 *10*	981.32	(7/2$^-$)	0.0	3/2$^{(-)}$
1019.0 *3*	8.2 *7*	2805.90	(7/2$^+$,9/2$^+$,11/2$^+$)	1786.30	(9/2$^-$)
1138.9 *2*	2.5 *8*	2925.21	(7/2$^+$,9/2$^+$,11/2$^+$)	1786.30	(9/2$^-$)
1189.5 *1*	33.4 *10*	1189.46	(7/2$^-$)	0.0	3/2$^{(-)}$
1248.2 *1*	11.7 *13*	3034.59	(7/2$^+$,9/2$^+$,11/2$^+$)	1786.30	(9/2$^-$)
1251.7 *1*	36.1 *10*	1786.30	(9/2$^-$)	534.44	(5/2$^-$)
1297.8 *2*	1.4 *5*	2751.12		1453.31	(9/2$^-$)
1311.3 *1*	4.9 *10*	1845.75	(7/2$^-$,9/2$^-$)	534.44	(5/2$^-$)
1352.6 *1*	9.8 *9*	2805.90	(7/2$^+$,9/2$^+$,11/2$^+$)	1453.31	(9/2$^-$)
1410.4 *1*	10.0 *10*	2599.84		1189.46	(7/2$^-$)
1497.1 *2*	6.6 *10*	2686.51		1189.46	(7/2$^-$)
1581.0 *4*	3.6 *8*	3034.59	(7/2$^+$,9/2$^+$,11/2$^+$)	1453.31	(9/2$^-$)
1885.9 *8*	7.7 *9*	2867.2	(7/2$^+$,9/2$^+$)	981.32	(7/2$^-$)
2017.0 *10*	36.7 *14*	2551.5	(7/2$^+$)	534.44	(5/2$^-$)

[†] For absolute intensity per 100 decays, multiply by ≈0.60.

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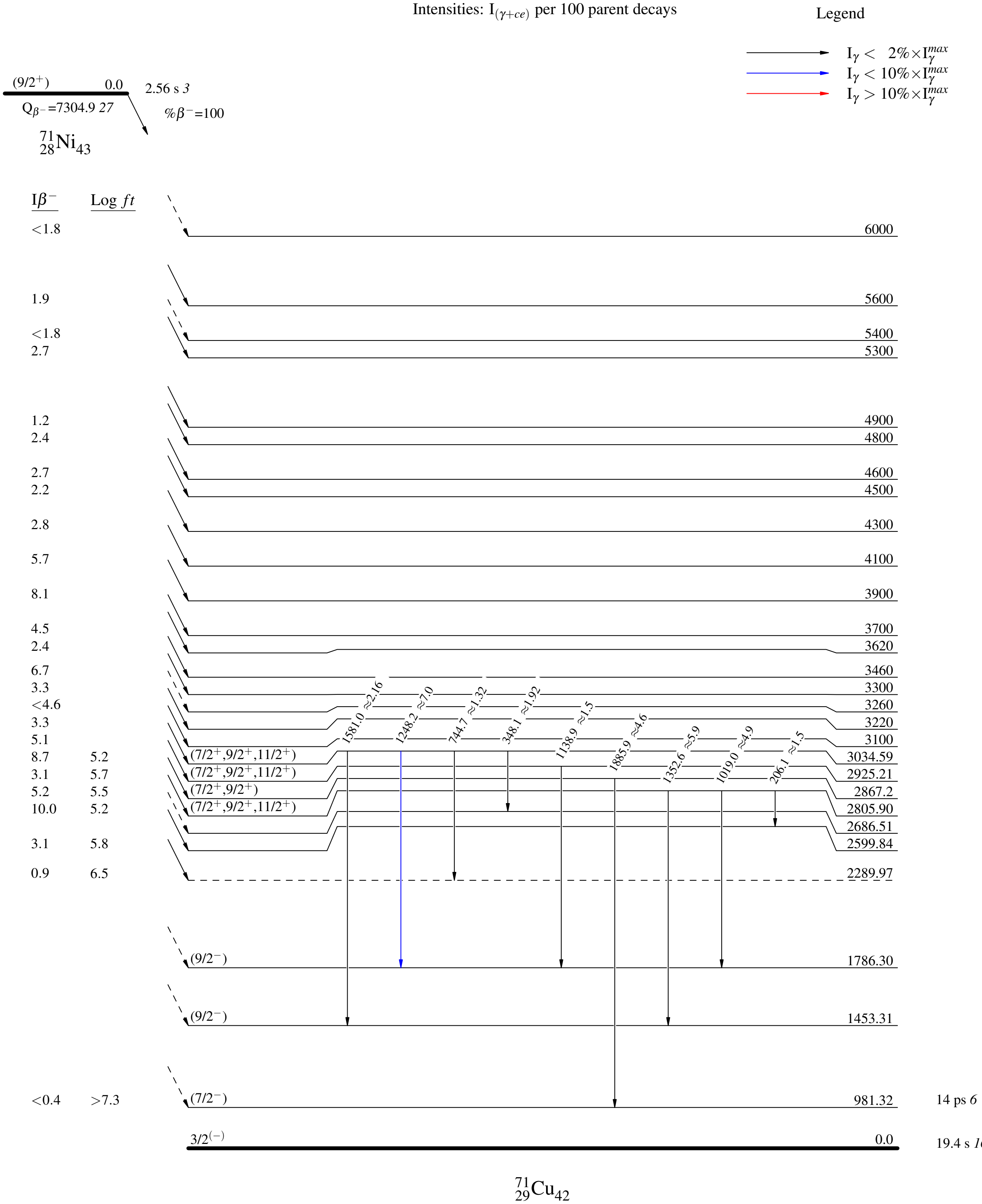
Decay Scheme

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



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Decay Scheme (continued)

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