^{76}Ni IT decay (547.8 ns) 2012Ka36,2014Ra20,2015So23

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jun Chen and Ameenah R. Farhan	NDS 194,3 (2024)	8-Jan-2024

Parent: ^{76}Ni: E=2418.6 *9*; $J^\pi=(8^+)$; $T_{1/2}$=547.8 ns *33*; %IT decay=100

2015So23: measured half-life of (8^+) isomer by γ(t).

2012Ka36: ^{76}Ni isomer produced in ^{9}Be(^{238}U,X) at 345 MeV/nucleon using BigRIPS separator at RIKEN facility. Measured delayed γ rays and isomer half-life. Total of 11000 ^{76}Ni fragments detected.

2014Ra20: ^{76}Ni isotope produced in fragmentation of ^{86}Kr beam in a ^{9}Be target at E=140 MeV/nucleon. Reaction products selected according to their momentum over charge ratio using the A1900 spectrometer at NSCL-MSU facility. Measured Eγ, Iγ, $\gamma\gamma$, γ-fragment coin, with the NSCL beta-counting system, Si strip detector used for particle detection and Ge detectors for γ rays.

2005Ma59 (also 2005Gr29): ^{76}Ni isomer produced in the fragmentation of ^{86}Kr beam on ^{9}Be target at E=140 MeV/nucleon. Reaction products selected according to their momentum/charge ratio using the A1900 spectrometer of the National Superconducting Cyclotron Laboratory (NSCL). Measured Eγ, Iγ, $\gamma\gamma$, γ(fragment) coin, time-of-flight and ΔE with the NSCL double-sided Si strip detector (DSSD) and the SeGA array of Ge detectors. Total of 1315 fragments of ^{76}Ni detected.

2004Sa13: ^{76}Ni isomer produced in the fragmentation of ^{86}Kr beam on Ta target at E=58 MeV/nucleon at GANIL. Measured Eγ, Iγ, (particle)γ coin, deduced half-life of the isomer in ^{76}Ni.

Additional information 1.

^{76}Ni Levels

E(level)	J^π[†]	$T_{1/2}$	Comments
0.0[‡]	0^+		
990.3[‡] *5*	(2^+)		
1920.4[‡] *7*	(4^+)		
2276.0[‡] *8*	(6^+)		
2418.6[‡] *9*	(8^+)	547.8 ns *33*	Configuration=$\nu g^2_{9/2}$ (2004Sa13). E(level): 2418.2 *5* in the Adopted Levels. $T_{1/2}$: from γ(t) method, weighted average of values from the four transitions (2015So23). Previous (less precise) measurements: 636 ns *90* (2014Ra20), 409 ns *+58−50* (2012Ka36); 0.59 μs *+18−11* (2005Ma59); 0.24 μs *8* (2004Sa13). Weighted average of above values, except seemingly discrepant result from 2004Sa13, is 547.4 ns *52*.

[†] Comparisons with shell-model calculations (2005Ma59).

[‡] Band(A): Yrast band. No experimental evidence (in 2005Ma59) for the existence of expected 12^+ or 14^+ isomers.

γ(^{76}Ni)

Eγ[†]	Iγ[‡#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[@]	Comments
142.6 *3*	76 *22*	2418.6	(8^+)	2276.0	(6^+)	[E2]	0.148 *3*	α(K)=0.131 *3*; α(L)=0.0141 *3*; α(M)=0.00197 *4*; α(N)=7.32×10^{-5} *14* B(E2)(W.u.)=1.01 *14*
355.6 *4*	99 *29*	2276.0	(6^+)	1920.4	(4^+)			Iγ: 54 *25* in 2005Ma59.
930.1 *5*	96 *31*	1920.4	(4^+)	990.3	(2^+)			
990.3 *5*	100	990.3	(2^+)	0.0	0^+			

[†] Weighted average of values from 2014Ra20 and 2012Ka36, energy uncertainty of 0.5 keV in 2012Ka36 is mainly systematic, while the statistical uncertainty is much smaller. Evaluators assume that 2014Ra20 have included systematic uncertainties.

[‡] From 2014Ra20. Values in 2005Ma59 are nearly the same, except as noted.

[#] Absolute intensity per 100 decays.

Continued on next page (footnotes at end of table)

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$\gamma(^{76}Ni)$ (continued)

[@] 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.

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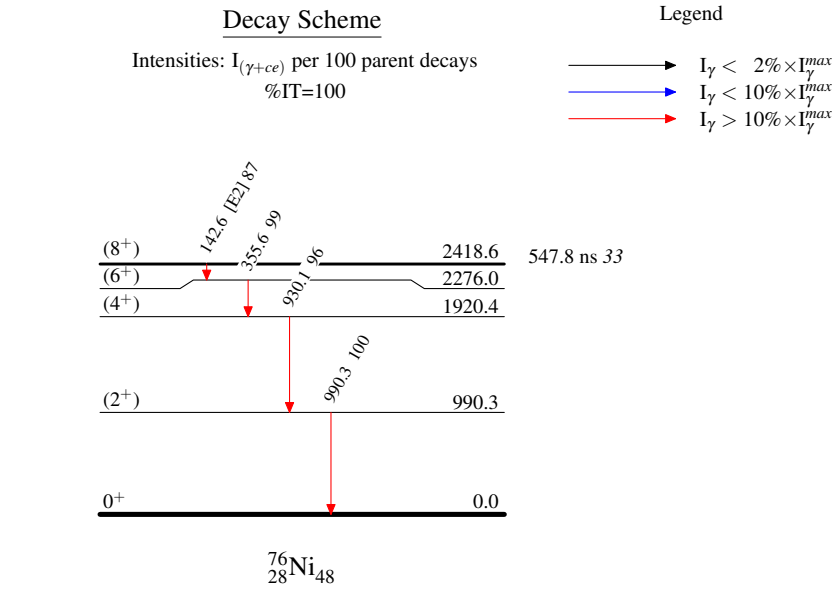

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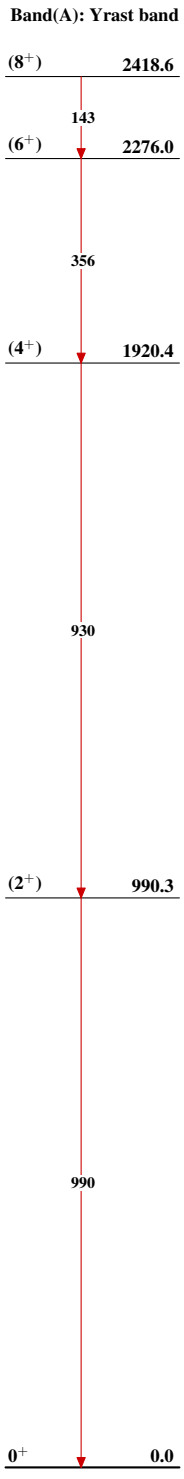

$^{76}_{28}Ni_{48}$