Adopted Levels, Gammas

History

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

Q(β^-)=8790 *syst*; S(n)=6020 *syst*; S(p)=18920 *syst*; Q(α)=−15370 *syst*   2021Wa16

Estimated uncertainties (2021Wa16): 300 for Q(β^-), 360 for S(n), 500 for S(p), 580 for Q(α).

Q(β^-n)=4210 *300*, S(2n)=9630 *360*, S(2p)=36110 *580* (syst,2021Wa16).

1987Ar21: some evidence of ^{76}Ni production from mass separation of fission products from ^{235}U(n,F).

1995En07: ^{76}Ni production in ^{9}Be(^{238}U,F) E=750 MeV/nucleon; fragment recoil separator at GSI facility, time-of-flight and energy loss measurements of fission products. Cross section for production=14 nb.

1998Am04: ^{76}Ni produced by fragmentation of ^{86}Kr beam at 500 MeV/nucleon and identified by mass and time-of-flight measurements at GSI facility.

2005Ho08: fragmentation of ^{86}Kr^{34+} beam at 140 MeV/nucleon on Be target at Coupled cyclotron facility at NSCL, A1900 fragment separator. Measured half-life.

2010Ho12: ^{9}Be(^{86}Kr,X) E=140 MeV/nucleon; fully-ionized ^{86}Kr beam, A1900 fragment separator at NSCL facility using Bρ-ΔE-Bρ method. After separation, the mixed beam was implanted into the NSCL β-counting system (BCS) consisting of stacks of Si PIN detectors, a double-sided Si strip detector (DSSD) for implantation of ions, and six single-sided Si strip detectors (SSSD) followed by two Si PIN diodes. The identification of each implanted event was made from energy loss, time-of-flight information and magnetic rigidity. The implantation detector measured time and position of ion implantations and β decays. Neutrons were detected with NERO detector. Measured β- and βn-correlated events with ion implants; half-life of ^{76}Ni and delayed-neutron emission probability. This work is from the same group as 2005Ho08.

2014Xu07 (also 2014XuZZ): ^{76}Ni produced in ^{9}Be(^{238}U,X), E=345 MeV/nucleon at RIBF-RIKEN facility. Identification of ^{76}Ni nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments using BigRIPS fragment separator. Measured heavy fragment, β and γ spectra using wide-range active silicon strip stopper array (WAS3ABi) for beta and ion detection, and EUROBALL-RIKEN Cluster array for γ detection. Decay curves were obtained from time differences between implantation and correlated β decays.

Additional information 1.

2023Li18, 2014Ts02, 2010Is04, 2006An27, 2003La05: theoretical structure calculations for even-A Ni isotopes.

Theoretical calculations: 85 primary references for structure and 17 for decay characteristics retrieved from the NSR database (www.nndc.bnl.gov/nsr/) are listed in this dataset under 'document' records.

^{76}Ni Levels

Cross Reference (XREF) Flags

A	^{76}Co β^- decay (16 ms)
B	^{76}Co β^- decay (21.7 ms)
C	^{76}Ni IT decay (547.8 ns)
D	^{1}H(^{77}Cu,2pγ)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	XREF	Comments
0.0[#]	0$^+$	234.7 ms *27*	ABCD	%β^-=100; %β^-n=14.0 *36* (2010Ho12) A total of 1441 implants were detected, and 43 correlated βn coincidences were observed (2010Ho12). T$_{1/2}$: weighted average of 234.6 ms *27* (2014Xu07, from $\beta\gamma$-coin decay curve) and 238 ms *18* (2010Ho12,2005Ho08, from measurement of time sequence of decay events correlated with the implanted ^{76}Ni nuclei in Si detectors; maximum likelihood analysis with input parameters of β-detection efficiency, background, half-lives of daughter and granddaughter nuclei, and experimental or theoretical values of %β^-n of all nuclei involved). Other: 0.24 s *+55−19* (1998Am04).
990.15[#] *25*	(2$^+$)		ABCD	J$^{\pi}$: systematics of even-even nuclides.
1920.2[#] *4*	(4$^+$)		BCD	

Adopted Levels, Gammas (continued)

^{76}Ni Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	XREF	Comments
2275.6[#] 5	(6$^+$)		BC	
2418.2[#] 5	(8$^+$)	547.8 ns 33	BC	%IT=100
				Configuration=νg$^2_{9/2}$ (2004Sa13).
				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 all the above values, except the seemingly discrepant result from 2004Sa13, is 547.4 ns *52*, in agreement with the result taken from 2015So23 only.
2994.7? 5	(0$^+$,2$^+$)		A	
3431? *50*			D	
3828? *69*			D	
4147 *35*	(4$^+$,5$^+$)		D	J$^{\pi}$: from shell-model predictions (2019El02).

† From Eγ values.
‡ From comparison with shell-model calculations (2005Ma59,2015So23), and systematics of even-even nuclei in this mass region.
# Band(A): Yrast band.

γ(^{76}Ni)

E$_i$(level)	J$^{\pi}_i$	E$_\gamma$	I$_\gamma$	E$_f$	J$^{\pi}_f$	Mult.	α[#]	Comments
990.15	(2$^+$)	990.14[†] *25*	100	0.0	0$^+$			
1920.2	(4$^+$)	930.00[†] *25*	100	990.15	(2$^+$)			
2275.6	(6$^+$)	355.43[†] *25*	100	1920.2	(4$^+$)			
2418.2	(8$^+$)	142.58[†] *25*	100	2275.6	(6$^+$)	[E2]	0.1482	B(E2)(W.u.)=1.01 *14* α(K)=0.1319 *21*; α(L)=0.01417 *23*; α(M)=0.00197 *3*; α(N)=7.34×10^{-5} *12*
2994.7?	(0$^+$,2$^+$)	2004.5[@] *4*		990.15	(2$^+$)			E$_\gamma$: from ^{76}Co β^- decay (16 ms).
3431?		2441[‡@] *50*	100	990.15	(2$^+$)			
3828?		2838[‡@] *69*	100	990.15	(2$^+$)			
4147	(4$^+$,5$^+$)	2227[‡] *35*	100	1920.2	(4$^+$)			

† Weighted averages of values from ^{76}Co β^- decay (21.7 ms) and ^{76}Ni IT decay (547.8 ns).
‡ From ^{1}H(^{77}Cu,2pγ) (2019El02).
# 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.
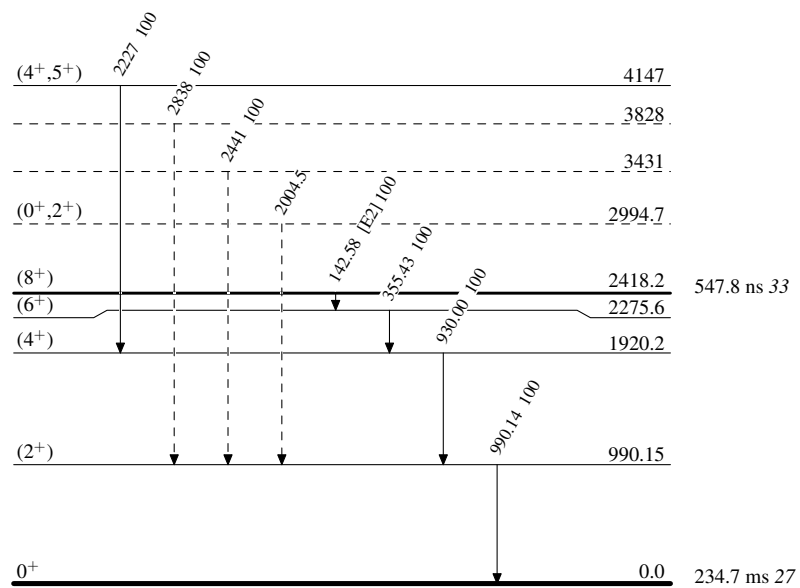@ Placement of transition in the level scheme is uncertain.

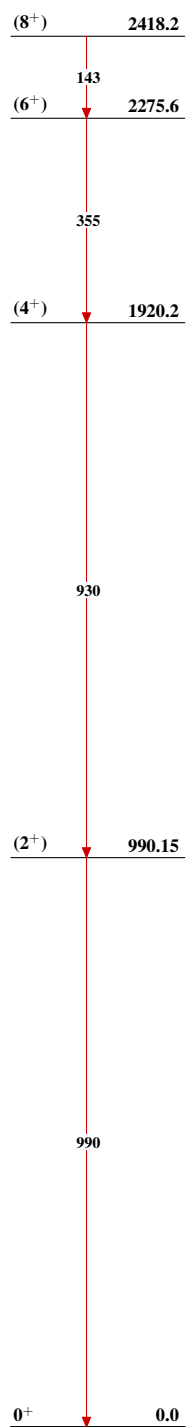**Adopted Levels, Gammas**   Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - ▶ γ Decay (Uncertain)

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

Adopted Levels, Gammas

Band(A): Yrast band

(8$^+$)   2418.2

143

(6$^+$)   2275.6

355

(4$^+$)   1920.2

930

(2$^+$)   990.15

990

0$^+$ 0.0

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