Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	31-Mar-2017

Q(β^-)=7550 *SY*; S(n)=6420 *SY*; S(p)=18330 *SY*; Q(α)=−14370 *SY* 2017Wa10

Estimated $\Delta Q(\beta^-)=\Delta S(n)=200$, $\Delta S(p)=\Delta Q(\alpha)=450$ (2017Wa10).

S(2n)=10370 *200*, S(2p)=34600 *540*, Q(β^-n)=2460 *200* (syst,2017Wa10).

^{74}Ni identified by 1987Ar21 and 1990Be13 in ^{235}U(n,F) reaction at E=thermal reaction. 1998Am04 used ^{9}Be(^{86}Kr,X) at 500 MeV/nucleon to produce ^{74}Ni and measured half-life. 1998Fr15 (also 2002Kr13, 2001Fr21, 2000Mu10, 1998FrZY): ^{238}U(p,F) at 30 MeV to measure half-life and yield of ^{74}Ni.

2014Xu07: ^{74}Ni nuclide produced in ^{9}Be(^{238}U,F) reaction with a $^{238}U^{86+}$ beam of 345 MeV/nucleon produced by the RIKEN accelerator complex. Identification of ^{74}Ni nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments (ΔE-Bρ-tof method) using BigRIPS fragment separator and ZeroDegree Spectrometer (ZDS) at RIBF-RIKEN facility. Based on A/Q spectrum and Z versus A/Q plot. 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.

2011Es06: mass measurements using time-of-flight at NSCL-MSU, mass excess for ^{74}Ni=−49210 keV *990*.

1999Le68 searched for microsecond isomers in ^{74}Ni using Ni(^{86}Kr,X) reaction at E=60.3 MeV/nucleon, but proved negative; no isomers were found between 50 ns to 100 μs.

Additional information 1.

Nuclear structure (Theory): 2014Ts02, 2012Sr03, 2006An27: levels, J^π, B(E2).

^{74}Ni Levels

Cross Reference (XREF) Flags

- A ^{74}Co β^- decay (31.3 ms)
- B ^{1}H(^{74}Ni,P$'\gamma$)
- C Coulomb excitation

E(level)	J^π	$T_{1/2}$	XREF	Comments
0	0^+	507.7 ms *46*	ABC	%β^-=100; %β^-n=? Theoretical $T_{1/2}$=1.2 s, %β^-n=2.3 (2003Mo09). Theoretical $T_{1/2}$=5.5 s, %β^-n=1.0 (2016Ma12). $T_{1/2}$: from β(implant) correlations (2014Xu07, see detailed analysis of the decay curve on Figs. A.66, 67, 68 and Tables A.39, 40, pages 191-193 of 2014XuZZ thesis). Others: 0.9 s *2* (1998Fr15,2001Fr21); 0.54 s *16* (1998Am04); 1.1 s *5* (1990Be13). Weighted average of all the four values is 508.0 ms *61*, however, the most precise value from 2014Xu07 is preferred. Additional information 2. In $\beta\gamma$ and $\gamma\gamma$ studies of ^{74}Ni decay, 1998Fr15 reported two most intense γ rays at 166.1 *1* and 694.3 *2*, forming a cascade. These γ rays feed levels either in ^{74}Cu through β^- decay or in ^{73}Cu through β^-n decay. The latter possibility, however, seems less likely (1998Fr15) since the γ-ray intensities imply %β^-n=30, much higher than the theoretical value of 2.3% (2003Mo09).
1024 *1*	2^+	3.9 ps *+21−10*	ABC	B(E2)↑=0.064 *+22−23* (2014Ma85) J^π: Coulomb excited state. $T_{1/2}$: deduced by evaluator from B(E2) value in 2014Ma85.
1763? *1*	(4^+)		AB	E(level): from β^- decay. Other: 1806 *30* in ^{1}H(^{74}Ni,p$'\gamma$).

Adopted Levels, Gammas (continued)

$\gamma(^{74}Ni)$

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	Comments
1024	2^+	1024 *1*	100	0	0^+	[E2]	B(E2)(W.u.)=6.9 *25*
1763?	(4^+)	739† *1*	100	1024	2^+		E_γ: from β^- decay. Other: 786 *30* in $^1H(^{74}Ni,p'\gamma)$.

† Placement of transition in the level scheme is uncertain.

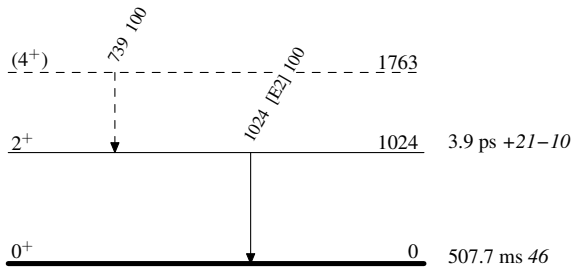
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

Legend

- - - - - - ► γ Decay (Uncertain)



$^{74}_{28}Ni_{46}$