^{39}Ti ε decay (28.5 ms) 2007Do17,2001Gi01,1992Mo15

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 149, 1 (2018)	1-Jan-2018

Parent: ^{39}Ti: E=0; J^π=(3/2$^+$); $T_{1/2}$=28.5 ms *9*; Q(ε)=16370 *SY*; %ε+%β^+ decay=100.0

^{39}Ti-J^π,$T_{1/2}$: From Adopted Levels. $T_{1/2}$ is adopted from 2007Do17, others: 31 ms *+6−4* from 2001Gi01, 26 ms *+8−7* from 1990DE43.

^{39}Ti-Q(ε): 16370 *200* (syst,2017Wa10).

2007Do17: ^{39}Ti was produced in Ni(^{58}Ni,X) reaction at 74.5 MeV/nucleon at GANIL. Measured decay-time distribution, β-delayed proton and γ spectra. Deduced ^{39}Ti half-life, decay branching ratios.

2001Gi01 (also 2001Gi02,2002Ch28): ^{39}Ti source was produced in fragmentation of E=74.5 MeV ^{58}Ni beam from GANIL on a natural Ni target. Fragments were selected with the Alpha spectrometer and the LISE3 separator and implanted into a silicon telescope. Measured delayed protons, decay-time distribution. Deduced parent $T_{1/2}$, IAS for ^{39}Sc.

1992Mo15: ^{39}Ti source was produced in Ca(^{3}He,X) reaction with E=110 MeV ^{3}He beam from the 88-inch cyclotron at Lawrence Berkeley Laboratory on natural Ca target. Charged particles were detected with telescopes of Si detectors. Measured β-delayed two-proton sum spectra. Deduced IAS for ^{39}Sc.

1990De43: ^{39}Ti produced In ^{58}Ni(^{58}Ni,X) reaction At 65 MeV/nucleon at GANIL. Measured β-delayed protons, $T_{1/2}$. No evidence found for delayed two-proton decay.

^{39}Sc is unbound in g.s., it decays by proton emission to ^{38}Ca and two-proton decay to ^{37}K.

The decay scheme is incomplete since most of the observed β-delayed protons are not placed.

^{39}Sc Levels

E(level)	J^π[†]	Comments
0	(7/2$^-$)	
8960 *60*	(3/2$^+$)	E(level): possible IAS from 2001Gi01, deduced from measured delayed-proton energy of 4880 *40* (lab system) by suggesting that this proton group corresponds to the β-delayed two-proton decay of ^{39}Ti to the ground state in ^{37}K via the IAS in ^{39}Sc. However, 2007Do17 consider the placement of this proton group as questionable and conclude that a firm assignment of this proton group needs better and higher statistics data. Other: 8820 *40* (1992Mo15).

[†] From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ [‡]	Iε[‡]	Log *ft*	I($\varepsilon+\beta^+$)[†‡]	Comments
(7410 *SY*)	8960	11 *3*	0.0077 *21*	≈3.4	11 *3*	av Eβ=2993 *30*; εK=0.000629 *18*; εL=6.32×10^{-5} *18*; εM+=1.08×10^{-5} *3* I($\varepsilon+\beta^+$): weighted average of 12.5 *65* for the proton group of 4880 *40* (lab system) in 2001Gi01 and 10 *3* for the proton group of 5170 *30* (c.m. system) in 2007Do17. It is suggested by 2001Gi01 that this proton group corresponds to β-delayed two-proton decay branch and is via the IAS in ^{39}Sc, but this placement is considered as questionable by 2007Do17. Other: 14 (calculated, 1992Mo15).

[†] From measured emission probability of β-delayed two-proton in ^{39}Ti decay. Total emission probabilities of β-delayed protons in ^{39}Ti decay is 100%, mostly by one-proton emission and the two-proton decay mode is expected from theoretical predictions but has not been established yet.

[‡] Absolute intensity per 100 decays.