

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	25-Mar-2019

$Q(\beta^-)=14160$ SY; $S(n)=2090$ SY; $S(p)=19590$ SY; $Q(\alpha)=-11900$ SY [2017Wa10](#)

Estimated uncertainties ([2017Wa10](#)): 980 for $Q(\beta^-)$, 500 for $S(n)$, 640 for $S(p)$, 570 for $Q(\alpha)$.

$Q(\beta^-n)=8820$ 460, $S(2n)=6980$ 450 (syst,[2017Wa10](#)). $S(2p)=38160$ ([1997Mo25](#),theory). $Q(\beta^-2n)=5340$ 430 deduced by evaluator from mass excesses in [2017Wa10](#).

^{61}Sc nuclide has been identified but no information about its decay to ^{61}Ti is available.

[1997Be70](#): ^{61}Ti identified in projectile fission of a 750 MeV/nucleon ^{238}U beam incident on a Be target, followed by fragment separation using FRS at GSI facility. Measured production cross section. Nine events were assigned to ^{61}Ti with corresponding cross section of 2.5 nb.

[2011Da08](#) (also [2002MaZN](#) thesis): ^{61}Ti produced in the fragmentation of 57.8 MeV/nucleon ^{86}Kr beam impinging on 50 mg/cm² thick tantalum target using LISE-2000 spectrometer at GANIL facility. Detector system included a three-element Si-detector telescope containing a double-sided silicon-strip detector (DSSSD) backed by a Si(Li) detector and surrounded by four clover type EXOGAM Ge detectors. Product identified by mass, atomic number, charge, energy loss and time-of-flight methods. Measured half-life.

[2019Wi04](#): two nanosecond isomers and gamma rays identified in this work from $^9\text{Be}(^{238}\text{U},X)$ reaction at RIBF-RIKEN.

A very weak γ ray at 126.2 reported by [2002MaZN](#) was seen in coincidence with heavy ions. This may either be an isomeric transition in ^{61}Ti or a γ ray in ^{61}V emitted by the decay of ^{61}Ti . But a 127.2 γ has also been reported by [2005Ga01](#) in the decay of ^{61}V to ^{61}Cr . The 126 γ seen by [2002MaZN](#) is probably the same as the 125.0 γ by [2019Wi04](#).

Theoretical calculations: [1995Ri05](#) Shell model calculations: predicted spin, binding energy, and mass defect.

Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for four references for structure calculations.

 ^{61}Ti LevelsCross Reference (XREF) Flags

A $^9\text{Be}(^{238}\text{U},X\gamma)$:isomers

E(level)	$J^\pi^\dagger$	$T_{1/2}$	XREF	Comments
0.0	(1/2 ⁻)	15 ms 4	A	$\% \beta^- = 100$; $\% \beta^- n = ?$; $\% \beta^- 2n = ?$ Theoretical $T_{1/2} = 22.2$ ms, $\% \beta^- n = 2.5$, $\% \beta^- 2n = 0.8$ (2003Mo09). Theoretical $T_{1/2} = 19.8$ ms, $\% \beta^- n = 1.3$, $\% \beta^- 2n = 0.4$ (2016Ma12). $T_{1/2}$: from 2011Da08 , based on time correlation between implantation and β -ray events in the DSSSD. Fitting procedure included five parameters: β -detection efficiency, background rate, mother, daughter and granddaughter half-lives.
125.0 5	(5/2 ⁻)	200 ns 28	A	$\%IT = 100$ $T_{1/2}$: from (implants)(125.0 γ) correlated decay curve in $^9\text{Be}(^{238}\text{U},X\gamma)$ (2019Wi04).
700.1 7	(9/2 ⁺)	354 ns 69	A	$\%IT = 100$ $T_{1/2}$: from (implants)(575.1 γ) correlated decay curve in $^9\text{Be}(^{238}\text{U},X\gamma)$ (2019Wi04).

[†] From predictions of large-scale shell-model calculations using LNPS interaction ([2019Wi04](#)). Also shell-model calculations by [1995Ri05](#).

Adopted Levels, Gammas (continued)

$\gamma(^{61}\text{Ti})$								
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	$\alpha^\dagger$	Comments
125.0	(5/2 ⁻)	125.0	5	100	0.0	(1/2 ⁻)	[E2]	0.143 3 B(E2)(W.u.)=5.7 8 The 125.0 γ may be the same as 126 keV 2 reported by 2002MaZN from its coincidence with heavy ions. B(M2)(W.u.)=0.090 18
700.1	(9/2 ⁺)	575.1	5	100	125.0	(5/2 ⁻)	[M2]	

[†] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

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Level Scheme

Intensities: Relative photon branching from each level

