

$^{38}\text{Si} \beta^-$ decay (63 ms) 2017Tr02

Type	Author	History Citation	Literature Cutoff Date
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Parent: ^{38}Si : $E=0$; $J^\pi=0^+$; $T_{1/2}=63$ ms 8; $Q(\beta^-)=1045 \times 10^1$ 13; $\% \beta^-$ decay=100.0

^{38}Si - $T_{1/2}$: From fit to measured decay curve of β -implant correlations (2017Tr02). This value is adopted in Adopted Levels of ^{38}Si .

^{38}Si - $Q(\beta^-)$: 10450 130 (2017Wa10: AME-2016).

^{38}Si - $\% \beta^-$ decay: $\% \beta^- n=25$ 10 for ^{38}Si decay (determined by 2017Tr02), from 100-(summed β feeding to the bound levels in ^{38}P).

2017Tr02: ^{38}Si was produced via $^9\text{Be}(^{48}\text{Ca}, X)$ with $E=140$ MeV/nucleon ^{48}Ca beam from the cyclotron at NSCL on a 795 mg/cm² Be target. Fragments were separated using A1900 fragment separator and implanted into a 16×16 segmented planar Ge double-sided strip detector (GeDSSD) for timing and position of the implanted ions, and subsequent decays. β -delayed γ rays were detected with the SeGA array of 16 segmented Ge detectors. Measured E_γ , I_γ , $\gamma\gamma$ -coin, implant- $\beta(t)$. Deduced levels, J , π , β feedings, $\% \beta^- n$, $\log ft$ values, parent $T_{1/2}$. Comparisons with shell-model calculations.

 ^{38}P Levels

E(level) [†]	J^π [‡]	Comments
0	(2 ⁻)	
1120? 2	(1 ⁺)	
1694 1	1 ⁺	
1874 1	1 ⁺	
3700+x		E(level): $x < Q(\beta^-) - S(n)(^{38}\text{P}) = 6750$ 150, where $S(n) = 3700$ 80 (2017Wa10).

[†] From E_γ values in 2017Tr02.

[‡] Proposed by 2017Tr02 based on shell-model prediction for ground state and allowed β -decay for bound levels. The same assignments were adopted in Adopted Levels.

 β^- radiations

Branching deduced by 2017Tr02 from the net direct feeding to each bound level and the number of total correlated implants (2017Tr02), unless otherwise noted.

E(decay)	E(level)	$I\beta^-$ [‡]	$\log ft$ [†]	Comments
(3×10^3 # 3)	3700+x	25 10		$I\beta^-$: $\% \beta^- n = 25$ 10, from 100-(summed β feeding to the bound levels in ^{38}P) (2017Tr02).
(8.58×10^3 13)	1874	51 8	4.01 10	av $E\beta = 4038$ 65
(8.76×10^3 13)	1694	17 5	4.53 15	av $E\beta = 4127$ 65
(9.33×10^3 13)	1120?	7 4	5.0 3	av $E\beta = 4410$ 65

[†] Deduced by the evaluator using the LOGFT code. Values are nearly the same in 2017Tr02 using a slightly different value of $Q(\beta^-) = 10.50$ MeV 11.

[‡] Absolute intensity per 100 decays.

Estimated for a range of levels.

^{38}Si β^- decay (63 ms) 2017Tr02 (continued) $\gamma(^{38}\text{P})$

I_γ normalization: From % $I(\beta$ feeding to 1874 level)=51.8 and the 1874 level is deexcited only by 1874 γ to ground state.

E_γ †	I_γ †‡	$E_i(\text{level})$	J_i^π	E_f	J_f^π
1120# 2	14.8	1120?	(1 ⁺)	0	(2 ⁻)
1694 I	34.9	1694	1 ⁺	0	(2 ⁻)
1874 I	100	1874	1 ⁺	0	(2 ⁻)

† From 2017Tr02.

‡ For absolute intensity per 100 decays, multiply by 0.518.

Placement of transition in the level scheme is uncertain.

 ^{38}Si β^- decay (63 ms) 2017Tr02Decay Scheme

Intensities: I_γ per 100 parent decays

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - - -→ γ Decay (Uncertain)

