

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	10-Feb-2014

$Q(\beta^-)=8.72\times 10^3$ 29; $S(n)=6.01\times 10^3$ 31; $S(p)=11.13\times 10^3$ 28; $Q(\alpha)=-10.92\times 10^3$ 27 [2012Wa38](#)

$S(2n)=11020$ 270, $S(2p)=30170$ 270, $Q(\beta^-n)=3290$ 270 ([2012Wa38](#)).

[1980Br26](#): ^{53}Sc produced and identified in $^{238}\text{U}(^{56}\text{Fe},X)$ at 8.3 MeV/nucleon at SuperHILAC facility in Berkeley; 19 6 events were assigned to ^{53}Sc , but no half-life was measured.

[1997Li15](#): $\text{Si}(^{53}\text{Sc},X),E=52-69$ MeV/nucleon; measured reaction σ , deduced strong absorption radius; Glauber model.

[1998So03](#): ^{53}Sc produced in $^9\text{Be}(^{65}\text{Cu},X),E=64.5$ MeV/nucleon reaction at GANIL. Measured half-life, E_γ , I_γ . Also [1995SoZX](#) report from the same group.

[2010Cr02](#): ^{53}Sc produced in fragmentation of $E=130$ MeV/nucleon ^{76}Ge beam provided by the NSCL cyclotrons K500 and K1200 at NSCL. Isotopes separated with A1900 fragment separator. Time-of-flight technique. Measured β particles using NSCL Beta Counting System of three Si PIN detectors, a double-sided silicon strip detector and six single sided silicon strip detectors. Detected prompt and delayed γ rays in coin with fragments using 16 Ge detectors of the Segmented Germanium array. Measured half-life of ^{53}Ca by fitting the decay curve of (^{53}Sc) $\beta\gamma$ correlated events. Also [2009Cr03](#) from the same group.

Mass measurements: [2011Es06](#), [1994Se12](#), [1990Tu01](#).

 ^{53}Sc LevelsCross Reference (XREF) Flags

- A ^{53}Ca β^- decay (461 ms)
- B $^9\text{Be}(^{54}\text{Ti},^{53}\text{Sc}\gamma)$
- C $^{48}\text{Ca}(^{238}\text{U},X\gamma)$

E(level)	J^π	$T_{1/2}$	XREF	Comments
0.0	(7/2 ⁻)	2.6 s 4	AB	$\% \beta^- = 100$; $\% \beta^- n = ?$ $T_{1/2}$: from (^{53}Sc) $\beta\gamma$ correlated decay curve (2010Cr02). Other: ≥ 3 s (1998So03 , earlier value of 0.7 s 9 in 1995SoZX). J^π : from systematics. Configuration= $\pi f_{7/2} \otimes \nu p_{3/2}^4$. Theoretical $\% \beta^- n = 0.24$ (1997Mo25).
2109.0 3	(3/2 ⁻)		AB	Most strongly populated excited state, which serves as collector of $\approx 60\%$ of total feeding from higher sd excited states. 2p _{3/2} state.
2283 18	(9/2 ⁻)		C	Configuration= $\pi f_{7/2} \otimes \nu(p_{3/2}^3 p_{1/2})$.
2617 20	(11/2 ⁻)		C	Configuration= $\pi f_{7/2} \otimes \nu(p_{3/2}^2 p_{1/2})$.
3220? 2	(5/2 ⁻)		B	1f _{5/2} state.
3382? 2	(1/2 ⁻)		B	2p _{1/2} state.

 $\gamma(^{53}\text{Sc})$

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
2109.0	(3/2 ⁻)	2109.0 3	100	0.0	(7/2 ⁻)	E_γ : from ^{53}Ca β^- Decay.
2283	(9/2 ⁻)	2283 18		0.0	(7/2 ⁻)	
2617	(11/2 ⁻)	345 [†] 7		2283	(9/2 ⁻)	
		2617 20		0.0	(7/2 ⁻)	
3220?	(5/2 ⁻)	1111 [†] 2		2109.0	(3/2 ⁻)	
3382?	(1/2 ⁻)	1273 [†] 2		2109.0	(3/2 ⁻)	

[†] Placement of transition in the level scheme is uncertain.

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Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)