^{25}Si $\varepsilon+\beta^+$ decay (218.7 ms) 2004Th09,2021Su03,1993Ro06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia, Anagha Chakraborty	NDS 205,1 (2025)	31-May-2025

Parent: ^{25}Si: E=0.0; $J^\pi=(5/2^+)$; $T_{1/2}$=218.7 ms *+10−14*; Q(ε)=12743 *10*; %ε+%β^+ decay=100

^{25}Si-$T_{1/2}$: from ^{25}Si Adopted Levels.

^{25}Si-Q($\varepsilon+\beta^+$): from 2021Wa16.

2004Th09: Source produced by projectile fragmentation of a 95 MeV/A ^{36}Ar beam on a ^{12}C target. Mass separation ΔE(Si)-tof.

2021Su03: ^{25}Si was obtained from ^{9}Be(^{36}Ar,X), E=150 MeV/nucleon, fragmentation reaction. Fragments were separated by A1900 fragment separator; measured Eγ, Iγ, $\gamma\gamma$, and pγ-coin, E(p), I(p) using the Gaseous Detector with Germanium Tagging (GADGET) system of a proton detector and the SeGA array; deduced %Iγ, γ branching ratios, half-life of ^{25}Si. 3×10^7 ions were implanted and studied.

1993Ro06: ^{25}Si was produced from ^{24}Mg(^{3}He,2n), E=40 MeV; measured β-delayed Ep, Ip; deduced levels, spin, parity.

Other references: 1966Re07, 1985Zh05, 1990Ga17, 1992Ha28, 1996Og01.

^{25}Si also decays to ^{24}Mg by εp.

^{25}Al Levels

E(level)†	J^π‡	$T_{1/2}$ or Γ#	Comments
0	$5/2^+$	7.168 s *4*	$T_{1/2}$: from Adopted Levels.
452.1 *7*	$1/2^+$	2.29 ns *5*	
945.1 *6*	$3/2^+$	4.3 ps *11*	
1612.1 *10*	$(7/2)^+$	11 fs *2*	
1789.7 *6*	$5/2^+$	390 fs *+40−30*	
2673.6 *5*	$3/2^+$	4 fs *3*	E(level): others: 2674 *1* (1992Ha28), 2653 *20* (1993Ro06).
3859 *2*	$5/2^+$		E(level): weighted average of 3844 *7* (2004Th09), 3859 *1* (1992Ha28), 3863 *20* (1993Ro06).
4191 *3*	$3/2^+$		E(level): weighted average of 4189 *2* (2004Th09), 4196 *3* (1992Ha28), 4190 *25* (1993Ro06).
4582 *2*	$5/2^+$		E(level): from 2004Th09. Others: 4583 *4* (1992Ha28), 4583 (1993Ro06).
4906 *4*			E(level): from 1992Ha28. Others: 4908 *6* (2004Th09), 4899 *16* (1993Ro06).
5597 *5*	$(3/2,5/2,7/2)^+$	56 keV *20*	E(level): from 1992Ha28. Other: 5597 *6* (2004Th09),
5804 *4*	$(3/2,5/2,7/2)^+$		E(level): weighted average of 5802 *4* (2004Th09), 5809 *7* (1992Ha28), 5805 *10* (1993Ro06).
6092 *25*			E(level): from 1993Ro06.
6123 *7*	$3/2^+$	89 keV *36*	E(level): from 1992Ha28. $J^\pi=5/2^+$ in 1992Ha28, $3/2^+$ in the Adopted Levels. Other: 6131 *16* (1993Ro06).
6170 *2*	$(3/2,5/2,7/2)^+$		E(level): from 2004Th09.
6620 *9*	$3/2^+,5/2^+,7/2^+$		E(level): from 2004Th09.
6651 *7*	$5/2^+$	76 keV *28*	E(level): from 1992Ha28. $J^\pi=(5/2,7/2)^+$ in 1992Ha28. Other: 6660 *15* (1993Ro06).
6877 *8*	$(3/2,5/2,7/2)^+$		E(level): weighted average of 6871 *8* (2004Th09), 6920 *40* (1966Re07), 6883 *10* (1992Ha28), 6877 *15* (1993Ro06). J^π: $3/2^+$ in 1992Ha28.
6982 *15*		147 keV *44*	E(level): from 1993Ro06. Authors list the level as the same level at 7022 in the adopted dataset. The energy is comparable as a doublet of 6944 and 7022 levels. The evaluators list only with the 6909 level, based on closer Γ of the 6944 level.
7108 *3*	$3/2^+$		E(level): weighted average of 7107 *3* (2004Th09), 7112 *10* (1992Ha28), 7112 *8* (1993Ro06). $J^\pi=(3/2,5/2)^+$ in 1992Ha28. Γ=27 keV *5* assuming the presence of 6996 *30* level (6982 *15* − in this data set). The Γ is significantly different compared to Γ=117 keV *4* for an adopted level at 7112 *4*, but closer to Γ=20 keV *6* for the 7150 keV level.
7249 *5*	$5/2^+$		E(level): weighted average of 7255 *7* (2004Th09), 7250 *30* (1966Re07), 7248 *5* (1992Ha28), 7245 *8* (1993Ro06). $J^\pi=(3/2,5/2)^+$ in 1992Ha28.
7434 *20*	$(7/2)^+$		E(level): from 1993Ro06.
7678 *7*	$7/2^-$		E(level): from 2004Th09. Others: 7665 *20* (1993Ro06), 7637 *6* (1992Ha28).

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^{25}Si $\varepsilon+\beta^+$ decay (218.7 ms) 2004Th09,2021Su03,1993Ro06 (continued)

^{25}Al Levels (continued)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$ or Γ[#]	Comments
			J$^\pi$=(3/2,5/2,7/2)$^+$ in 1992Ha28.
7820 *15*			E(level): from 1993Ro06.
7902.7 *22*	5/2$^+$		T=3/2 E(level): others: 7900 *20* (1966Re07), 7901 *2* (1992Ha28), 7896 *6* (1993Ro06), 7892 *2* (2004Th09).
7943 *20*			E(level): from 1993Ro06.
8188 *3*	(3/2,5/2,7/2)$^+$	20 keV *20*	E(level): weighted average of 8193 *6* (2004Th09), 8200 *30* (1966Re07), 8186 *3* (1992Ha28), 8197 *10* (1993Ro06). J$^\pi$: (3/2,5/2,7/2)$^+$ in 1992Ha28.
9068 *7*	(3/2,5/2,7/2)$^+$		E(level): weighted average of 9073 *7* (2004Th09), 8970 *40* (1966Re07), 9065 *10* (1985Zh05), 9065 *10* (1992Ha28). J$^\pi$: (3/2,5/2,7/2)$^+$ in 1992Ha28.
9275 *25*			E(level): from 1985Zh05. Same in 1992Ha28. J$^\pi$: (3/2,5/2,7/2)$^+$ in 1992Ha28.

[†] From a least-squares fit to the γ-ray energies, except where otherwise noted. $\Delta E\gamma$=1 keV assumed, if missing.
[‡] From Adopted Levels.
[#] From 1992Ha28.

ε,β^+ radiations

εK, εL, εM, εN: Additional information 1.
av Eβ: Additional information 2.

E(decay)	E(level)	Iβ^+ [#]	Iε[#]	Log *ft*	I($\varepsilon+\beta^+$)[†#]	Comments
(3468 *27*)	9275	0.012 *4*	2.8×10^{-5} *9*	5.41 *15*	0.012 *4*	av Eβ=1072 *13*; εK=0.00212 *11*; εL=1.75×10^{-4} *9*; εM=2.26×10^{-5} *12* I($\varepsilon+\beta^+$): from 1985Zh05: 0.12(2)*[%I$_p$(4252)= 10.2(32)/100 (2022Ba40)].
(3675 *12*)	9068	0.21 *4*	3.8×10^{-4} *7*	4.33 *8*	0.21[‡] *4*	av Eβ=1170 *6*; εK=0.00167 *5*; εL=1.375×10^{-4} *42*; εM=1.77×10^{-5} *7* I($\varepsilon+\beta^+$): other: 0.07 *2* (1985Zh05 – 0.72(4)*[%I$_p$(4252)=10.2(32)/100 (2022Ba40)]).
(4555 *11*)	8188	1.2 *2*	9.4×10^{-4} *16*	4.13 *7*	1.2[‡] *2*	av Eβ=1589.4 *48*; εK=7.14×10^{-4} *18*; εL=5.89×10^{-5} *15*; εM=7.59×10^{-6} *26*
(4840 *10*)	7902.7	12.9 *8*	0.0080 *5*	3.248 *28*	12.9 *8*	av Eβ=1726.4 *48*; εK=5.68×10^{-4} *14*; εL=4.68×10^{-5} *12*; εM=6.04×10^{-6} *20* I($\varepsilon+\beta^+$): weighted average of 13.4 *16* (2021Su03) and 12.8 *8* (2004Th09).
(5065 *12*)	7678	0.34 *6*	1.78×10^{-4} *32*	4.94 *8*	0.34[‡] *6*	av Eβ=1835 *6*; εK=4.80×10^{-4} *12*; εL=3.96×10^{-5} *10*; εM=5.11×10^{-6} *17*
(5494 *11*)	7249	1.2 *5*	4.7×10^{-4} *20*	4.59 *18*	1.2 *5*	av Eβ=2042 *5*; εK=3.57×10^{-4} *8*; εL=2.95×10^{-5} *7*; εM=3.80×10^{-6} *12* I($\varepsilon+\beta^+$): weighted average of 1.3 *5* (2021Su03) and 1.0 *6* (2004Th09).
(5635 *11*)	7108	3.7 *2*	0.00132 *8*	4.166 *24*	3.7[‡] *2*	av Eβ=2110.8 *49*; εK=3.26×10^{-4} *7*; εL=2.69×10^{-5} *6*; εM=3.47×10^{-6} *11*
(5866 *13*)	6877	0.5 *1*	1.55×10^{-4} *31*	5.13 *9*	0.5[‡] *1*	av Eβ=2223 *6*; εK=2.83×10^{-4} *7*; εL=2.33×10^{-5} *6*; εM=3.01×10^{-6} *10*

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^{25}Si $\varepsilon+\beta^+$ decay (218.7 ms) 2004Th09,2021Su03,1993Ro06 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ #	Iε#	Log *ft*	I($\varepsilon+\beta^+$)†#	Comments
(6123 *14*)	6620	0.16 *7*	4.3×10^{-5} *19*	5.73 *19*	0.16‡ *7*	av Eβ=2348 *6*; εK=2.43×10^{-4} *6*; εL=2.006×10^{-5} *49*; εM=2.59×10^{-6} *8*
(6573 *10*)	6170	0.32 *6*	6.7×10^{-5} *13*	5.60 *8*	0.32‡ *6*	av Eβ=2567.1 *49*; εK=1.902×10^{-4} *41*; εL=1.568×10^{-5} *35*; εM=2.02×10^{-6} *6*
(6939 *11*)	5804	1.7 *2*	2.94×10^{-4} *35*	5.00 *5*	1.7‡ *2*	av Eβ=2746 *5*; εK=1.580×10^{-4} *34*; εL=1.302×10^{-5} *29*; εM=1.68×10^{-6} *5*
(7146 *11*)	5597	0.6 *1*	9.4×10^{-5} *16*	5.53 *7*	0.6‡ *1*	av Eβ=2847 *5*; εK=1.430×10^{-4} *31*; εL=1.179×10^{-5} *26*; εM=1.520×10^{-6} *47*
(7837 *11*)	4906	0.6 *2*	6.9×10^{-5} *23*	5.74 *14*	0.6‡ *2*	av Eβ=3185 *5*; εK=1.049×10^{-4} *22*; εL=8.65×10^{-6} *19*; εM=1.115×10^{-6} *34*
(8161 *10*)	4582	3.2 *3*	3.21×10^{-4} *31*	5.112 *41*	3.2‡ *3*	av Eβ=3344.0 *49*; εK=9.18×10^{-5} *19*; εL=7.57×10^{-6} *16*; εM=9.76×10^{-7} *30*
(8552 *11*)	4191	2.9 *3*	2.50×10^{-4} *26*	5.264 *45*	2.9‡ *3*	av Eβ=3535.9 *49*; εK=7.87×10^{-5} *16*; εL=6.49×10^{-6} *14*; εM=8.37×10^{-7} *25*
(8884 *10*)	3859	0.4 *1*	3.0×10^{-5} *8*	6.21 *11*	0.4‡ *1*	av Eβ=3698.9 *49*; εK=6.96×10^{-5} *14*; εL=5.74×10^{-6} *12*; εM=7.39×10^{-7} *22*
(10069 *10*)	2673.6	4.9 *4*	2.50×10^{-4} *21*	5.414 *36*	4.9 *4*	av Eβ=4281.7 *49*; εK=4.66×10^{-5} *9*; εL=3.84×10^{-6} *8*; εM=4.95×10^{-7} *15* I($\varepsilon+\beta^+$): weighted average of 6.8 *15* (2021Su03) and 4.8 *3* (2004Th09).
(10953 *10*)	1789.7	1.46 *7*	5.71×10^{-5} *29*	6.133 *21*	1.46 *7*	av Eβ=4717.2 *49*; εK=3.58×10^{-5} *7*; εL=2.95×10^{-6} *6*; εM=3.80×10^{-7} *11*
(11131 *10*)	1612.1	15.2 *9*	5.66×10^{-4} *35*	5.152 *26*	15.2 *9*	av Eβ=4804.9 *49*; εK=3.41×10^{-5} *6*; εL=2.81×10^{-6} *6*; εM=3.62×10^{-7} *11* I($\varepsilon+\beta^+$): other: 15 *3* (2004Th09).
(11798 *10*)	945.1	22.6 *7*	7.03×10^{-4} *25*	5.113 *14*	22.6 *7*	av Eβ=5133.8 *49*; εK=2.85×10^{-5} *5*; εL=2.347×10^{-6} *46*; εM=3.02×10^{-7} *9* I($\varepsilon+\beta^+$): other: 26 *4* (2004Th09).
(12743 *10*)	0	21.5 *12*	5.29×10^{-4} *31*	5.310 *24*	21.5 *12*	av Eβ=5600.1 *49*; εK=2.252×10^{-5} *42*; εL=1.856×10^{-6} *36*; εM=2.39×10^{-7} *7* I($\varepsilon+\beta^+$): other: 25 *7* (2004Th09).

† From 2021Su03, except where otherwise noted. In 2021Su03, one new level at 1789.7 and new depopulating gammas are reported for 1789.7, 2673.6, and 7902.7 keV levels, resulted slight variation of the central I_β data for one or more levels, although statistically consistent with the data of 2004Th09. In 2004Th09, for unbound states the I_β feeding intensities are from their I_p measurements. In 2021Su03, for three unbound states at 2673.6, 7240, and 7902.7, the I_β data are from measured I_p and $I\gamma$. The total I_β in 2004Th09 is ΣI_β=100 and 82 *3* in 2021Su03. Combining these data yields ΣI_β=95.6 *21* in this dataset, which is expected to be 100. Additional measurement for I_p of the proton unbound states may resolve this discrepancy.

‡ from 2004Th09.

Absolute intensity per 100 decays.

$\gamma(^{25}Al)$

E_γ †	I_γ#@	E_i(level)	J_i^π	E_f	J_f^π	Comments
452	15.1 *6*	452.1	1/2$^+$	0	5/2$^+$	I_γ: weighted average of 15.0 *6* (2021Su03) and 18.4 *42* (2004Th09).
493	13.6 *5*	945.1	3/2$^+$	452.1	1/2$^+$	I_γ: from 2021Su03. Other: %I_γ=15.3 *34* (2004Th09). Branching ratio from the level=48.4 *16* (2021Su03).
844.6‡ *7*	0.76 *4*	1789.7	5/2$^+$	945.1	3/2$^+$	I_γ: branching ratio from the level=44 *3* (2021Su03).

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^{25}Si $\varepsilon+\beta^+$ decay (218.7 ms) 2004Th09,2021Su03,1993Ro06 (continued)

$\gamma(^{25}Al)$ (continued)

E_γ[†]	I_γ[#@]	E_i(level)	J_i^π	E_f	J_f^π	Comments
883.8[‡] *6*	0.26 *3*	2673.6	$3/2^+$	1789.7	$5/2^+$	I_γ: branching ratio from the level=37 *5* (2021Su03).
945	9.7 *4*	945.1	$3/2^+$	0	$5/2^+$	I_γ: from 2021Su03. Other: $\%I_\gamma$=10.4 *23* (2004Th09). Branching ratio from the level=41.6 *16* (2021Su03).
1337.4[‡] *16*	0.52 *3*	1789.7	$5/2^+$	452.1	$1/2^+$	I_γ: branching ratio from the level=30.6 *20* (2021Su03).
1612	15.3 *9*	1612.1	$(7/2)^+$	0	$5/2^+$	I_γ: from 2021Su03. Other: $\%I_\gamma$=14.7 *32* (2004Th09), corrected for intensity of 1611.7-keV impurity from ^{25}Mg.
1728.3 *8*		2673.6	$3/2^+$	945.1	$3/2^+$	E_γ: from Adopted Gammas.
1789.4[‡] *9*	0.43 *3*	1789.7	$5/2^+$	0	$5/2^+$	I_γ: branching ratio from the level=25.2 *19* (2021Su03).
2221.4[‡] *18*	0.25 *3*	2673.6	$3/2^+$	452.1	$1/2^+$	I_γ: branching ratio from the level=36 *4* (2021Su03).
2673.6[‡] *6*	0.184 *17*	2673.6	$3/2^+$	0	$5/2^+$	I_γ: branching ratio from the level=26 *3* (2021Su03).
6289[‡] *3*	0.086 *20*	7902.7	$5/2^+$	1612.1	$(7/2)^+$	I_γ: branching ratio from the level=36 *10* (2021Su03).
7902[‡] *3*	0.110 *19*	7902.7	$5/2^+$	0	$5/2^+$	I_γ: branching ratio from the level=45 *10* (2021Su03).

[†] From 2004Th09, except where otherwise noted.
[‡] From 2021Su03.
[#] The data of 2021Su03 are more precise but consistent with the data of 2004Th09.
[@] Absolute intensity per 100 decays.

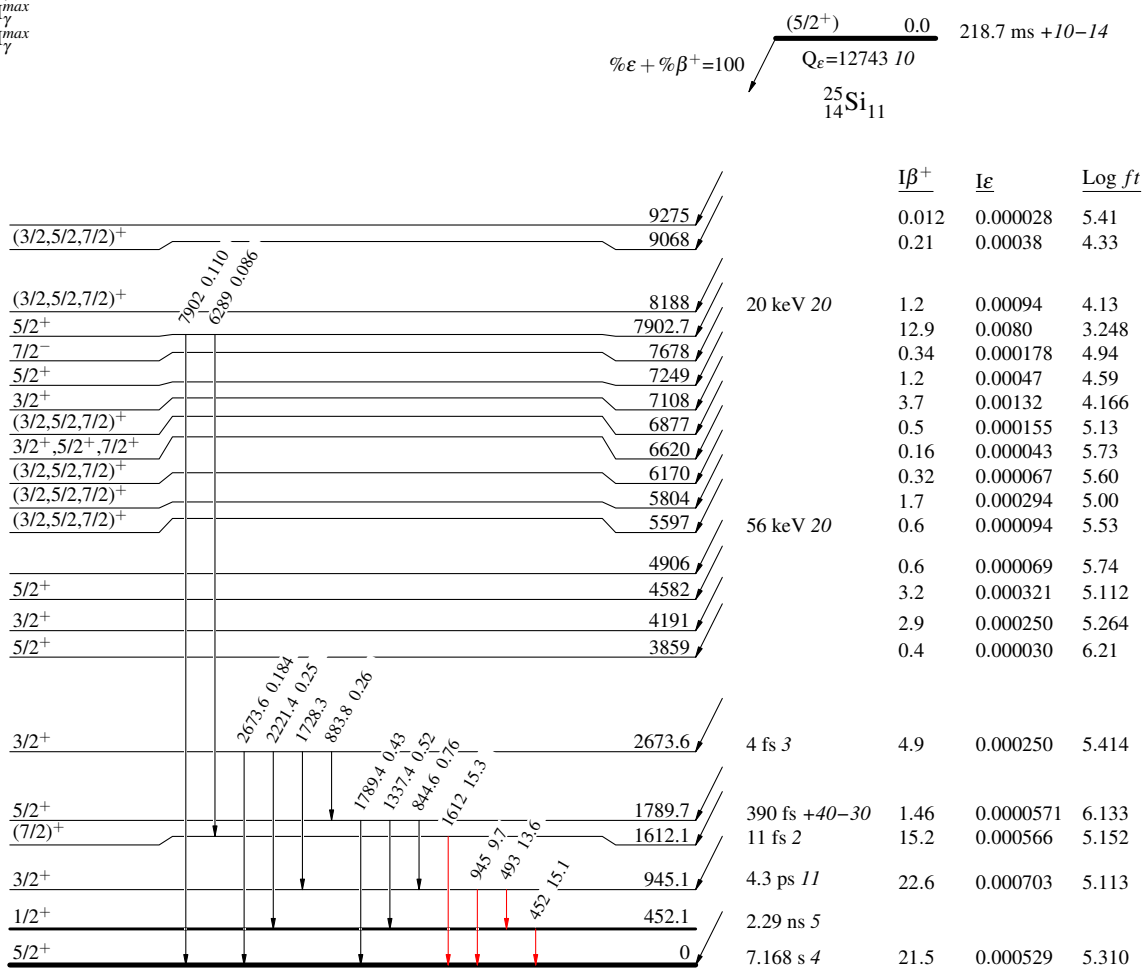
^{25}Si $\varepsilon+\beta^+$ decay (218.7 ms) 2004Th09,2021Su03,1993Ro06

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



	Iβ+	Iε	Log *ft*
9275	0.012	0.000028	5.41
9068	0.21	0.00038	4.33
8188	1.2	0.00094	4.13
7902.7	12.9	0.0080	3.248
7678	0.34	0.000178	4.94
7249	1.2	0.00047	4.59
7108	3.7	0.00132	4.166
6877	0.5	0.000155	5.13
6620	0.16	0.000043	5.73
6170	0.32	0.000067	5.60
5804	1.7	0.000294	5.00
5597	0.6	0.000094	5.53
4906	0.6	0.000069	5.74
4582	3.2	0.000321	5.112
4191	2.9	0.000250	5.264
3859	0.4	0.000030	6.21
2673.6	4.9	0.000250	5.414
1789.7	1.46	0.0000571	6.133
1612.1	15.2	0.000566	5.152
945.1	22.6	0.000703	5.113
452.1			
0	21.5	0.000529	5.310