^{35}Si β^- decay (0.78 s) 1988DuZS,1986Du07,1988DuZT

Parent: ^{35}Si: E=0; J$^\pi$=7/2$^-$; T$_{1/2}$=0.78 s *12*; Q(β^-)=10470 *40*; %β^- decay=100

^{35}Si-J$^\pi$,T$_{1/2}$: From the Adopted Levels of ^{35}Si.

^{35}Si-Q(β^-): From 2021Wa16.

1988DuZS, 1986Du07, 1988DuZT: ^{35}Si produced by fragmentation of ^{40}Ar beam of 2x10^{11} particles/s at 60 MeV/nucleon on a 190 mg/cm^2 Be target at GANIL. Decay observed with a 1 mm thick plastic scintillator and a 174 cm^3 intrinsic Ge detector (1.2% absolute efficiency at 1.33 MeV). Measured $\beta\gamma$(t), Eγ, Iγ. Deduced levels, J, π, parent T$_{1/2}$.

1987Wa10: shell-model calculations for ^{35}Si β^- decay scheme, ^{35}P levels, decay branching ratios, log *ft*, and Gamow-Teller transition strengths.

2007Ne14: measured ^{35}Si ground state g-factor using the β-NMR method.

The decay scheme is considered incomplete due to a large gap of about 4.9 MeV between the highest observed level at E=5561 and Q(β^-) value=10470 *40* (2021Wa16). There may be missing transitions from unobserved levels in the gap.

^{35}P Levels

E(level)†	J$^\pi$‡	T$_{1/2}$‡
0	1/2$^+$	47.3 s *8*
2386.5 *5*	3/2$^+$	<0.69 ps
3859.7 *5*	5/2$^+$	<0.69 ps
4101.2 *5*	(7/2$^-$)	>69 ps
4381.3? *8*	(5/2$^-$)	
4493.5 *6*	(7/2$^-$)	2.29 ps *49*
4869.4 *6*	(5/2$^-$,7/2$^-$)	
4962.4? *7*	(9/2$^-$)	
5560.7 *7*	(5/2$^-$)	

† From a least-squares fit to γ-ray energies.

‡ From the Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*†	Comments
(4.91×10^3 *4*)	5560.7	12.7	4.6	Iβ=12.4 *18* and log *ft*=4.6 from 1988DuZS.
(5.51×10^3 *4*)	4962.4?	5.1	5.2	Placed based on the 4959−>4493 transition observed in ^{208}Pb(^{36}S,Xγ) (2008Wi09) and adopted 468.9Iγ from 1988DuZS to deduce its Iβ.
(5.60×10^3 *4*)	4869.4	10.8	4.9	Iβ=10.8 *16* and log *ft*=4.9 from 1988DuZS.
(5.98×10^3 *4*)	4493.5	16.6	4.9	Iβ=21.4 *11* and log *ft*=4.8 from 1988DuZS. 468.9Iγ feeding this level is deducted from its Iβ.
(6.09×10^3 *4*)	4381.3?	9.7	5.1	Iβ=9.4 *13* and log *ft*=5.1 from 1988DuZS.
(6.37×10^3 *4*)	4101.2	46.1	4.6	Iβ=45.9 *31* and log *ft*=4.5 from 1988DuZS.
(8.08×10^3 *4*)	2386.5	1.9	8.6^{1u}	

† β-feeding from γ-ray intensity balance at each level. Quoted Iβ^- values are considered upper limits due to the incomplete decay scheme, and the associated log *ft* values are considered lower limits.

‡ Absolute intensity per 100 decays.

γ(^{35}P)

Iγ normalization: From Σ%I(γ to g.s.)=100. The deduced normalization factor of 0.27 should be considered an upper limit due to potential missing γ transitions from unobserved levels in the gap to the ground state.

Continued on next page (footnotes at end of table)

$^{35}Si\ \beta^-$ decay (0.78 s) 1988DuZS,1986Du07,1988DuZT (continued)

$\gamma(^{35}P)$ (continued)

E_γ[‡]	I_γ[‡@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	Comments
241.4 *3*	100 *4*	4101.2	(7/2⁻)	3859.7	5/2⁺	[E1]	%Iγ=27
392.3 *3*	58.2 *28*	4493.5	(7/2⁻)	4101.2	(7/2⁻)	[M1+E2]	%Iγ=16
468.9[&] *4*	18.7 *25*	4962.4?	(9/2⁻)	4493.5	(7/2⁻)		%Iγ=5.0 Unplaced γ ray in 1988DuZS. The placement is based on a 466γ observed in ^{208}Pb(^{36}S,Xγ) (2008Wi09).
633.7 *5*	21.9 *28*	4493.5	(7/2⁻)	3859.7	5/2⁺	[E1]	%Iγ=5.9
768.0 *4*	15.9 *29*	4869.4	(5/2⁻,7/2⁻)	4101.2	(7/2⁻)		%Iγ=4.3
1009.9 *5*	24 *5*	4869.4	(5/2⁻,7/2⁻)	3859.7	5/2⁺		%Iγ=6.5
1459.7 *5*	12 *4*	5560.7	(5/2⁻)	4101.2	(7/2⁻)		%Iγ=3.2
1473.4 *5*	17 *4*	3859.7	5/2⁺	2386.5	3/2⁺	[M1,E2]	%Iγ=4.6
1714.7 *6*	22 *5*	4101.2	(7/2⁻)	2386.5	3/2⁺	[M2]	%Iγ=5.9
1994.8[&] *6*	36 *6*	4381.3?	(5/2⁻)	2386.5	3/2⁺		%Iγ=9.7 Placement from 1988DuZS, consistent with the 1995γ 4381−>2386 transition observed in ^{208}Pb(^{36}S,Xγ) (2008Wi09) and the 1995γ 4382−>2386 transition observed in ^{9}Be(^{36}S,^{35}Pγ) (2016Mu03). 1988DuZT and 1987Wa10 placed this γ as the 6096−>4101 transition. 1988Or01 placed this γ as the 6488−>4493 transition.
2386.4 *6*	117 *7*	2386.5	3/2⁺	0	1/2⁺	[M1,E2]	%Iγ=32
3173.5 *10*	35 *6*	5560.7	(5/2⁻)	2386.5	3/2⁺		%Iγ=9.5 1988Or01 suggested that this γ ray cannot be placed into the decay scheme of ^{35}Si, and it could be a transition to the 4101 or 4493 levels based on intensity balances.
[x]3349.1[#] *10*	46[#] *6*						%Iγ=12
[x]3590.0[#] *11*	60[#] *7*						%Iγ=16
3859.5 *10*	121 *8*	3859.7	5/2⁺	0	1/2⁺	[E2]	%Iγ=33
4100.8 *10*	135 *8*	4101.2	(7/2⁻)	0	1/2⁺	[E3]	%Iγ=36

[†] From the Adopted Levels.

[‡] From 1988DuZS, unless otherwise noted.

[#] From 1986Du07. 1988Or01 tentatively suggested that these γ rays de-excite a level at 7450, but this suggestion has not been experimentally confirmed.

[@] For absolute intensity per 100 decays, multiply by 0.27.

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

[x] γ ray not placed in level scheme.

^{35}Si β^- decay (0.78 s) 1988DuZS,1986Du07,1988DuZT

Decay Scheme

Intensities: I_γ per 100 parent decays