

$^{36}\text{Al} \beta^- \text{n} \text{ decay (12.0 ms) } \quad \text{2023Lu07}$

Parent: ^{36}Al : $E=0$; $T_{1/2}=12.0 \text{ ms } 20$; $Q(\beta^- \text{n})=1.227 \times 10^4 \text{ keV } 15$; $\% \beta^- \text{n} \text{ decay} < 31$

^{36}Al - $T_{1/2}$: From implant- $\beta\gamma$ correlation (2023Lu07). Other: 14.7 ms 10 (2023Lu07, implant- β correlation), 94 ms 37 (1995ReZZ/2008ReZZ, implant- β correlation), $\approx 15 \text{ ms}$ (1999YoZW, implant- β correlation, preliminary). 2023Lu07 adopted 12.0 ms 20 instead of 14.7 ms 10 based on the cleanest determination with the γ -ray gating.

^{36}Al - $Q(\beta^- \text{n})$: From 2021Wa16.

^{36}Al - $\% \beta^- \text{n} \text{ decay}$: From 1995ReZZ/2008ReZZ.

2023Lu07: Exp 1: ^{36}Mg and ^{36}Al were produced via the projectile fragmentation of a 140-MeV/nucleon, 80-pnA ^{48}Ca primary beam from the NSCL cyclotrons impinging on a 642-mg/cm²-thick ^9Be target. The secondary cocktail beam centered around ^{33}Na was selected by the A1900 separator and implanted into a CeBr₃ scintillator sandwiched between two plastic scintillator veto detectors. Surrounding the implantation array were the SeGA array of 16 segmented Ge detectors and 15 LaBr₃ detectors. Exp 2: ^{36}Mg and ^{36}Al were produced via the projectile fragmentation of a 172.3-MeV/nucleon, 120-pnA ^{48}Ca primary beam from the FRIB linac impinging on an 8.89-mm-thick ^9Be target. The secondary cocktail beam centered around ^{42}Si was selected by the ARIS separator and implanted into a 5-mm-thick YSO segmented scintillator sandwiched between two plastic scintillator veto detectors. Surrounding the implantation array were 11 HPGe clover detectors and 15 fast-timing LaBr₃ detectors, and the VANDLE array of 88 neutron detectors. Both the NSCL and FRIB experiments in 2023Lu07 measured E_γ , I_γ , $\beta\gamma$ -coin, $\gamma\gamma$ -coin, implant- $\beta\gamma$ correlation and deduced $T_{1/2}$ of ^{36}Mg g.s., ^{36}Al g.s. and a ^{36}Al isomer. Comparisons with FSU shell-model calculations.

 ^{35}Si Levels

$E(\text{level})$

0

910

 $\gamma(^{35}\text{Si})$

E_γ

910

$E_i(\text{level})$

910

E_f

0

Comments

E_γ : From 2023Lu07.

2023Lu07 observed the 910 γ within the 100-ms window following the arrival of a ^{36}Al ion in both NSCL and FRIB experiments. 2023Lu07 also observed the 910 γ within the 100-ms window following the arrival of a ^{36}Mg ion in both NSCL and FRIB experiments.

2013StZY observed the 910 γ in ^{36}Mg decay with its maximum intensity in the 20-30 ms time window after the implantation of ^{36}Mg , indicating its origin from the granddaughter generation.

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Decay Scheme