

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

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

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

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

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

2023Lu07: Exp 1:  $^{36}\text{Mg}$  and  $^{36}\text{Al}$  were produced via the projectile fragmentation of a 140-MeV/nucleon, 80-pnA  $^{48}\text{Ca}$  primary beam from the NSCL cyclotrons impinging on a 642-mg/cm<sup>2</sup>-thick  $^9\text{Be}$  target. The secondary cocktail beam centered around  $^{33}\text{Na}$  was selected by the A1900 separator and implanted into a CeBr<sub>3</sub> scintillator sandwiched between two plastic scintillator veto detectors. Surrounding the implantation array were the SeGA array of 16 segmented Ge detectors and 15 LaBr<sub>3</sub> detectors. Exp 2:  $^{36}\text{Mg}$  and  $^{36}\text{Al}$  were produced via the projectile fragmentation of a 172.3-MeV/nucleon, 120-pnA  $^{48}\text{Ca}$  primary beam from the FRIB linac impinging on an 8.89-mm-thick  $^9\text{Be}$  target. The secondary cocktail beam centered around  $^{42}\text{Si}$  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 LaBr<sub>3</sub> detectors, and the VANDLE array of 88 neutron detectors. Both the NSCL and FRIB experiments in 2023Lu07 measured  $E_\gamma$ ,  $I_\gamma$ ,  $\beta\gamma$ -coin,  $\gamma\gamma$ -coin, implant- $\beta\gamma$  correlation and deduced  $T_{1/2}$  of  $^{36}\text{Mg}$  g.s.,  $^{36}\text{Al}$  g.s. and a  $^{36}\text{Al}$  isomer. Comparisons with FSU shell-model calculations.

 $^{35}\text{Si}$  Levels

$E(\text{level})$	$J^\pi^\dagger$	$T_{1/2}^\dagger$
0	$(7/2)^-$	0.78 s 12
910	$(3/2)^-$	55 ps 14

$^\dagger$  From the Adopted Levels of  $^{35}\text{Si}$ .

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

$E_\gamma$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Comments
910	910	$(3/2)^-$	0	$(7/2)^-$	<p><math>E_\gamma</math>: From 2023Lu07.</p> <p>2023Lu07 observed the 910<math>\gamma</math> within the 100-ms window following the arrival of a <math>^{36}\text{Al}</math> ion in both NSCL and FRIB experiments. 2023Lu07 also observed the 910<math>\gamma</math> within the 100-ms window following the arrival of a <math>^{36}\text{Mg}</math> ion in both NSCL and FRIB experiments.</p> <p>2013StZY observed the 910<math>\gamma</math> in <math>^{36}\text{Mg}</math> decay with its maximum intensity in the 20-30 ms time window after the implantation of <math>^{36}\text{Mg}</math>, indicating its origin from the granddaughter generation.</p>

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Decay Scheme