A 185 kg NaI[Tl] Detector for Observing the Charged-Current Neutrino Interaction on $^{127}\text{I}$

$^{127}\text{I} + \nu_{e} \rightarrow ^{127}\text{Xe} + e^{-}$

- $^{127}\text{I}$ charged-current reaction proposed by W. Haxton$^{[1]}$ for solar, supernova neutrino detection
- Additionally, measurement used to test nuclear models, measure $g_A$ quenching with neutrinos
  - Very few neutrino-nuclear cross sections measured at these energies!
- Radiochemical measurement$^{[2]}$ made at LAMPF in 1990s, but:
  - No energy dependence of cross section
  - Exclusive measurement (no $^{127}\text{Xe}$ particle emission)
- Inclusive cross section calculated by Mintz & Pourkaviani$^{[3]}$

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The NaIνE Detector

• Twenty-four 7.7kg NaI[Tl] scintillators deployed to the SNS in 2016

• Goal: make a preliminary measurement of the charged-current reaction on $^{127}$I, test backgrounds for a CEνNS search with $^{23}$Na
  • Using dual-gain base with range 3 keV-60 MeV

• Main background for CC is cosmic muons
  • Vetos deployed in 2017, big improvement
  • Also investigating tracking algorithms

• Beam resumed in May (at higher power)
  • Work on tonne-scale detector continues