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## Development of a High-Energy Two-Component Gamma Calibration Source

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The detection of electron antineutrinos can provide the means for confirming the presence and monitoring of the operational characteristics of nuclear reactors. Water-based Cherenkov detectors with gadolinium doping are one of the technologies under study for this application. The energy scale of the emitted positron and the de-excitation cascade from neutron capture by gadolinium motivates the development of gamma calibration sources with energies of several MeV. One such potential source is provided by the  $13C(\alpha,n)16O$  reaction. At alpha energies above ~5 MeV, a significant branching ratio exists for the deexcitation of 16O via the emission of a 6.1-MeV gamma ray. The fast neutron also produced from this reaction can be used to tag events in the large water-based detector. 241Am is an appealing alpha source as it has emission energy above the ~5 MeV threshold, high specific activity, and does not possess the regulatory overhead of other alpha sources. We discuss continued refinement of the simulation methods developed to predict source yield as a function of the source design parameters. These include implementing more advanced physics models and transitioning the simulation software to a more generalized framework. We additionally present initial measurement results to demonstrate the production of the calibration signals of interest.

## Abstract title

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