

# Proton Beam Production of Curie Scale Ac-225 at 100 MeV and Below

The DOE National Isotope Program for radionuclide production operates two intermediate energy, high intensity accelerator-based production facilities: The 100 MeV Isotope Production Facility (IPF) at Los Alamos National Laboratory and the 200 MeV Brookhaven Linac Isotope Producer (BLIP). They are two of only eight intermediate energy production facilities worldwide and often operate with record breaking beam intensities on target. These two facilities will be used for year-round Ci-scale batch production of Ac-225 via proton bombardment of thorium targets. High power targetry for this purpose is being developed as part of the US DOE Tri-Lab production development effort.

Production cross sections measured in recent years dictate that Ci-scale production at a 100 MeV facility such as IPF requires much higher beam currents than at higher energy facilities such as BLIP. As a result, targets used for production at these lower energies must withstand power levels that are higher by a factor that approaches an order of magnitude. While existing target designs have been used to successfully produce up to ~200 mCi at end-of-bombardment, improvements are needed to achieve Ci-scale production. As part of the US DOE Tri-Lab effort, ultra-high power thorium targets are being developed to withstand 100 MeV proton beam currents up to 450  $\mu$ A. Based on thermal model predictions, a major emphasis is placed on the enhancement of thermal contact between the thorium target and its containment. Several enhancement approaches and techniques are being explored with the goal to down select and integrate the most appropriate technique into a procedure for the routine fabrication of IPF targets.

This presentation will provide a status update on the ongoing targetry R&D effort to achieve Ci-scale production. In the context of recent upgrades at IPF, updated Ac-225 production projections will also be presented based on expected target thermal performance at ultra-high beam currents and yields obtained from recent pilot Ac-225 production campaigns.

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## Email Address

meiring@lanl.gov

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**Primary author:** Dr NORTIER, Meiring Nortier (Los Alamos National Laboratory)

**Co-authors:** Dr STEIN, Benjamin (Los Alamos National Laboratory); MARTINEZ, Chris (Los Alamos National Laboratory); Dr VERMEULEN, Christiaan (Los Alamos National Laboratory); O'BRIEN, Ellen (Los Alamos National Laboratory); OLIVAS, Eric (Los Alamos National Laboratory); BIRNBAUM, Eva (Los Alamos National Laboratory); COOLEY, Jason (Los Alamos National Laboratory); JOHN, Kevin (Los Alamos National Laboratory); Mr BHANDIA, Rishi (Los Alamos National Laboratory)

**Presenter:** Dr NORTIER, Meiring Nortier (Los Alamos National Laboratory)