

# Measuring pre-actinide fission charge distributions via light ion induced fusion-fission with heavy rare isotope beams

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Prompted by the discovery of an unexpected region of asymmetric, beta-delayed fission in the neutron deficient mercury region, we have developed the capability to fuse neutron-deficient rare isotope beams on  $^4\text{He}$  within the Active-Target Time Projection Chamber (AT-TPC)[1] and measure their charge distributions.

First measurements with this technique have been performed with neutron deficient beams in the pre-actinide region at the National Superconducting Cyclotron Laboratory. The isotopes were produced by projectile fragmentation of a stable  $^{208}\text{Pb}$  beam, identified with a new HEavy Isotope Tagger (HEIST) [2] and then transmitted to the AT-TPC. The  $^4\text{He}$  counter gas in the AT-TPC provides the target nuclei for fusion-fission reactions and serves as the fission fragment detector. This allows for the separation of fission events from other reactions, and enables the identification of the charge of the fission fragments through their stopping power.

In this talk, we present first results for the measured nuclei. We also discuss the potential for extending these measurements at FRIB to neutron deficient  $^{184}\text{Pb}$ .

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1. J. Bradt et al., Nucl. Instrum. Methods Phys. Res. A, 875 (2017).
2. A.K. Anthony et al., Rev. Sci. Instrum. 93, 013306 (2022).