

## Exploring the Nuclear Physics Opportunities of CARIBU at ANL

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The study of neutron-rich nuclei far from the valley of beta stability has led the development and construction of dedicated rare isotope facilities all over the world. The Californium Rare Isotope Beam Upgrade (CARIBU) to the ATLAS facility at Argonne National Laboratory presents a unique opportunity to study intermediate mass neutron-rich nuclei. Fission fragments from a  $\sim 350$  mCi  $^{252}\text{Cf}$  source are cooled, focused, and extracted using a gas catcher and selected using an isobar separator. Ion beams can then be transported to a low-energy beam line ( $<2$  keV) or re-accelerated to energies up to 6 MeV/A. A major component of the low-energy scientific program at CARIBU is the precision mass measurement of nuclei in this region using the Canadian Penning Trap (CPT) many of which play a critical role in determining the final r-process abundance pattern [1]. These mass measurements are challenging due to the short half lives ( $t_{1/2} < 200$  ms) and weak beam intensities making it a necessity to optimize the transmission and efficiency of the CARIBU-CPT systems. Many of the additional low-energy CARIBU experiments will be discussed including a forthcoming program for measurements of beta-delayed neutron emission using recoil-ion spectroscopy.

[1] S. Brett, I. Bentley, N. Paul, R. Surman, and A. Aprahamian. Eur. Phys. J. A (2012) 48:184.