Contribution ID: **342** Type: **Oral (Student, Not in Competition) / Orale (Étudiant(e), pas dans la compétition)**

# Current Status of the Canadian Penning Trap Mass Spectrometer at the CARIBU Facility

*Monday 16 June 2014 16:30 (15 minutes)*

The astrophysical r-process is thought to be responsible for the formation of almost half the elements in the universe heavier than iron. The r-process reaction path is located on the neutron-rich side of the chart of the nuclides approaching the neutron drip line. Reaction rates of the r-process and the location of the path are dependent on the neutron separation energies of the nuclei. As the neutron separation energies are derived from the mass of the nuclei, high precision mass measurements are vital. Currently, most of the nuclei in possible r¬-process paths are beyond experimental reach due to their short lifetimes and difficulties in production so their masses must be predicted by theoretical models. Mass measurements allow testing and refinement of these models and provide new data of astrophysical interest.

Our group uses the Canadian Penning Trap Mass Spectrometer at the Californium Rare Isotope Breeder Upgrade (CARIBU) facility at Argonne National Laboratory to measure masses of nuclei with lifetimes approaching on the order of 100ms and precisions down to 10 ppb. Changes made to the instrument system have improved the transmission efficiency of ions to the trap, allowing the investigation of shorter lived species. At present, the masses of over 70 species have been measured. The planned implementation of a new ion detector will allow phase imaging cyclotron frequency measurements, further increasing the number of exotic nuclei accessible. We present, in this talk, recent and future upgrades that will allow measurements of shorter lived, more exotic, isotopes that are of interest for studies of the r-process path.

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**Session Classification:** (M2-2) Nuclear Astrophysics - DNP / Astrophysique nucléaire - DPN

**Track Classification:** Nuclear Physics / Physique nucléaire (DNP-DPN)