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The CPT Mass Spectrometer at ANL

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The origin of chemical elements heavier than ^{56}Fe is still not clearly understood.
The rapid neutron capture process (*r* process) is presumed to be responsible for more than half of these elements on the neutron rich side of the chart of nuclides.
However, the site and exact conditions for the *r* process is still not accurately known.
Making and verifying these *r*-process predictions rely on the availability of nuclear data like the nuclide masses, neutron capture rates and beta-decay characteristics.
Currently there is very little data available for these neutron rich nuclides due to the challenges in producing the rare isotope beams (RIB) necessary for conducting such experiments.
However, over the past few years, with the development of a number of advanced RIB facilities, the situation has improved.
One such facility is the CAlifornium Rare Isotope Breeder Upgrade (CARIBU), at the Argonne National Laboratory (ANL), which uses the spontaneous fission of a ^{252}Cf source to produce beams of neutron rich isotopes.
The installation of a Multi-Reflection Time-Of-Flight (MR-TOF) isobar separator enables us to achieve a mass resolution (i.e. $R = m/\Delta m$) in excess of $100,000$.
These mass resolved beams are then sent to the Canadian Penning Trap (CPT) Mass Spectrometer located at the low-energy experimental area of CARIBU.
An upgrade to the CPT detection system allowed for the implementation of the novel detection technique, Phase-Imaging Ion-Cyclotron-Resonance (PI-ICR), which permits us to make measurements faster and with improved resolutions, compared to the traditional Time-Of-Flight Ion-Cyclotron-Resonance (TOF-ICR) method.
This enables us to measure masses of weakly produced neutron-rich isotopes without loss of precision.

My poster will be about the production of RIB at CARIBU, the mass measurement technique implemented at the CPT. and a brief status report.

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