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## **Design and Operation of a Penning Ion Trap Source for the CHIP-TRAP Mass Spectrometer**

*Monday, 20 September 2021 10:05 (20 minutes)*

The CMU High Precision Trap (CHIP-TRAP) mass spectrometer at Central Michigan University will be used to perform precise mass measurements on stable and long-lived radioactive isotopes. As part of this project, we have developed a Penning Ion Trap (PIT) source capable of producing singly-charged, low intensity, ion bunches (~ 100s to 1000s of ions) from gaseous species with pulse widths of ~1  $\mu$ s.

The PIT Source is similar to a PIG type ion source, but consists of a miniature cylindrical Penning trap, comprised of two end caps and a center ring with a trap volume of about 0.8 cm<sup>3</sup>, housed inside a permanent neodymium ring magnet. Gas enters the trap through a hole in the end cap with the flow controlled by a precision leak valve. Gas is ionized by an ~1  $\mu$ A electron beam from a thermal tungsten emitter applied for ~1  $\mu$ s. After a short confinement period, ions are released from the trap by dropping the voltage on one of the end caps and extracted into the beamline. In this presentation, I will describe the design, operation and recent calibration results of the PIT source.

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