

# Penning trap mass spectrometry at the LEBIT facility

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Room 118 Nieuwland Science Hall

Refreshments @ 3:30 in 202 NSH

One of the most fundamental properties of an atomic nucleus is its mass. The difference in the mass of the nucleus and the sum total of the masses of the constituent nucleons is the nuclear binding energy. The nuclear binding energy plays an important role in several areas of physics, such as nuclear structure, nuclear astrophysics, and fundamental interactions. In order to make measurements relevant to these fields, rare isotopes, which do not exist naturally on Earth, must be produced.

One of the most important recent developments in mass spectrometry is the use of Penning traps. Penning traps, used for many years in mass spectrometry of stable charged particles, have proven themselves invaluable for their accuracy, efficiency and sensitivity. For the study of short-lived, rare isotopes several Penning trap mass spectrometers have been installed at low-to-medium energy radioactive-beam facilities around the world. The Low Energy Beam and Ion Trap facility (LEBIT) at the National Superconducting Cyclotron Laboratory (NSCL), on the campus of Michigan State University, is the first to implement Penning trap mass spectrometry at a high-energy, rare-isotope facility using projectile fragmentation.

In this talk I will discuss the past, present, and future of Penning trap mass spectrometry at the NSCL. I will also cover a recent campaign to measure  $Q$ -values of double beta decay candidates in support of improving our understanding of the neutrino.