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Mass measurements of rare isotopes with the Single Ion Penning Trap MARTIN EIBACH, National Superconducting Cyclotron Laboratory, GEORG BOLLEN, Facility for Rare Isotope Beams, KERIM GULYUZ, CHRISTOPHER IZZO, National Superconducting Cyclotron Laboratory, MATTHEW REDSHAW, Central Michigan University, RYAN RINGLE, RACHEL SANDLER, STEFAN SCHWARZ, ADRIAN VALVERDE, National Superconducting Cyclotron Laboratory — High-precision mass data of atomic nuclei are integral for several different fields in fundamental research like investigations of fundamental interactions or nuclear structure studies. At the National Superconducting Cyclotron Laboratory rare isotope ions are produced by projectile fragmentation and subsequent in-flight separation. Using the Penning trap mass spectrometer LEBIT their mass can be measured with high precision using the time-of–flight ion cyclotron resonance (TOF-ICR) technique. However, it requires on the order of hundred detected ions for one mass measurement. As one moves further from the valley of stability, production rates of the exotic isotopes decline. In order to access rare isotopes being delivered at rates of about 1 ion/hour or less, a more sensitive technique is required. Therefore, the Single Ion Penning Trap (SIPT) is being developed, and will enable high-precision mass measurements with a single ion using the Fourier-Transform Ion Cyclotron Resonance (FT-ICR) technique. It aims for mass measurements around doubly magic rare isotopes far away from stability where the half-lives are usually sufficiently long for FT-ICR measurements. SIPT is currently being commissioned and ions have been sent through the beam line and detected in front of the magnet.

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