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Beam Transport Efficiencies of the LEBIT Cooler/Buncher

MATTHEW HODEK, Bowling Green State University, GEORG BOLLEN, STEFAN SHWARZ, AMANDA PRINKE, JOSH SAVORY, National Superconducting Cyclotron Laboratory — The Low Energy Beam and Ion Trap (LEBIT) facility at the NSCL is used to make high precision mass measurements of rare isotopes. A continuous beam of fragments from the NSCL's Coupled Cyclotrons Facility is stopped in a gas cell and extracted as a continuous ion beam. These ions are then accumulated and cooled using a linear radio frequency quadrupole (RFQ) ion trap filled with a low pressure buffer gas. On command the ions are ejected as a low emittance bunch. This pulsed beam is then injected into a 9.4T Penning trap for mass measurement. The cooling and bunching of the isotopes is essential for an efficient capture in the Penning trap and for obtaining high mass precision. Presented here is a study of the transport efficiencies of the RFQ cooler and buncher of LEBIT. The role of unwanted 'parasitic' traps inside this cooler and buncher was investigated. For this purpose detailed SIMION simulations were performed. These simulation results are compared to the results of dedicated experimental tests.

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