

ABSTRACT – A. Lapierre

The ReA EBIT charge breeder and a new EBIS at the NSCL

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The electron-beam ion trap (EBIT) charge breeder of the ReA post-accelerator, located at the National Superconducting Cyclotron Laboratory (NSCL) (Michigan State University), has been delivering charge-bred rare-isotope beams for the nuclear-physics program since September 2015. Before transport to ReA and charge breeding, those beams are first produced by fragmentation and fission of fast projectiles provided by the Coupled Cyclotron Facility (CCF), in-flight separated, and thermalized in a gas stopping cell. The Facility for Rare Isotope Beams (FRIB) currently under construction will significantly increase the production yield of rare isotopes in comparison to the rates presently available with the CCF. Moreover, future experimental facilities will necessitate stable-isotope beams of high intensity for commissioning. However, the ion-beam current that can be injected into and ejected from the ReA EBIT is restricted by its charge capacity, mostly limited by the current of its electron beam.

Last summer, parts of the TEST EBIS previously used as a test source at the Relativistic Heavy Ion Collider at the Brookhaven National Laboratory were transferred to the NSCL. This EBIS can operate with an electron-beam current exceeding 4 Amperes, allowing the device to deliver ion beams of intensities of up to 10^{10} ions per second. This new EBIS is being re-assembled. Over the last months, the 5-T superconducting magnet was re-assembled and successfully cool down with liquid helium and energized. This High-Current EBIS (HCEBIS) is expected to replace the ReA EBIT next year.

This contribution will present new results obtained with the ReA EBIT over the year. It will also present estimates of injection efficiencies and ejection rates expected with the new HCEBIS.