



Contribution ID: 79

Type: **Poster Presentation**

A Compact All-Permanent Magnet ECR Ion Source Injector for ReA at MSU NSCL

Monday, 11 May 2015 16:31 (0 minutes)

The design of a compact all-permanent magnet electron cyclotron resonance (ECR) ion source injector for the superconducting heavy ion linac rare isotope ReAccelerator Facility (ReA) at the Michigan State University (MSU) National Superconducting Cyclotron Laboratory (NSCL) is currently being carried out. The ECR ion source injector is based on a Grenoble design using microwave heating with a frequency range between 12.75 GHz and 14.5 GHz. The off-line injector will augment the electron beam ion trap (EBIT) rare isotope charge breeder as stable ion beam injector for the ReA linac. The ECR ion source injector will be optimized for high charge state to provide CW heavy ion beams from hydrogen to masses up to ^{136}Xe within the ReA charge-to-mass ratio (Q/A) operational range between 0.2 to 0.5. The ECR ion source will be mounted on a high-voltage platform that can be adjusted to provide the required injection energy of 12 keV/u into a room temperature RFQ in preparation for further acceleration. The beam line consists of a 30 kV tetrode extraction system, two mass analyzing sections, and optical matching section for injection into the existing ReA Low Energy Beam Transport (LEBT) line. The design of the ECR ion source and the associated beam lines are discussed in the proceeding.

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Session Classification: Poster Session A