Contribution ID: **53** Type: **Poster Presentation**

Development of a next generation RFQ beam cooler and buncher for the CANREB project at TRIUMF

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

A new RFQ-based ion beam cooler and buncher is under development as part of the CANREB project at TRIUMF. The CANREB project requires an RFQ buncher that will efficiently accept continuous beams of rare isotopes from the ARIEL or ISAC target, by way of a high resolution mass spectrometer (HRS), with energies up to 60 keV and deliver bunched beams to an EBIS for charge breeding. The CANREB RFQ incorporates design considerations to facilitate ease of use over a wide range of ion masses, and is intended to accommodate incident beam rates as high as 108 pps, delivering beam bunches at 100 Hz. Many design concepts to be implemented in the CANREB RFQ have been developed and tested through the development and commissioning of a beam cooler and buncher [1] for the BECOLA facility [2] at Michigan State University, including a novel DC electrode shape in the cooling region, the technique used to couple RF and DC to the RFQ electrodes, and the design of the cooling region which reduces the risk of RF discharge in the buffer gas. The efforts to commission the BECOLA beam cooler and buncher demonstrated the success of many new beam cooler design concepts, while also suggesting avenues for further tailoring of the design for the needs of the CANREB project. An overview of the CANREB RFQ design concept will be presented, informed by results from both ion optical simulations as well as commissioning efforts with the BECOLA beam cooler and buncher.

[1] B.R. Barquest et al. An advanced RFQ based beam cooler and buncher for collinear laser spectroscopy at NSCL, paper in progress
[2] K. Minamisono et al. Commissioning of the collinear laser spectroscopy system in the BECOLA facility at NSCL, Nucl. Instr. Meth. A, 709 (2013) 85-94

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Session Classification: Poster Session A