

Abstract Submitted  
for the DNP08 Meeting of  
The American Physical Society

**RF Quadrupole Ion cooler for negative ions**<sup>1</sup> JACQUES PAPE, YUAN LIU, Oak Ridge National Laboratory, TOM LEWIS — In order to improve the quality of radioactive ion beams (RIBs), radio frequency (RF) quadrupole ion coolers are being developed for reducing the energy spreads and, consequently, the emittances of negative RIBs. RF quadrupole ion coolers are RF-only quadrupole ion guides filled with a buffer gas. The ions can be cooled by collisions with lighter buffer gases and their radial trajectories can be reduced to a small region near the axis of the device while the ions are inside the RF quadrupole ion cooler. Studies have been conducted to determine the operation parameters and the transmission of two ion coolers of quadrupole rod size of 11.48 mm diameter and 8 mm diameter, which are equipped with provisions for both retarding energetic negative ion beams to energies below thresholds for electron detachment at injection and re-accelerating negative ion beams to high energies after the cooling process. After mass separation, the ions of a selected mass are focused into the ion coolers where they are slowed by collisions with He buffer gas. At the exit of the cooler, the ions are re-accelerated to their original energies and measured with a Faraday cup detector. The performances of the two coolers are characterized with  $O^-$ ,  $OH^-$ ,  $F^-$ ,  $S^-$ ,  $Cl^-$ ,  $Ni^-$ ,  $Co^-$  and  $Cu^-$  ions. The analysis results gathered from the two RF quadrupole ion coolers will be presented.

<sup>1</sup>Research funded by the Oak Ridge National Laboratory.

Jacques Pape

Date submitted: 14 Aug 2008

Electronic form version 1.4