

Abstract Submitted
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Ion Confinement and Doppler Laser Cooling in a Permanent Magnet Penning Trap¹ BRIAN MCMAHON, BRIAN SAWYER, Georgia Tech Research Institute — Large-scale Penning traps utilizing electromagnets have proven useful for a variety of trapped charged-particle experiments including quantum simulation, mass spectrometry, precision metrology, molecular spectroscopy, and measurements of fundamental constants. Unitary Penning traps built with permanent magnets have been demonstrated for storage and spectroscopy of highly-charged ions [1]. Permanent-magnet-based Penning traps allow for passive ion confinement without radiofrequency (RF) micromotion, making them potentially attractive for use in portable frequency references. We will describe recent experimental results including confinement, spectroscopy, and trap characterization using $^{40}\text{Ca}^+$ ions in a NdFeB-based combined (RF and Penning) trap operating at 0.6 T. We will also detail progress towards confinement and Doppler cooling of $^9\text{Be}^+$ in a permanent magnet Penning trap. [1] N.D. Guise, J. N. Tan, S. M. Brewer, C. F. Fischer, and P. Jonsson, *Phys. Rev. A* **89**, 040502 (2014)

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