Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Crystals of $^{40}Ca^+$ and $^9Be^+$ in a Compact Penning Trap[1] BRIAN MCMAHON, BRIAN SAWYER, Georgia Tech Research Institute — Penning ion traps are useful experimental platforms for quantum simulation, mass spectrometry, precision metrology, molecular spectroscopy, and measurements of fundamental constants. We recently developed a compact, permanent-magnet based Penning trap that is compatible with cold ion physics experiments at 0.6 T [1]. We will describe the results of trap magnetic field characterization (both stability and uniformity) using confined, laser-cooled $^{40}Ca^+$ and $^9Be^+$ as probes. We have also demonstrated a laser cooling technique for $^{40}Ca^+$ at high magnetic field that allows for spin state detection without the need for shelving to metastable D levels. This cooling and detection scheme reduces the laser requirements for Penning trap experiments with atomic ions possessing low-lying D states. [1] B. J. McMahon, C. Volin, W. G. Rellergert, and B. C. Sawyer, Phys. Rev. A **101**, 013408 (2020)

[1]This work is supported by Office of Naval Research Grant N00014-17-1-2408

Brian Sawyer
Georgia Inst of Tech

Date submitted: 30 Jan 2020 Electronic form version 1.4