Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Cyclotron-Cavity Mode Resonant Cooling in Single Component Electron Plasmas ALEXANDER POVILUS, Lawrence Livermore Natl Lab, ERIC HUNTER, University of California, Berkeley, NATHAN EVETTS, University of British Columbia, SABRINA SHANMAN, NATHAN BELMORE, NICOLE LEWIS, CHUKMAN SO, University of California, Berkeley, ISSAC MARTENS, WALTER HARDY, University of British Columbia, JONATHAN WURTELE, JOEL FAJANS, University of California, Berkeley — Generating cold (<50 K) single component electron plasmas is of critical importance to many experiments. Examples include optimizing recombination rates for antihydrogen or Rydberg atom production and producing monoenergetic beams. Replacing a section of a Penning-Malmberg trap with a high-Q cavity resonantly enhances spontaneous emission of cyclotron radiation in the cavity through interaction with electromagnetic modes. This allows for rapid cooling of a single-component electron plasma confined in the high-Q cavity. We describe the observed effects of frequency detuning (lineshape), position dependence of the confined plasma, and saturation effects on both the cooling rate and equilibrium temperature as the number of trapped electrons increases from $5{\cdot}10^6$ to $3{\cdot}10^6$. Prepared by LLNL under Contract DE-AC52-07NA27344. This research was supported by the Department of Energy, Grant DE-FG02-06ER54904.

Alexander Povilus
Lawrence Livermore Natl Lab

Date submitted: 24 Jul 2015 Electronic form version 1.4