Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Thermalization and Cooling of Cold, Highly-Magnetized, One-Component Electron Plasmas ALEX POVILUS, University of California, Berkeley, STEVE CHAPMAN, MARCELO BAQUERO-RUIZ, JOEL FAJANS, Univeristy of California, Berkeley — Thermalization of strongly-magnetized plasmas relies on the dynamics of particle collisions and interaction with the background electromagnetic field. The nature of these interactions changes greatly as a plasma is cooled to lower temperatures. In particular, these effects can have a large effect on techniques requiring sympathetic cooling through cyclotron radiation of a cloud of electrons. With the intention of cooling dense ($\sim 10^9$/cc) non-neutral plasmas to 4K, we model the various mechanisms that are important in this regime. As a one-component plasma cools, the transverse and longitudinal degrees of motion become decoupled in collisions, inhibiting thermalization. Electromagnetic cavity modes couple in a complex manner to the electrons, changing the expected cyclotron radiation emission rates and absorption of energy from electrical noise. Here, we present a model for these mechanisms and a proposed experiment currently in construction for characterizing their behavior.

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Date submitted: 16 Jul 2010 Electronic form version 1.4