Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Experimental and Computational Studies of Rotational and Magnetic Pumping in a Toroidal Electron Plasma ALEX S. PATTERSON, ANDREW R. DOARES, MATTHEW R. STONEKING, Department of Physics, Lawrence University, Appleton, WI, 54911 — Electron plasma is confined using a purely toroidal magnetic field (R_0=18 cm, B < 1 kG) for times (1s) that are much longer than any of the dynamical timescales of the system. The Lawrence Non-Neutral Torus II (LNT II) can be operated as a partial torus in which plasma is confined in C-shaped set of toroidal sectors or as a fully toroidal, closed-field trap. Experimentally controlling the plasma's equilibrium position is found to increase the m=1 diocotron mode damping time from near 40ms to near 400ms. Three-dimensional equilibria are computed by enforcing a Boltzman distribution along field lines, yielding new predictions of rotational and magnetic pumping timescales for this diocotron mode. Recent magnetic field enhancements permit extension of mode damping and confinement studies to higher field (from B < 500 G up to 1 kG) strengths. This work is supported by National Science Foundation Grant Award No.1202540.

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Date submitted: 11 Jul 2013

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