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Density Scaling Studies in Toroidal Electron Plasma and Upgrade Plans for the Lawrence Non-Neutral Torus II M.R. STONEKING, J.W. DARRELL, S.A. EXARHOS, A.S. PATTERSON, M. PRICE, A.H. WRIGHT, Department of Physics, Lawrence University, Appleton, WI 54911 — Electron plasma is confined using a purely toroidal magnetic field ($R_o = 18$ cm, $B < 550$ G) for times ($\sim$500 ms) that are much longer than any of the dynamical timescales of the system. The Lawrence Non-Neutral Torus II (LNT II) can be operated as a partial torus in which plasma is confined in C-shaped toroidal sectors or as a fully toroidal, closed field trap. Electron density is controlled by adjusting the injector (filament) bias and by attempts to apply a "rotating wall." Confinement and diocotron mode damping are measured by monitoring image charge on isolated wall sectors. High relative density ($>10^7$ cm^{-3}) fully toroidal plasma is also generated by placing the injector at the edge and gating the bias voltage. We also present plans to upgrade the magnetic field (to exceed 1 kG) and enhance the diagnostic capabilities of the LNT II to permit measurement of higher order modes. This work is supported by the National Science Foundation – Award #1202540.

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