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**Attempts to produce nearly steady-state conditions in a fully toroidal electron plasma** ERIC FRATER, FARAZ CHOUDHURY, MATTHEW STONEKING, Lawrence University — The Lawrence Non-neutral Torus II (major radius = 17.4 cm, minor radius = 1.27 cm, B $\sim$ 550 G) confines non-neutral (electron) plasmas in a purely toroidal magnetic field. By employing techniques used in cylindrical Penning-Malmberg traps, electron plasmas are confined in a 270° toroidal arc for times exceeding one second. The observed long confinement times indicate the production of nearly steady-state conditions and permit study of intrinsic toroidal effects on dynamics and transport. We report on attempts to trap electrons in a *full* torus. This is done by filling the trap and confining electrons in a partial torus, retracting the electron source, and then removing the electric potential barriers to allow the plasma to occupy the full torus. The long confinement times achieved in the partial torus make this experiment possible. The plasma is diagnosed by measuring the flow of image charge to and from isolated sectors of the fully segmented conducting shell. Electron plasmas (n $\sim$ 5x10$^6$ cm$^{-3}$) are confined and exhibit toroidal versions of diocotron modes. Frequency measurements of the $m$=1 diocotron mode along with numerical models yield the total charge in the plasma. This work is supported by National Science Foundation Grant PHY-0812893.

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