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Attempts to apply the "rotating wall" technique to a toroidal non-neutral plasma M. PRICE, A.S. PATTERSON, M.R. STONEKING, Department of Physics, Lawrence University, Appleton, WI 54911 — We apply "rotating wall" electric fields in an attempt to spin up, compress and extend the confinement time of toroidal non-neutral plasma. In cylindrical Penning-Malmberg traps (with magnetic field strengths exceeding 1 tesla), azimuthally propagating electric field perturbations result in arbitrarily long confinement times for non-neutral plasma [X.-P. Huang, F. Anderegg, E.M. Hollmann, C.F. Driscoll and T.M. O'Neil, Phys. Rev. Lett. **78**, 875 (1997)]. We attempt to apply this technique to the toroidal electron plasma in the Lawrence Non-neutral Torus II device (major radius = 18 cm, minor radius = 3.81 cm, $B \sim 550$ G). Long confinement times (>300 ms) for plasma in a partially toroidal trap (270° arc) represent nearly steady-state conditions. A rotating electric potential perturbation with m=2 symmetry is applied to eight poloidal sectors of the segmented conducting boundary, and attempts are made to "spin up" the plasma with a frequency sweep in order to increase the density and confinement time. The plasma is diagnosed by measuring the flow of image charge to and from isolated sectors of the conducting boundary. The frequency of the m=2 (k=0) diocotron mode is used to measure the density. This work is supported by National Science Foundation Grant Award #1202540.

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