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Observation of Trivelpiece-Gould modes in toroidal pure electron plasma F. CHOUDHURY, M.R. STONEKING, A.R. KNOEDLER, Dept. of Physics, Lawrence University, Appleton, WI — Non-neutral (electron) plasma are confined in the Lawrence Non-neutral Torus II (major radius = 17.4 cm, minor radius = 1.27 cm, $B \sim 550$ G) with a purely toroidal magnetic field. The plasma is diagnosed by measuring the flow of image charge to and from isolated sectors of the fully segmented conducting boundary. Long confinement times (>300 ms) in both partial (270° arc) and fully toroidal traps indicate the production of nearly steady-state conditions and permit study of intrinsic toroidal effects on dynamics and transport. We report the first observations of Trivelpiece-Gould modes (space-charge waves) [A.W. Trivelpiece and R.W. Gould, *J. Appl. Phys.* **30**, 1784 (1959)] with poloidal mode number $m=0$ in toroidal non-neutral plasma. The fundamental mode at 1.3 MHz and the first few harmonics are excited with a tone burst in partially toroidal conditions. We also report on attempts to observe Trivelpiece-Gould modes in plasma confined in a fully toroidal trap, and on attempts to use numerical modeling to identify toroidal effects on these modes. This work is supported by the National Science Foundation Grant PHY-0812893.

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