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Experimental Investigation of Trapped Particle Modes in a Toroidal Electron Plasma Without End Effects[1] BENJAMIN TOMHAVE, ALBERT MARSHALL, MATTHEW STONEKING, Department of Physics, Lawrence University — Electron plasma is confined using a purely toroidal magnetic field (R_o = 18 cm, B <1 kG) for times (∼4 s) that are much longer than any of the dynamical timescales of the system. The experiment can be operated as a variable length partial torus or a fully toroidal closed-field trap. Plasma dynamics are observed by monitoring the image charge on isolated wall sectors. In addition, the plasma is controlled or perturbed by application of time-varying potential to isolated wall sectors. Phase-space separatrices are ubiquitous in magnetically confined plasma and the resulting interactions between trapped and passing particles lead to many important effects. We introduce a phase-space separatrix in a closed field (fully-toroidal trap) by applying an electric squeeze to toroidally localized wall sectors in order to study trapped particle modes in a full torus. These experiments provide a comparison with similar experiments in cylindrical traps, but without end effects.

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