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Experimental Investigation of Temperature Measurement Techniques in a Toroidal Pure Electron.[1] ALBERT MARSHALL, BENJAMIN TOMHAVE, MATTHEW STONEKING, Department of Physics Lawrence University — In the Lawrence Non-neutral Torus II (LNT II), a purely toroidal magnetic field (R_0 =18 cm, B <1 kG) cofines electron plasma for several seconds at densities near 10^7 /cm^3. The experiment can be operated as a variable-length partial torus or a full torus trap. Trapped charge and density are determined from the frequencies of the lowest order diocotron modes, but as yet, no simple temperature measurement technique has been developed for the LNT II. We report on two strategies for determining the temperature: thermal excitation of Trivelpiece-Gould modes and plasma expansion into a vacuum region past a time varying electrostatic barrier. Besides its being a fundamental plasma parameter, temperature is expected to determine the maximum confinement time in a toroidal plasma due to magnetic pumping transport.

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