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Confinement of pure electron plasmas in the Columbia Non-neutral Torus JOHN BERKERY, THOMAS PEDERSEN, ALLEN BOOZER, PAUL BRENNER, QUINN MARKSTEINER, MICHAEL HAHN, JASON KREMER, Columbia University — One goal of the Columbia Non-neutral Torus (CNT) research program is to investigate the possibility of enhanced confinement in stellarators due to high electric fields. Non-neutral plasmas with high electric fields are predicted to have long confinement times. Measured confinement times have fallen somewhat short of these predictions, however. There are several factors influencing the transport in these plasmas, including the presence of insulated rods, the neutral pressure, the ion fraction (through ion-driven instabilities), the match of equipotential and magnetic surfaces, and possibly prompt losses due to bad orbits. Each of these factors has been or is presently being investigated in CNT. Results are presented from the theoretical scaling of the neoclassical confinement time, and the measured confinement time's dependence on the presence of rods and on the neutral pressure. Comparisons are made between the predicted and measured values and possible explanations for the discrepancy are offered. Calculations and measurements of the ion fraction in these plasmas are also presented.

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