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Equilibrium Reconstructions of Pure Electron Plasmas Confined on Magnetic Surfaces REMI G. LEFRANCOIS, THOMAS SUNN PEDERSEN, ALLEN H. BOOZER, JASON P. KREMER, QUINN R. MARKSTEINER, JOHN W. BERKERY, MIKE HAHN, Columbia University — Using recently obtained experimental data from the Columbia Non-Neutral Torus (CNT), the first equilibrium reconstructions of electron plasmas confined in a stellarator have been performed. A fully three-dimensional equilibrium solver (PBS) is used to solve the non-linear Poisson-Boltzmann equation for electrostatic potential that characterizes such plasmas. In order to fully specify an equilibrium, measurements of temperature and density are required. Specifically, we require one-dimensional temperature and density profiles along any line that runs from the magnetic axis to the outer magnetic surface. These are the inputs for the PBS code, which outputs full three-dimensional density and potential information - these quantities are not flux functions. In fact, for typical CNT plasmas, the PBS code predicts a factor of four variation of electron density along the magnetic axis. Comparisons between CNT equilibrium reconstructions and measurements will be presented, along with work done in collaboration with the Compact Helical System (CHS) group. This material is based upon work supported by the National Science Foundation under Grant No. 0317359.

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