

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

First observations of partially neutralized and quasineutral plasmas in the Columbia Non-neutral Torus¹ XABIER SARASOLA, PAUL BRENNER, MICHAEL HAHN, THOMAS PEDERSEN, Columbia University — The Columbia Non-neutral Torus (CNT) is the first stellarator devoted to the study of pure electron, partially neutralized and positron-electron plasmas. To date, CNT usually operates with electron rich plasmas (with negligible ion density) [1], but a stellarator can also confine plasmas of arbitrary degree of neutralization. In CNT the accumulation of ions alters the equilibrium of electron plasmas and a global instability has been observed when the ion fraction exceeds 10%. A characterization of this instability is presented in [2], analyzing its parameter dependence and spatial structure (non-resonant with rational surfaces). A new set of experiments is currently underway studying plasmas of arbitrary degree of neutralization, ranging from pure electron to quasineutral plasmas. Basic observations show that the plasma potential decouples from emitter bias when we increase the degree of the neutralization of our plasmas. Partially neutralized plasmas are also characterized by multiple mode behavior with dominant modes between 20 and 200 kHz. When the plasma becomes quasineutral, it reverts to single mode behavior. The first results on partially neutralized plasmas confined on magnetic surfaces will be presented. [1] J. Kremer, PRL 97, (2006) 095003 [2] Q. Marksteiner, PRL 100 (2008) 065002

¹Supported by Fundación Caja Madrid and NSF-PHY-04-49813.

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Date submitted: 18 Jul 2009

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