Abstract Submitted
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e-/H- Plasmas: Exceptional inwards transport from a Rotating Wall drive and rapid outwards convection afterwards.[1] K. A. THOMPSON, A. A. KABANTSEV, C. F. DRISCOLL, University of California, San Diego, N. PANZERI, University of Milan, Italy — In nonneutral plasmas consisting primarily of electrons with a small fraction of H- ions, we observe exceptional radial compression of the ions by externally-applied rotating electric fields (Rotating Wall drive). In a Penning-Malmberg trap designed to confine electron plasmas, we can accumulate H- ions until they comprise up to 20% of the total charge in the trap. Initially, the ions reside at the outer radii of the rotating plasma column, due to mass-dependent centrifugal forces. We find that the Rotating Wall drive causes preferential inward transport of the ions, with the ions ultimately forming 30% of the total charge density at r=0. Nascent theory suggests the ion transport is due to a resonant interaction between the ion axial bounce motion and the applied fields. When the Rotating Wall drive is turned off, the ions convect to the outer edge of the column, apparently as a coherent clump, on a time scale much faster than predicted for diffusive centrifugal separation. Detailed measurements of the temporal evolution of the electron density profile are presented for a variety of Rotating Wall drive configurations.

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