Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Inhomogeneity scale lengths in a collisionless, Q-machine plasma column E.W. REYNOLDS, M.E. KOEPKE, West Virginia University, S. SHINOHARA, Kyushu University, Kasuga, Fukuoka, Japan — Radial inhomogeneity scale lengths for radial electric field, ion density, and magnetic-field-aligned electron drift velocity have been measured and interpreted in magnetized, low temperature, collisionless, Q-machine plasma. When the ion Larmor radius ρ_i is on the order of [much smaller than] the half-width-at-half-maximum $\ell_r\{E(r)\}$ of the radially-localized radial electric field profile $E(r)$, the radial profile of the azimuthal ion drift velocity, measured using laser-induced-fluorescence (LIF), has a peak V_θ that, because of finite [negligible]-Larmor-radius effects, is significantly lower than [comparable to] the peak V_{sum} of the combined radial profile of the $\boldsymbol{E}$x$\boldsymbol{B}$ and diamagnetic drift velocities. For example, when $\rho_i/\ell_r\{E(r)\}$=1 [2] we find that V_θ/V_{sum}=0.58 [0.25]. Results of an experimentally benchmarked test-particle simulation are presented and applied using experimentally relevant electric field profiles. Work supported by U.S.-NSF and the US-Japan Exchange Program.

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Date submitted: 18 Jul 2005 Electronic form version 1.4