

**Abstract Submitted for the Thirty-Third Annual Meeting
Division of Plasma Physics
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Category Number and Subject 1.3 Nonneutral Plasmas

☐ Theory ☒ Experiment

Parametric Studies of Test Particle Confinement in a Non-neutral Plasma Trap*, D.L. Eggleston and A. Sheng, Occidental College - We have studied the dependence of τ (the time to lose half the test particles) on various machine parameters[1]. We find that: 1) τ scales with L/B in a way similar to that observed on nonneutral plasma experiments (here L is the length of the confinement region and B is the axial magnetic field). Since collective processes are negligible in our experiment, they cannot be responsible for this scaling. 2) τ shows only weak dependence on central wire bias and initial electron velocity, which implies a weak dependence on the azimuthal rotation frequency and the axial bounce frequency. Thus the observed L/B scaling cannot be a reflection of an underlying dependence on these frequencies. 3) The magnitude of τ in our experiments is comparable (for comparable L/B) to that in non-neutral plasma experiments. However the electron-electron collision frequency in our experiment is at least two orders of magnitude smaller than it is in these plasmas. Evidently, the correct model of transport in these devices will not depend critically on the magnitude of this collision frequency.

[1] This device is described in B.A.P.S. 35, 2137 (1990).

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