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Evidence of Resonant Particle Dominance in Asymmetry-Induced Transport[1] D.L. EGGLESTON, Occidental College — While it is easy to experimentally demonstrate that applied field asymmetries produce radial transport, convincing comparisons of experiment and theory have yet to be made. A key prediction of the theory is that the transport will be dominated by particles that move in resonance with the asymmetry. For the general case of a time-varying asymmetry, the resonance condition is $\omega - l\omega_R - kv = 0$, where v is the axial velocity, ω_R is the $E \times B$ rotation frequency, and ω, l and k are the asymmetry frequency, azimuthal and axial wavenumbers, respectively. While it is experimentally useful to probe the resonance with a variable frequency asymmetry, collective effects (waves and shielding) have limited the usefulness of this technique in previous experiments. Our low density trap avoids these limitations while maintaining the essential elements of the transport physics [2]. Our current experiments show a resonance in the radial particle flux similar to that predicted by theory. The peak frequency of the resonance increases with ω_R and k, but not as theory predicts. We also find that low-frequency asymmetries are anomolously ineffective at producing transport.

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[2]D.L. Eggleston, Phys. Plasmas 4, 1196 (1997).

☐ Prefer Oral Session
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