Abstract Submitted
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Controlled Growth of Gigantic Swirls in a Laboratory Magnetosphere[1] M.W. WORSTELL, M.E. MAUEL, T.M. ROBERTS, Columbia University — Space and laboratory plasma confined by a strong magnetic field have remarkable properties. Low frequency mixing of the plasma occurs through the interchange of long plasma-filled tubes aligned with the magnetic field. The plasma dynamics becomes two-dimensional because these tubes can only move radially or circulate around the poles of the magnetic dipole. Studies of turbulent interchange dynamics made using the Collisionless Terella Experiment (CTX) show that turbulence appears as chaotic time-varying modes with broad global mode structures that interact nonlinearly and form an inverse cascade.[2] When we drive vortex mixing through the application of electrostatic bias to multiple probes, we break the rotational symmetry of the plasma and small vortex tubes are seen to drive larger "gigantic" swirls. Statistical analysis of the time-evolving spectra and measurement of the bicoherence of the turbulence show an increase of three wave coupling during non-axisymmetric electrostatic drive of the probe array.

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[2]B.A. Grierson, M.W. Worstell, M.E. Mauel, *Phys. Plasmas* **16** 055902 (2009)

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