Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Drift wave turbulence in the edge region of MST reversed field pinch plasmas[1] D.J. THUECKS, Washington College, A.F. ALMAGRI, J.S. SARFF, P.W. TERRY, University of Wisconsin-Madison — Measurements of electric field fluctuations reveal activity consistent with drift waves in the edge region of standard-confinement MST plasmas. The fluctuations are broadband and strongly anisotropic, with a power spectral index that is steeper in the direction parallel to the mean magnetic field direction than it is in the perpendicular direction. The power in the fluctuating kinetic energy, $\frac{1}{2}m_i n_i v^2_{\tilde{E}\times B_0}$, exceeds the power in magnetic fluctuation energy for frequencies above 80 kHz. At lower frequencies (20-40 kHz), magnetic energy associated with unstable global tearing modes dominates. A lack of equipartition in the turbulent cascade coincides with measured signatures of independent fluctuation activity broadly consistent with drift-wave fluctuations. Statistical coherence measurements reveal mode activity at high frequencies ($\geq$80 kHz) that is compressive, has high coherence in regions of the plasma with strong density gradients, and has a phase speed comparable to the electron drift speed. Elevated coherency associated with this fluctuation feature of the drift wave fluctuations return more quickly following magnetic reconnection events than corresponding coherence associated with the tearing activity. This suggests the drift-wave fluctuations may be excited by the large edge-localized thermal pressure gradient, but they could also be excited nonlinearly in a turbulent cascade driven by the tearing modes.

[1]Work supported by DOE and NSF.

Derek Thuecks
Washington College

Date submitted: 14 Jul 2016 Electronic form version 1.4