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Measurement of Momentum Transport in Magnetic Turbulence
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Momentum transport in a hot accretion disk must be much faster than allowed by classical dissipation. The leading candidate for this anomalous transport is the magnetorotational instability (MRI), which produces magnetic turbulence [1]. Anomalous momentum transport is also observed in reversed field pinch (RFP) plasmas. Surprisingly, despite β a few percent in MST plasmas, parallel pressure fluctuations correlated with magnetic fluctuations can produce momentum flux comparable to the radial momentum transport that occurs in magnetic relaxation events (sawteeth), thereby implying that kinetic effects are important for momentum transport in a turbulent magnetic field. This result was obtained using advanced interferometry and polarimetry techniques in the hot MST plasma core. Previous measurements in MST identified that both the Reynolds and Maxwell fluid stresses are also large (and oppositely directed) during these relaxation events. Thus multiple momentum transport mechanisms appear to be active in the RFP. We note that the parallel Maxwell stress is identically the Hall dynamo; the self-consistent coupling of momentum transport and dynamo has also been considered for accretion disks [2].
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[1] S.A. Balbus, J.F. Hawley, Rev. Mod. Phys., **70**, 1 (1998). [2] F. Ebrahimi et al., Phys. Rev. Lett. **99**, 075003 (2007).

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