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**The Princeton MagnetoRotational Instability (MRI) Experiment - Apparatus and Diagnostics** ETHAN SCHARTMAN, MARK NORNBERG, HANTAO JI, PPPL, CMSO, MICHAEL J. BURIN, California State University, San Marcos, JEREMY GOODMAN, Princeton University — The Princeton MRI experiment investigates instabilities believed to be responsible for angular momentum transport in accretion disks. The apparatus consists of fluid confined between a pair of concentric spinning cylinders. The shear flow developed shares with accretion disks the properties of linear hydrodynamic stability and outwardly-decreasing angular velocity. Onset of instability in this apparatus is relevant to studies of turbulent transport in astrophysical disks. Using water or a liquid Gallium alloy we investigate Subcritical Hydrodynamic Instability (SHI) or the MRI. The cylinder end caps are divided into two pairs of differentially-rotatable rings to reduce the impact of the vertical boundaries on the bulk flow. When using water the Reynolds stress is directly measured using 2-component Laser Doppler Velocimetry. During Gallium operation a 5kG axial magnetic field is applied. Radial motions of the fluid generate a fluctuating radial component of the magnetic field which is detected by an array of magnetic B-dot coils external to the flow. For the largest flow shear in our apparatus the radial fields will be generated by the MRI. To test the operation of the B-dot coils the magnetic field is applied to a Rayleigh-unstable flow. Supported by DOE, NASA and NSF.

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