Abstract Submitted
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Overview of the Princeton MagnetoRotational Instability Experiment[1] E. SCHARTMAN, Princeton Univ., M. NORNBERG, A. ROACH, H.T. JI, PPPL, D. COSTER, Wheaton College, W. LIU, LANL, J. GOODMAN, Princeton Univ., M.J. BURIN, Cal State San Marcos — A turbulent viscosity is required to explain the observationally-inferred rates of angular momentum transport in accretion disks. Investigation of thin disks has focused on two sources of instability to drive the turbulence: the MagnetoRotational Instability (MRI) and Subcritical Hydrodynamic Instability (SHI). In MRI a weak ambient magnetic field causes the radially-decreasing angular velocity to become a source of free energy. In SHI, stable perturbations allow access to unstable modes. This experiment investigates both of these instabilities in a Couette-Taylor flow. Using water or liquid Gallium alloy we generate rotating shear flows with linear stability properties analagous to astrophysical disks. Differentially rotatable end-rings reduce boundary effects. We found no evidence of SHI, up to Reynolds number of order one million. During the MHD experiments a solenoidal magnetic field of up to 5 kG is applied. Radially-aligned induction coils detect magnetic perturbations generated by the liquid metal. Initial magnetized experiments focussed on magneto-Coriolis waves which at large magnetic Reynolds number are expected to transition into MRI modes. Results of the current search for the MRI will be presented.

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Ethan Schartman
Princeton University

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