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**Hydrodynamics of the Princeton Magnetorotational Instability Experiment** M.J. BURIN, E. SCHARTMAN , H. JI, W. LIU, J. GOODMAN, Princeton University — Astrophysical accretion disks are thought to be turbulent, a state that promotes significant outward transport of angular momentum. The magnetorotational instability (MRI) is thought to provide the mechanism for turbulence in disks of sufficient ionization. For cooler (e.g. protostellar) disks however magnetic effects are possibly negligible, and purely hydrodynamic turbulence may be essential. It is claimed that turbulence may occur in these centrifugally-stable flows at a sufficiently high Reynolds number ($Re$) via *nonlinear* instabilities. However, with $Re$-limited simulations and only a handful of relevant experiments, there is current uncertainty about this claim. A laboratory apparatus has recently been constructed that generates rapidly rotating, centrifugally-stable sheared flows with $Re \leq 10^7$. Experiments include two primary diagnostics: Laser Doppler Velocimetry, providing turbulent intensity, and driving torque, providing a measure of angular momentum transport. Issues also discussed include the reduction of secondary flows driven by boundary layers (Ekman circulation) by a novel split end-cap design, as well as the effect of shear discontinuities (Stewartson layers) within the fluid. This work is funded by the U.S. DOE, NSF, and NASA.

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