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First Experimental Results From the Princeton MagnetoRotational Instability (MRI) Experiment[1] E. SCHARTMAN, H. JI, R. CUTLER, PPPL, M.J. BURIN, J. GOODMAN, Princeton University — The inferred rate of angular momentum transport in accretion disks is too large to be explained by a molecular viscosity. Two sources of instability to drive turbulence have been proposed: the MRI and subcritical hydrodynamic instability. In the MRI, a weak magnetic field can use the angular velocity gradient as a source of free energy. In the subcritical case, finite amplitude disturbances are expected to allow access to non-linear instabilities. Recent experimental investigations have claimed to observe both mechanisms in the laboratory, but neither has been conclusively demonstrated. During the first year of operation, the Princeton MRI Experiment has been searching for conclusive evidence of these instabilities. The experiment is a Couette-Taylor apparatus which uses water or liquid Gallium alloy to generate rotating shear flows with linear stability properties analagous to astrophysical disks. In the purely hydrodynamic case we do not find evidence of angular momentum transport great enough to be astrophysically important. We will also present initial results of our search for the MRI using liquid Gallium as our working fluid.

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