Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Characterizing the Velocity Profile of a Swirling Gas Experiment by Particle Imaging Velocimetry to Study Angular Momentum Transport in Accretion Disks SAMUEL GREESS, Carnegie Mellon University, HANTAO JI, ENRIQUE MERINO, Princeton Plasma Physics Lab, WILLIAM BERRIOS, Canada College — The method by which angular momentum transfers between different sections of accretion disks is a matter of ongoing debate. One suggested answer is Magnetorotational instability (MRI), which would facilitate this transfer through the magnetic interactions between particles at different distances from the center of the disk. While ongoing experiments with MRI have focused on the use of liquid metals to test the effects of magnetic fields, we are developing a swirling gas experiment to study effects beyond incompressible hydrodynamics, including compressible gas dynamics and plasma effects when gas is ionized. A second-generation prototype swirling gas experiment has been built to test the principle and to establish favorable rotation profiles using a chamber of swirling fog to simulate the formation and movement of accretion disks about some gravitational center. The paths of the visible fog particles can then be analyzed with Particle Imaging Velocimetry (PIV) techniques; these velocity measurements can then be organized by a Python program. Anticipated results include a radial profile of velocities at different times during the gas injection process, as well as further refinement of the fog chamber design to improve the accuracy in controlling the profile.

Samuel Greess
Carnegie Mellon University

Date submitted: 12 Jul 2013 Electronic form version 1.4