Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Differentially rotating HED plasma experiments on the MAGPIE pulsed-power generator V. VALENZUELA-VILLASECA, S. V. LEBEDEV, F. SUZUKI-VIDAL, L. G. SUTTLE, J. P. CHITTENDEN, J. W. D. HALLIDAY, D. R. RUSSELL, J. D. HARE, S. MERLINI, E. R. TUBMAN, Imperial College London, M. E. KOEPKE, West Virginia University — We present results from a laboratory platform capable of producing differentially rotating plasmas aiming to study angular momentum transport in conditions relevant to those astrophysical disks and jets. A 1.4 MA electrical current pulse drives 8 radial plasma jets carrying angular momentum relative to the setup's common axis. When the jets merge around the common axis of the experiment, a hollow rotating plasma column is formed and a hollow, highly collimated jet is ejected along the axis of the system. Laser interferometry used to determine the radial density profile provides measurements of the density depletion at the jet axis. Optical Thomson scattering measurements reveal the jet spins at ˜10 km/s with Ti ˜70 eV, Te ˜30 eV, resulting in a subsonic M ˜0.6 rotational motion, whereas estimates from XUV images indicate a supersonic axial flow M ˜3. Furthermore, Re ˜10^5, Rm ˜10^2, hence Pm $<<$1 putting our experiment in the regime relevant to young stellar object disks and jets. Supported by US Department of Energy Awards DE-F03-02NA00057 & DE-SC-0001063 and the Royal Astronomical Society. V. Valenzuela-Villaseca is funded by the Imperial College President's PhD Scholarships.

Vicente Valenzuela-Villaseca
Imperial College London

Date submitted: 29 Jun 2020 Electronic form version 1.4