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Experimental study of formation of differentially rotated supersonic plasma flows SERGEY LEBEDEV, M. BENNETT, G.N. HALL, S. PATANKAR, M. BOCCHI, F. SUZUKI-VIDAL, G. SWADLING, S.N. BLAND, G. BURDIAK, J.P. CHITTENDEN, P. DE GROUCHY, J. SKIDMORE, L. PICKWORTH, L. SUTTLE, R.A. SMITH, Imperial College, A. FRANK, E. BLACKMAN, University of Rochester — We will present experiments designed to form a differentially rotating supersonic plasma flow with dimensionless parameters relevant to modeling physics of astrophysical discs. The set-up is based on a modification of cylindrical wire array z-pinch, combined with a cusp magnetic field. The azimuthal component of the JxB force introduces an angular momentum into the ablation flow converging on the array axis, leading to formation of rotating disc supported in equilibrium by the ram pressure of the flow. The level of radiative cooling can be controlled by variation of the wire material. Plasma parameters of the formed disc were measured with laser probing (interferometry and shadowgraphy) and Thomson scattering. The disc rotates with velocity of $\sim$30km/s, has Mach number of $\sim$4 and Reynolds number $>10^5$. Development of hydrodynamic instabilities in the rotating plasma will be investigated and discussed.

Sergey Lebedev
Imperial College

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