

Magnetized jet experiments and radiative shocks driven by pulsed power

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Abstract

Results of recent experimental studies of supersonic, radiatively cooled plasma jets, performed at the pulsed power MAGPIE facility (1.5MA, 250ns) at Imperial College will be presented. The experiments are scalable to astrophysical flows in that critical dimensionless numbers such as the plasma collisionality, the plasma beta, Reynolds number and the magnetic Reynolds number are all in the astrophysically appropriate ranges. The presentation will include discussion of the dynamics of magnetically driven jets, in particular formation of episodic outflows. Studies of the interaction of jets with ambient medium (He, Ar, Kr gases), showing the effects of radiative cooling on the morphology of the interaction, will be also presented. Results of first experiments aimed on formation of rotating plasma discs generated by cylindrically converging plasma streams in wire array z-pinch with added cusp magnetic fields will be discussed. Quantitative information on the plasma parameters in all these experiments is provided by several spatially and temporally resolved diagnostics, including direct measurements of flow velocities using Doppler shift of Thomson scattering spectra.

References

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- [2] F.A. Suzuki-Vidal, M. Bocchi, S.V. Lebedev et al., *Physics of Plasmas*, 19, 022708 (2012).