Generation of supersonic plasma jets from pulsed-power driven exploding wire experiments

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Astrophysical jets and supersonic outflows are associated with a wide range of phenomena. Determination of the processes which dominate jet behaviour can be used to infer the properties of their sources which include Young Stellar Objects (YSO) and Active Galactic Nuclei (AGN). Limited observational data makes the construction of theoretical descriptions problematic, and accurately scaled laboratory experiments represent an important test-bed for assessing the important physical processes.
We present laboratory experiments studying the generation and propagation of hydrodynamic super-sonic plasma jets in conical wire arrays. Jets are analyzed using both laser interferometry and time-resolved self emission and estimations of the dimensionless scaling parameters (Mach number, jet/ambient density ratio, cooling parameter) will be given The relatively low density of the jets produced in these experiments allows continuous 2-dimensional quantitative measurements of the electron density, which was not possible in previous experiments, and this may allow a closer examination of the jet structure during an interaction event. Preliminary results from jet-target experiments will be presented and discussed.