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Laser-triggered millimeter-scale collimated plasma jets in crossed electric and magnetic fields P. BRADY, H. QUEVEDO, P. VALANJU, M. MC-CORMICK, R. BENGTSON, T. DITMIRE, University of Texas at Austin — We present a laser plasma triggered jet experiment where we produce millimeter-scale collimated outflows from a cylindrically symmetric electrode configuration motivated by astrophysical jet dynamics. The electrode design consists of a grounded plane with a ~1 cm diameter hole and a wire aligned normally to this plane, with its tip placed at the center of the hole. A rapid discharge is formed between the wire and ground plane when a laser pulse hits an aluminum target placed above the electrodes, creating plasma which closes the circuit. The resulting current and corresponding magnetic fields give rise to a plasma jet. The jets were 0.1-0.3 cm wide, about 2 cm in length, had velocities of ~40 km/s and an estimated plasma density of less than 10^{17} cm^{-3}. To study the effects of magnetic fields on jet evolution, we have embedded the plasma in axially directed permanent magnetic fields with strength up to 0.4 Tesla. We measured the evolution of the jet over duration of ~1 μs with nanosecond resolution using a fast ICCD camera and interferometry. Under certain conditions the jets also form helical structures due to kink instabilities and the onset is characterized. We compare the dynamics of the plasma jet with one dimensional MHD codes.

Parrish Brady
University of Texas at Austin

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