Abstract Submitted
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Dynamics of Laboratory Astrophysical Jets with Magnetized Helical Flows[1] JENS VON DER LINDEN, SETTHIVOINE YOU, University of Washington — A triple electrode planar plasma gun (MOCHI LabJet) designed to study the dynamics of magnetized helical flows in plasma jets provides boundary conditions and dimensionless numbers relevant to astrophysical jets. The goal is to observe the effect of current and flow profiles on the collimation and stability of jets to address the questions: why are jets collimated and long? How are jet irregularities related to plasma instabilities? The current and azimuthal flow profiles of the jets are tailored by biasing the electrodes at different potentials. High-speed camera images, high-resolution $\dot{B}$ probe measurements, and 3D vector tomography of plasma flows will map a stability space for varying current and flow profiles. An analytical stability space is derived with Newcomb's variational analysis applied to collimated magnetic flux tubes with skin and core currents. Two numerical stability spaces are also computed by integrating the Euler-Lagrange equation and applying a shooting method to the ideal MHD eigenvalue problem. The eigenvalue problem is generalized to include azimuthal flows and computed with a monotonicity condition [1] for minimizing the required scanning of the complex eigenvalue space.

[1] J.P. Goedbloed, Plasma Phys. Control. Fusion **53**, (2011).

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Jens von der Linden
University of Washington

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