Abstract Submitted
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Dynamics of Laboratory Astrophysical Jets with Magnetized Helical Flows[1] ERIC LAVINE, JENS VON DER LINDEN, KEON VEREEN, EVAN CARROLL, MANUEL AZUARA ROSALES, ALEX CARD, MORGAN QUINLEY, IMAN DATTA, SETTHIVOINE YOU, University of Washington — A novel planar plasma gun experiment is under construction to investigate the dynamics of plasma jets with magnetized helical flows. The goal is to observe the effects of current profiles, flow profiles, and launch boundary conditions on the length, collimation, and stability of jets. The apparatus is carefully designed to provide boundary conditions relevant to astrophysical jets. The gun has three, planar, concentric electrodes that can be biased at different potentials to mimic an accretion disk rotation profile when coupled to the vacuum magnetic field. The dimensionless parameters are appropriate for protostellar jets and numerical simulations of astrophysical jets. Diagnostics include internal B-dot probes, and vector tomographic reconstruction of ion Doppler spectroscopic measurements capable of reconstructing 3D flow fields. Measurements will be interpreted with a two fluid model of canonical flux tube evolution that describes how magnetic helicity is converted into stabilizing shear helical flows while a system's total canonical helicity (sum of magnetic and fluid momentum helicity) is conserved. The study aims to address the questions: 1) Why are jets highly collimated, straight, and very long? 2) How are jet irregularities related to plasma instabilities and boundary conditions?

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