Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Investigating the Dynamics of Canonical Flux Tubes in Jet Geometry[1] ERIC LAVINE, SETTHIVOINE YOU, University of Washington — Highly collimated plasma jets are frequently observed at galactic, stellar, and laboratory scales. Some models suppose these jets are magnetohydrodynamically-driven magnetic flux tubes filled with flowing plasma, but they do not agree on a collimation process. Some evidence supporting a universal MHD pumping mechanism has been obtained from planar electrode experiments with aspect ratios of ∼10:1; however, these jets are subject to kink instabilities beyond a certain length and are unable to replicate the remarkable aspect ratios (10-1000:1) seen in astrophysical systems. Other models suppose these jets are flowing Z-pinch plasmas and experiments that use stabilizing shear flows have achieved aspect ratios of ∼30:1, but are line tied at both ends. Can both collimation and stabilization mechanisms work together to produce long jets without kink instabilities and only one end tied to the central object? This question is evaluated from the point of view of canonical flux tubes and canonical helicity transport, indicating that jets can become long and collimated due to a combination of strong helical shear flows and conversion of magnetic helicity into kinetic helicity. The MOCHI LabJet experiment is designed to study this in the laboratory.

[1]Supported by US DoE Early Career Grant DE-SC0010340

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Date submitted: 11 Jul 2014 Electronic form version 1.4