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Results from the Mochi.Labjet Experiment ERIC SANDER LAVINE, SETTHIVOINE YOU, University of Washington — Magnetized plasma jets are generally modeled as magnetic flux tubes filled with flowing plasma governed by magnetohydrodynamics (MHD). Recent theoretical work has outlined a more fundamental approach based on flux tubes of canonical vorticity, where canonical vorticity is defined as the circulation of a species' canonical momentum. This approach extends the concept of magnetic flux tube evolution to include the effects of finite particle momentum and enables visualization of the topology of plasma jets in regimes beyond MHD. Under the appropriate conditions this framework suggests how to form and drive stable, collimated plasma jets with very long aspect-ratios. To explore this possibility, a triple electrode planar plasma gun (Mochi.LabJet) has been designed to produce helical shear flows inside a driven magnetized plasma jet. High speed video confirms the experiment can produce long (∼1m), collimated, stable jets with core plasma currents of 60 - 80 kA, skin currents of 100 - 120 kA and axial velocities on the order of 40 – 80 km/s (for hydrogen). Presented here are magnetic and ion flow velocity measurements as well as stability space analysis that suggests the jets are stable to kink instabilities over many Alfvén times.

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