Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Experimental and theoretical developments in the Mochi project[1] SETTHIVOINE YOU, JENS VON DER LINDEN, KEON VEREEN, ERIC SANDER LAVINE, EVAN CARROLL, ALEXANDER CARD, MANUEL AZUARA-ROSALES, MORGAN QUINLEY, University of Washington, GUNSU YUN, Pohang Institute of Technology, Korea — The Mochi project investigates the interaction between magnetic fields and plasma flows in cylindrical and toroidal geometries. The configuration is designed to tailor the radial electric field profile with three annular electrodes and allow for shear helical flows in magnetized plasma jets or merging spheromaks. First plasma has been achieved and characterization is in progress with images, magnetic probes, an energy analyzer, an interferometer, a fast ion gauge, and optical and RF spectroscopy. Vector tomography of ion Doppler spectroscopy is progressing with the design of the custom fiber bundle and implementation of the numerical code. The first experiments are investigating the coupling of sausage and kink instabilities, comparing measurements to a new stability criterion and a numerical stability code. A new canonical field theory has been developed to help interpret the dynamics of plasma self-organization. The theory augments the Lagrangian of general dynamical systems to rigourously demonstrate that canonical helicity transport is valid across single particle, kinetic and fluid regimes, that dynamical equations can be re-formulated as a form of Maxwell's equations, and that helicity is conserved only when density gradients are shallow.

[1]This work is supported by US DOE Grant DE-SC0010340

Setthivoine You
University of Washington

Date submitted: 24 Jul 2015

Electronic form version 1.4