Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Magnetically driven behavior of plasma loops[1] EVE STENSON, PAUL BELLAN, Caltech — By studying one or two current-carrying arched flux tubes in a laboratory environment, much can be learned about fundamental plasma dynamics and, potentially, analogous features found in the solar corona. These flux tubes, filled with low-beta plasma, are created with a modified plasma gun. Similar to spheromak guns but possessing a different geometry, the gun comprises an arched vacuum field linking a coplanar anode and cathode. Neutral gas is supplied from nozzles in the electrodes as high voltage is applied, ionizing the gas to form a semicircular loop of plasma. Supplying more than one neutral gas allows the resulting portions of the plasma to be imaged separately with optical filters. When two gases are supplied to a single loop, one from each electrode, high-speed jets are seen to flow from both ends into the apex. This method was used to test an MHD theory explaining flux tube collimation (P. M. Bellan, Phys. Plasmas 10, 1999 (2003)). If instead a pair of loops is created, each from a different gas, the two twist around each other and/or merge; experiments of this type suggest reconnection effects (J. F. Hansen et al, Phys. Plasmas 11, 3177 (2004)). The plasma's changing magnetic field is measured with an array of "B dot" probes and compared to force-free models.

[1]This work was supported by the AFOSR and USDOE.

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Date submitted: 22 Jul 2008 Electronic form version 1.4