

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Measuring and imaging bulk flows in laboratory plasma loops¹

E.V. STENSON, P.M. BELLAN, California Institute of Technology — Arched plasmas similar to solar coronal loops are made in the lab by means of a magnetized plasma gun. These plasma structures are created in a process resembling that used to make spheromaks, exhibit behavior that is also seen in the sun, and demonstrate some very general flow phenomena. It has been proposed that in a current-carrying flux tube with nonuniform cross-section, plasma jets flow from more constricted to less constricted regions (P. M. Bellan, Phys. Plasmas 10, 1999 (2003)). By making arched plasmas from two different gas species - one at each of the two footpoints of the arch - we see that this is indeed the case. High-speed imaging with optical filters reveals a jet emanating from each footpoint. With velocities on the order of the Alfvén speed, these jets move much faster than both the sound speed of the neutral gas and the thermal velocity of the ions. The technique of using two gases will next be used for experiments wherein two adjacent plasma arches merge. Each will be made of a different gas, so that the process by which the two combine can be resolved.

¹supported by USDOE and AFOSR

E. V. Stenson
California Institute of Technology

Date submitted: 25 Jul 2007

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