Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Velocity and magnetic field measurements of Taylor plumes in SSX under different boundary conditions[1] MANJIT KAUR, M. R. BROWN, J. HAN, J. E. SHROCK, Swarthmore College, D. A. SCHAFFNER, Bryn Mawr College — The SSX device has been modified by the addition of a 1 m long glass extension for accommodating pulsed theta pinch coils. The Taylor plumes* are launched from a magnetized plasma gun and flow to an expansion volume downstream. The time of flight (TOF) measurements of these plumes are carried out using a linear array of $\dot{B}$ probes (separated by 10 cm). TOF of the plasma plumes from one probe location to the next is determined by direct comparison of the magnetic field structures as well as by carrying out a cross-correlation analysis. With the glass boundary, the typical velocity of the Taylor plumes is found to be $\approx 25\ km/s$, accompanied by a fast plasma ($\geq 50\ km/s$) at the leading edge. Magnetic field embedded in the Taylor plumes is measured in the expansion chamber using a three-dimensional array of $\dot{B}$ probes and is found to be $\approx 700\ G$. Some flux conservation of the Taylor plumes is provided by using a resistive (soak time $\approx 3\ \mu s$) and a mesh (soak time $\approx 170\ \mu s >$ discharge time) liner around the glass tube for improving the downstream Taylor state velocity as well as the magnetic field. The results from these different boundary conditions will be presented. * Gray, et al, PRL **110**, 085002 (2013).

[1]Work supported by DOE OFES and ARPA-E ALPHA programs

Manjit Kaur
Swarthmore College

Date submitted: 15 Jul 2016 Electronic form version 1.4