

Abstract Submitted  
for the DPP16 Meeting of  
The American Physical Society

**Characterization of Taylor plumes on SSX**<sup>1</sup> M. R. BROWN, M. KAUR, J. HAN, J. E. SHROCK, Swarthmore College, D. A. SCHAFFNER, Bryn Mawr College — We have added a 1 *m* glass extension to the SSX plasma wind tunnel device. Initial experiments have been performed to characterize velocity, density, and magnetic field of relaxed helical Taylor states\* formed in the glass boundary. We are also experimenting with resistive and mesh liners to provide some flux conservation of the Taylor states. Under construction is a theta pinch coil and pulsed power supply to accelerate the fully relaxed (tilted) Taylor states. Once characterization studies are complete, one or two prototype theta pinch coils will be used to accelerate the Taylor states to over 100 *km/s* and compressed to small volumes by stagnation. A segmented resistive or mesh flux conserver may also be employed. Preliminary un-accelerated characterization studies produce peak proton densities of  $10^{15} \text{ cm}^{-3}$ . Densities are measured with a precision quadrature He-Ne laser interferometer located in an expansion volume downstream of the glass extension. Temperatures will be measured by an ion Doppler spectrometer. Stagnated plasma parameters will be  $n_e \approx 10^{16} \text{ cm}^{-3}$  with  $T_i \geq 20 \text{ eV}$ ,  $B \geq 0.5 \text{ T}$  with lifetimes over 100  $\mu\text{s}$ . Results from a single prototype acceleration coil will be presented. \* Gray, et al, PRL **110**, 085002 (2013).

<sup>1</sup>Work supported by DOE ARPA-E ALPHA program.

Michael Brown  
Swarthmore College

Date submitted: 14 Jul 2016

Electronic form version 1.4