

Swarthmore College

## Works

---

Physics & Astronomy Faculty Works

Physics & Astronomy

---

11-16-2015

### Accelerated Taylor Plumes For MIF Targets

Michael R. Brown

*Swarthmore College*, [doc@swarthmore.edu](mailto:doc@swarthmore.edu)

D. A. Schaffner

Holden L. Parks , '16

Ariel B. Rock , '16

Follow this and additional works at: <https://works.swarthmore.edu/fac-physics>



Part of the [Physics Commons](#)

[Let us know how access to these works benefits you](#)

---

#### Recommended Citation

Michael R. Brown; D. A. Schaffner; Holden L. Parks , '16; and Ariel B. Rock , '16. (2015). "Accelerated Taylor Plumes For MIF Targets". *Bulletin Of The American Physical Society*. Volume 60, Issue 19.

<https://works.swarthmore.edu/fac-physics/236>

This work is brought to you for free by Swarthmore College Libraries' Works. It has been accepted for inclusion in Physics & Astronomy Faculty Works by an authorized administrator of Works. For more information, please contact [myworks@swarthmore.edu](mailto:myworks@swarthmore.edu).

Abstract Submitted  
for the DPP15 Meeting of  
The American Physical Society

**Accelerated Taylor plumes for MIF targets**<sup>1</sup> M.R. BROWN, D.A. SCHAFFNER, H.L. PARKS, A.B. ROCK, Swarthmore College — The SSX plasma device has been converted to a 2.5 *m* merging plasma wind tunnel configuration. Experiments are underway to study merging and stagnation of high density, helical Taylor states<sup>2</sup> to employ as a potential target for magneto-inertial fusion. Eventually, SSX Taylor states will be accelerated to over 100 *km/s* and compressed to small volumes either by stagnation or merging. Initial un-accelerated merging studies produce peak proton densities of  $5 \times 10^{15} \text{ cm}^{-3}$ . Densities are measured with a precision quadrature He-Ne laser interferometer. Typical merged plasma parameters are  $T_i = 20 \text{ eV}$ ,  $T_e = 10 \text{ eV}$ ,  $B = 0.4 \text{ T}$  with lifetimes of 100  $\mu\text{s}$ . Results from a single prototype acceleration coil will be presented, as well as initial simulation studies of Taylor state plasma acceleration using multiple staged, pulsed theta-pinch coils.

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

<sup>2</sup>Gray, et al, PRL **110**, 085002 (2013).

Michael Brown  
Swarthmore College

Date submitted: 24 Jul 2015

Electronic form version 1.4