

11-16-2015

Accelerated Taylor Plumes For MIF Targets

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

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Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Accelerated Taylor plumes for MIF targets¹ 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 states² 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 μs . 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.

¹Work supported by DOE ARPA-E ALPHA program.

²Gray, et al, PRL **110**, 085002 (2013).

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Date submitted: 24 Jul 2015

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