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Accelerated Taylor Plumes For MIF Targets

Michael R. Brown
Swarthmore College, doc@swarthmore.edu

D. A. Schaffner

Holden L. Parks, '16

Ariel B. Rock, '16

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Abstract Submitted
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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.

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

Michael Brown
Swarthmore College

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