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Time of Flight Measurements of a Plasma Plume in a Glass Tube With and Without a Metal Liner[1] C. FIEDLER KAWAGUCHI, D. A. SCHAFFNER, Bryn Mawr College, M. R. BROWN, M. KAUR, Swarthmore College, H. K. JOHNSON, Bryn Mawr College — Researchers have yet to attain a self-sustaining fusion reaction in which the amount of energy put in is less than that being produced. A novel approach for the compression and heating of plasma is under development at Swarthmore College with collaboration from Bryn Mawr College through the ARPA-E ALPHA program. Two acceleration modules are being designed to accelerate and compress plasma plumes using pulsed copper rings outside of a glass chamber (module one) and inside of a stainless steel chamber (module two). Measurements of plasma velocity are made using a time of flight technique using Hall probes and magnetic pickup probes (B-dot) probes to measure magnetic field at an array of spatial locations along the chamber. Results shows that the response time of the Hall probe chip used was too slow to register the fast changing fields. B-dot probes were shown to have a fast enough response. Time of flight measurements of field are made in the glass tube using cross correlation methods, with and without a stainless steel liner. Preliminary results show an average increase in the plasma plume velocity, from 38 km/s to 45 km/s, when the glass chamber is lined.

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