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Dense Hypervelocity Plasma Jets[1] ANDREW CASE, F. DOUGLAS WITHERSPOON, SARAH MESSER, RICHARD BOMGARDNER, MICHAEL PHILLIPS, DAVID VAN DOREN, HyperV Technologies Corp., RAYMOND ELTON, ILKER UZUN-KAYMAK, University of Maryland — We are developing high velocity dense plasma jets for fusion and HEDP applications. Traditional coaxial plasma accelerators suffer from the blow-by instability which limits the mass accelerated to high velocity. In the current design blow-by is delayed by a combination of electrode shaping and use of a tailored plasma armature created by injection of a high density plasma at a few eV generated by arrays of capillary discharges or sparkgaps. Experimental data will be presented for a complete 32 injector gun system built for driving rotation in the Maryland MCX experiment, including data on penetration of the plasma jet through a magnetic field. We present spectroscopic measurements of plasma velocity, temperature, and density, as well as total momentum measured using a ballistic pendulum. Measurements are in agreement with each other and with time of flight data from photodiodes and a multichannel PMT. Plasma density is above 10^{15} cm^{-3}, velocities range up to about 100 km/s. Preliminary results from a quadrature heterodyne HeNe interferometer are consistent with these results.

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