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Overview and Recent Results from the HyperV Plasma Gun[1] F. DOUGLAS WITHERSPOON, ANDREW CASE, SARAH MESSER, RICHARD BOMGARDNER, MICHAEL PHILLIPS, DAVID VAN DOREN, HyperV Technologies Corp., RAYMOND ELTON, ILKER UZUN-KAYMAK, University of Maryland
— We present an overview of research at HyperV to develop high velocity dense plasma jets for application to fusion and HEDP. The approach uses symmetrical pulsed injection of high density plasma into a coaxial EM accelerator having a cross-section tailored to prevent formation of the blow-by instability. Two development paths are followed to accomplish this injection step: we compare large arrays of capillary discharges to sparkgaps arranged in a toroidal configuration. Experiments on three test fixtures are described: a 2pi configuration with 64 capillary injectors, a 32 injector prototype gun designed to drive rotation in the Maryland MCX experiment, and a second gun using 112 sparkgap electrodes for injection. Data is presented from visible light spectroscopy, fast optical imaging, Rogowski coils, pressure probes, Bdot probes, photodiodes, and a laser interferometer. Ballistic pendulum tests indicate plasma jets with mass 160 micrograms at 70 km/s have been achieved with plasma density above 10^{15} cm^{-3}.

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