Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Magnetized Plasma Gun Development for the PLX PJMIF Project[1] EDWARD CRUZ, ANDREW CASE, ADAM COOK, MARCO LUNA, ROBERT BECKER, F. D. WITHERPSOON, HyperJet Fusion Corporation, THE PLX TEAM — We present a description of the engineering and technical development, including a detailed overview of the design choices, of magnetized plasma guns for the PLX PJMIF Project. Intended to form a magnetized hydrogen plasma target, the magnetized plasma gun is an extension of HyperJet Fusion's latest coaxial plasma gun, called HJ1, which was developed for the 4π scaling study of spherically imploding plasma liners as a standoff driver for plasma-jet-driven magneto-inertial fusion (PJMIF). Each magnetized gun incorporates a high power, pulsed magnet coil designed to inject sufficient helicity into the forming plasma within the gun, such that the resultant hydrogen plasma jet exits the gun with an embedded magnetic field. The desire is to achieve a magnetized hydrogen plasma jet with $\sim$3x10^{14} cm^{-3} muzzle density at 100 km/s with an embedded field of $\sim$1 kG. Each magnetized gun also includes a compact capacitor drive module with integral transmission line and sparkgap switching, an ultra-fast precision gas dispensing valve and a gas pre-ionization system utilizing a self-switching glow discharge. [1] Hsu et al., IEEE Trans. Plasma Sci. 40 (2012). [2] Y.C.F. Thio et al., Fus. Sci. Tech., Vol. 75, 581598 (2019). [3] Yates et al., Phys. Plasmas 27, 062706 (2020).

[1]This work supported by ARPA-E SEED Program Grant DE-AR0001236 and by ARPA-E BETHE Program with Grant# TBD.

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Date submitted: 29 Jun 2020 Electronic form version 1.4