

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

The PLX- α Plasma Guns: Progress and Plans¹ F.D. WITHER-
SPOON, S. BROCKINGTON, A. CASE, E. CRUZ, M. LUNA, HyperV Technolo-
gies Corp., Y.C. FRANCIS THIO, HyperJet Fusion Corporation, AND THE LANL
PLX- α TEAM — The ALPHA coaxial plasma guns are being developed to support
a 60-gun scaling study of spherically imploding plasma liners as a standoff driver for
plasma-jet-driven magneto-inertial fusion (PJMIF) [1]. Seven complete guns have
been delivered to LANL with 6 guns currently undergoing simultaneous test firings
on PLX. The guns are designed to operate over a range of parameters: 0.5-5.0 mg
of Ar, Ne, N₂, Kr, and Xe; 20-60 km/s; $\sim 2 \times 10^{16}$ cm⁻³ muzzle density; and up
to 7.5 kJ stored energy per gun. Each coaxial gun incorporates a fast dense gas
injection and triggering system, a compact low-weight pfn with integral sparkgap
switching, and a contoured coaxial gap to suppress the blow-by instability [2]. Opti-
mizing parameter scans performed at HyperV have achieved : ~ 4 mg at >50 km/s
and length of ~ 10 cm. Peak axial density 30 cm from the muzzle is $\sim 2 \times 10^{16}$
cm⁻³. We will provide an overview of the experimental results, along with plans
for further improvements in reliability, maintainability, fabricability, and plasma jet
performance, with the latter focused on further improvements in the fast gas valve
and the ignitors. [1] Hsu et al., IEEE Trans. Plasma Sci. **40**, 1287 (2012). [2]
Witherspoon et al., Rev. Sci. Instr.

¹This work supported by the ARPA-E ALPHA Program under contract DE-
AR0000566 and Strong Atomics, LLC.

Franklin Witherspoon
HyperV Technologies Corp.

Date submitted: 14 Jul 2017

Electronic form version 1.4