Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Experimental studies of collisional plasma shocks and plasma interpenetration via merging supersonic plasma jets[1] S.C. HSU, A.L. MOSER[2], E.C. MERRITT, C.S. ADAMS[3], LANL — Over the past 4 years on the Plasma Liner Experiment (PLX) at LANL, we have studied obliquely and head-on-merging supersonic plasma jets of an argon/impurity or hydrogen/impurity mixture. The jets are formed/launched by pulsed-power-driven railguns. In successive experimental campaigns, we characterized the (a) evolution of plasma parameters of a single plasma jet as it propagated up to $\sim$ 1 m away from the railgun nozzle, (b) density profiles and 2D morphology of the stagnation layer and oblique shocks that formed between obliquely merging jets, and (c) collisionless interpenetration transitioning to collisional stagnation between head-on-merging jets. Key plasma diagnostics included a fast-framing CCD camera, an 8-chord visible interferometer, a survey spectrometer, and a photodiode array. This talk summarizes the primary results mentioned above, and highlights analyses of inferred post-shock temperatures based on observations of density gradients that we attribute to shock-layer thickness. We also briefly describe more recent PLX experiments on Rayleigh-Taylor-instability evolution with magnetic and viscous effects, and potential future collisionless shock experiments enabled by low-impurity, higher-velocity plasma jets formed by contoured-gap coaxial guns.

[1]Supported by DOE Fusion Energy Sciences and LANL LDRD.
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Date submitted: 21 Jul 2015 Electronic form version 1.4