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Progress towards gas jet collisionless shock experiments at OMEGA TIMOTHY JOHNSON, ANDREW BIRKEL, JACOB PEARCY, GRAEME SUTCLIFFE, RICHARD PETRASSO, CHIKANG LI, Massachusetts Institute of Technology MIT — The study of astrophysically relevant collisionless shocks has largely been constrained to numerical and theoretical investigations until now. Recent experiments at OMEGA and the NIF have shown that electromagnetic collisionless shocks can be generated in the laboratory. The OMEGA experiments created magnetic piston generated collisionless shocks which are distinct from Weibel mediated shocks. This was achieved by colliding a supersonic plasma flow with a gas bag filled with H₂ and enclosed by a thin CH shell. The explosion of the gas bag shell upon collision is not well understood and is currently too difficult to probe. Using a gas jet instead of a gas bag removes the complication of CH shell. These gas jet experiments offer a simpler system to study. Here, we present results from these gas jet experiments at OMEGA. A supersonic plasma flow intercepts the gas jet H₂ gas puff, providing physical insight into the shock formation. This work is supported in part by the DOE U.S. DOE, the MIT/NNSA CoE, and NLUF.

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