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Kinetic Effects and Neutron Generation in Converging Fully-Ionized Plasma Jets[1] WILLIAM RIEDEL, Stanford University, NATHAN MEEZAN, DREW HIGGINSON, MATTHIAS HOHENBERGER, Lawrence Livermore National Laboratory, MARK CAPPELLI, SIEGFRIED GLENZER, Stanford University — In this work, the use of laser-driven convergent plasma fusion targets is investigated for the study of counter-streaming and converging rarefied plasma flows. The scheme consists of a fuel layer lined along the interior surface of a hohlraum that is laser-ablated and expands inward towards the hohlraum center. Previous experiments have demonstrated the potential of such targets as neutron sources. The plasma streams generated in these targets are initially nearly collisionless as they converge, leading to wide interaction length scales and long interaction time scales as the jets interpenetrate. Such interactions are difficult to accurately model using standard magnetohydrodynamic (MHD) simulations, which assume high collisionality. Instead we model the system kinetically using the hybrid particle-in-cell (PIC) code Chicago to explore the importance of kinetic ion effects during stagnation. Predicted neutron yields and stagnation properties (density and temperature) are compared to the results from experiments conducted at the OMEGA Laser facility for both vacuum and gas-filled targets.

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