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Numerical Modeling of Imploding Plasma liners Using the 1D Radiation-Hydrodynamics Code HELIOS[1] J.S. DAVIS, UNF, D.S. HANNA, T.J. AWE, S.C. HSU, LANL, M. STANIC, J.T. CASSIBRY, UAH, J.J. MACFARLANE, Prism Computational Sciences — The Plasma Liner Experiment (PLX) is attempting to form imploding plasma liners to reach 0.1 Mbar upon stagnation, via 30–60 spherically convergent plasma jets. PLX is partly motivated by the desire to develop a standoff driver for magneto-inertial fusion. The liner density, atomic makeup, and implosion velocity will help determine the maximum pressure that can be achieved. This work focuses on exploring the effects of atomic physics and radiation on the 1D liner implosion and stagnation dynamics. For this reason, we are using Prism Computational Science's 1D Lagrangian rad-hydro code HELIOS, which has both equation of state (EOS) table-lookup and detailed configuration accounting (DCA) atomic physics modeling. By comparing a series of PLX-relevant cases proceeding from ideal gas, to EOS tables, to DCA treatments, we aim to identify how and when atomic physics effects are important for determining the peak achievable stagnation pressures. In addition, we present verification test results as well as brief comparisons to results obtained with RAVEN (1D radiation-MHD) and SPHC (smoothed particle hydrodynamics).

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