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One-dimensional numerical modeling of imploding plasma liners[1]

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— The Plasma Liner Experiment (PLX) will generate high energy density laboratory plasmas (HEDLP) of unmatched size and lifetime (cm & μs), with peak pressures near 1 Mbar, by merging 30–60 spherically convergent hypervelocity plasma jets. PLX is motivated by the interest in fundamental HEDLP science and the need for a standoff driver for magneto-inertial fusion (MIF). Plasma-liner-driven MIF may simultaneously create the magnetized D-T target and the high-Z liner using composite jets. 1D physics issues of PLX liner implosions are discussed, with focus on the scaling of stagnation pressure on liner initial conditions, and atomic physics effects. A goal is to develop scaling laws applicable to more energetic liners and higher peak pressures. 1D results from RAVEN (rad-MHD), HELIOS (rad-hydro with DCA), and SPHC (smoothed particle hydro) will address the above physics issues. Simulations on multiple platforms allow direct comparison between numerical algorithms and EOS and transport models. The pertinence of results to PLX experimental design and application to HEDLP and MIF is emphasized.

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