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Ab-initio Modeling of Ultra-Intense Laser-Matter Interactions with Cone-coupled Wire Targets[1] CHRIS ORBAN, VLADIMIR OVCHINNIKOV, KRAMER AKLI, DOUGLASS SCHUMACHER, The Ohio State University, MILAD FATENEJAD, DONALD LAMB, Flash Center for Computational Science at the University of Chicago — Current experiments with ultra-intense lasers can potentially yield valuable information on the fast-ignition (FI) approach to achieving high-yield fusion in the laboratory. Using the Particle-In-Cell code LSP and the radiation-hydrodynamics code FLASH, we present simulations that self-consistently model the irradiation of Al cone targets coupled to Cu wires at the Titan laser based at Lawrence Livermore National Laboratory. Our novel approach ensures that the nanosecond time-scale pre-irradiation of the target by leakage light ahead of the main laser pulse is modeled in its full complexity by the FLASH code. By using these results as initial conditions for LSP simulations, the picosecond time-scale interaction of the main pulse with the target can be self-consistently modeled as well. This coupling of the codes has revealed valuable insights into the experimental results, and yield interesting ramifications for the Fast-Ignition route to fusion energy.

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