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Full-scale PIC simulations of fast ignition LUIS O. SILVA, FREDERICO FIUZA, MICHAEL MARTI, RICARDO A. FONSECA, GoLP/IPFN - LA - Instituto Superior Tecnico, JOHN TONGE, JOSH MAY, WARREN B. MORI, UCLA — Fast ignition modeling presents a grand challenging due to the different spatial and temporal scales. Following the work on a optimized hybrid algorithm for modeling inhomogeneous plasmas by B. Cohen et al. [JCP 229, 4591 (2010)], an hybrid algorithm was implemented in OSIRIS [F. Fiuza et al., PPCF 53, 074004 (2011)], allowing for the self-consistent modeling of all the relevant physics at different scales, and leading to a dramatic change in the computational resources required to model fast ignition. We will present results from the first multi-dimensional full-scale integrated simulations of fast ignition. Realistic compressed target profiles obtained from hydrodynamic simulations were used to study key questions such as the multipicosecond evolution of laser absorption and beam divergence, the fast electron transport, and its energy deposition in a fully self-consistent manner. Control of electron divergence, capable of providing laser to core energy efficiencies consistent with ignition conditions, will be shown either by changing the laser profile or by using external collimating structures.

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