Integrated hybrid-PIC modeling of fast ignition

FREDERICO FIUZA, RICARDO FONSECA, LUIS SILVA, GoLP/Instituto de Plasmas e Fusão Nuclear - LA, Instituto Superior Tecnico, Portugal, WARREN MORI, UCLA — The integrated modeling of fast ignition of ICF targets is important to understand the electron source requirements and the optimal laser/target configuration for ignition. We have used the hybrid-PIC algorithm of OSIRIS [F. Fiuza et al., PPCF 53, 074004 (2011)] to model fast ignition in a self-consistent way at realistic densities, spatial and temporal scales. We will present a detailed analysis of the laser absorption and the fast electron source characterization for different laser and target parameters in 2D and 3D. Integrated electron transport and energy deposition calculations for realistic ignition laser parameters (100 kJ, multi-ps) will be shown and used to identify the electron source requirements for ignition. The control of the electron energy distribution and divergence by using an external magnetic structure and/or multiple radially incident short pulses will be discussed, showing the possibility of achieving conditions consistent with ignition.

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