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Fast electron generation and transport from ten-picosecond laser-plasma interactions in the cone-guided fast ignition[1] B. QIAO, L.C. JARROTT, C. MCGUFFEY, UCSD, M.S. WEI, GA, S. CHAWLA, UCSD, A.A. SOLODOV, LLE, R.B. STEPHENS, GA, P.K. PATEL, H.S. MCLEAN, LLNL, F.N. BEG, UCSD — In fast ignition (FI) inertial confinement fusion, an essential element is the efficient conversion of the ignition laser energy into directional fast electrons and transport of the latter through the cone tip. Here, we report 2D PIC simulations of laser plasma interaction (LPI) and fast electron generation and transport using LSP code for recent cone-in-shell integrated FI experiments at the Omega laser facility. In the simulations, the exact OMEGA-EP laser parameter (10ps scale) is used and the initial preplasma condition inside the cone is calculated directly from the 2D rad-hydro modeling of the measured EP prepulse (21mJ), which exhibit a jet-structured density profile with critical surface extending 150μm away from the tip on axis. The result shows that a larger number of fast electrons escape sideway to the cone wall instead of going forward to the tip due to LPI in large-scale preplasma and laser bifurcation when interacting with the curved critical surface. It is also found that intense magnetic field traps the fast electrons inside low-density plasma affecting the coupling. Therefore, only 1% of laser energy coupled into the fast electrons entering the tip. However with high contrast EP laser (prepulse $<$ 1mJ), coupling increased to be 12%.

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