Abstract Submitted
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Investigation of high-intensity laser-plasma interaction and fast electron source characteristics from 1-10 ps pulse length[1] A. SOROKOVIKOVA, B. QIAO, UC San Diego, M.S. WEI, R.B. STEPHENS, GA, P. PATEL, H. MCLEAN, LLNL, F.N. BEG, UC San Diego — Efficient conversion of laser energy to hot electrons is extremely important for the success of Fast Ignition (FI), where a drive laser pulse with duration of 10ps and energy 100's of kJ is required. Here we report the first theoretical and numerical study on the characteristics of laser-plasma interaction (LPI) and fast electron source production from 1-10 ps pulse drive. It is found that due to a significant hydrodynamic plasma expansion in picoseconds, the fast electron acceleration mechanism strongly relies on the laser leading edge depletion [1] in near critical plasma and the electrostatic potential [2] caused by low-density plasmas. Both the fast electron average temperature and the laser-electron conversion efficiency increase more than 2 times by extending the laser pulse length from 1ps to 10 ps. Their dependences on the preplasma scale length are also analyzed.

[1] A. P. L. Robinson et al., PPCF 53, 065019 (2011).
[2] B. S. Paradkar et al., PRE 83 046401 (2011).

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