

**PRE-PLASMA SCALE LENGTH EFFECT ON HOT
ELECTRON GENERATION IN LASER MATTER
INTERACTION***

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The pre-plasma created by the laser pre-pulse can significantly alter the dynamics of relativistic hot electrons generation in laser matter interaction at relativistic intensities ($\gg 10^{18}$ W/cm²). This may be important for fast ignition of Inertial Confinement Fusion (ICF) as optimum energy of hot electrons required for efficient core heating is in the range of 1-3 MeV.

We have investigated the dynamics of hot electrons generation in presence of pre-plasma with three different scale-lengths (0.1 μ m, 5 μ m, and 15 μ m) in intensity range of 10^{19} to 10^{21} W/cm² by performing 1-D PIC simulations with hybrid-PIC code LSP. Highly non-linear interaction of plasma with electromagnetic waves is observed near critical density surface. The role played by recently reported axial electric fields^{1,2} produced by charge separation is examined for both fixed and mobile ion cases. The effects of the plasma scale length and laser intensity on fast electron energy distribution, effective hot electron temperature and laser reflection coefficient will be discussed. In addition, comparison of results for linearly and circularly polarized light will be presented.

1. A.J.Kemp, Y.Sentoku and M.Tabak, Phys. Rev. Lett. 101, 075004 (2008)
2. M.Sherlock, Phys. Plasmas 16, 103101 (2009)

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