Abstract Submitted
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Absorption of High Intensity Lasers at Solid Density[1] J. MAY, J. TONGE, UCLA, F. FIUZA, R.A. FONSECA, L.O. SILVA, IST, C. REN, U. of Rochester, W.B. MORI, UCLA — Understanding the interaction of very intense lasers ($I \geq 5 \times 10^{19} W/cm^2$) with dense plasmas is critical to the fast ignition (FI) approach to confined fusion, as well as other processes such as radiation pressure acceleration (RPA). To investigate this regime we use the particle-in-cell (PIC) code OSIRIS, looking at such lasers interacting directly with solid density targets ($n \gg n_c$). We find that electrons are accelerated in a way distinct from the commonly proposed absorption mechanisms, i.e. Brunel or JxB. Specifically, we see a standing wave structure being setup at the target surface, and electrons accelerated directly by the transverse electric field of this wave in the vacuum region. Furthermore the magnetic field of this structure reflects all electrons except those with sufficient transverse momentum in phase with this wave, meaning that absorption is very low until the target surface heats to keV temperatures, and also for circular laser polarization. Particle tracking in OSIRIS and a test particle simulation confirm that this model explains well the acceleration we see in simulations.

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