Abstract Submitted
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Laser-plasma interactions and hot electron generation in shock ignition[1] CHUANG REN, RUI YAN, JUN LI, University of Rochester — We present 2D Particle-in-cell (PIC) simulations, including electron-ion collisions and lasting more than 10 ps, on laser-plasma interactions for two sets of shock ignition (SI) parameters. The first is for conditions relevant to the Omega laser facility with a spike intensity of $I = 2 \times 10^{15}\mathrm{W/cm^2}$ and the density scale length at the quarter critical surface of L $\sim$ 170microns. The second is relevant to NIF conditions with $I = 5 \times 10^{15}\mathrm{W/cm^2}$ and L$\sim$400microns. Under the Omega conditions, the simulations show a bursting pattern in both plasma waves and hot electron fluxes, which is attributed to the interplay between stimulated Raman scattering (SRS) and two-plasmon decay (TPD) instabilities. The observed hot electron temperatures compare favorably to those measured in the 40+20 spherical SI experiments (Theobald et al. 2012). SRS is the main source for hot electrons but TPD can produce >100 keV ones. Similar bursting patterns are also observed in the NIF-relevant simulations. However, these simulations show strong SBS in rather low density region ($\sim 0.1 n_{cr}$).

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