The hot electron temperature and laser light absorption in fast ignition[1] MALCOLM HAINES, Imperial College, London, MINGSHENG WEI, FARHAT BEG, University of California, San Diego, RICHARD STEPHENS, General Atomics, San Diego — Experimental data [F. N. Beg et al, Phys. Plasmas 4, 447 (1997)] indicates that for intense short pulse laser-solid interactions at intensities up to 5×10^{18} Wcm^{-2}, the hot electron temperature scales as $(I\lambda^2)^{1/3}$. A series of analytic models based on conservation laws is presented here. The first and simplest model finds this scaling with the appropriate constant assuming 100% energy absorption from the laser beam to fast electrons. The second and more accurate, fully relativistic model includes momentum conservation and a more general formula is found that essentially agrees closely with the first, the scaling being much lower than ponderomotive scaling. The reason for this is to be found in examining the electron forward displacement compared to the collisionless skin-depth. The effect of reflected and back-scattered light in the third model indicates that at high intensity ($>10^{19}$ Wcm^{-2}) the absorption of laser light approaches 80 to 90%.

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