Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Laser Energy Absorption Scaling and Ion Production in Thick and Thin Targets[1] MALCOLM HAINES, Imperial College, London, MING-SHENG WEI, FARHAT BEG, University of California San Diego, RICHARD STEPHENS, General Atomics San Diego — A fully relativistic model has been developed for the interaction of an intense laser with an overdense plasma. The model is based on conservation laws in one dimension for momentum flux and energy flux across the vacuum-plasma boundary. The main results are (a) that the maximum hot electron temperature scales as $(1 + 2^{1/2}a_0)^{1/2} - 1$, in units of the electron rest mass energy and (b) the light absorption can be 80%-90% for intensity $>10^{19}$ W cm^{-2} This theory has been extended to the case of a thin target, at the rear boundary of which fast electrons can reflux. Momentum and energy flux conservation leads to surface ion acceleration (typically protons in experiments), while refluxing electrons re-entering the front boundary region lead to greatly reduced laser-light absorption. This is relevant to proton driven fast ignition.

[1]Work supported by US DOE under contracts DE-FC02-04ER54789 (Fusion Science Center) and DE-FG02-05ER54834 (ACE).

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Date submitted: 21 Jul 2009 Electronic form version 1.4