Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Integrated LSP Modeling of Fast-electron Production and Transport in a Wire Target[1] MINGSHENG WEI, JOHN PASLEY, FARHAT BEG, UCSD, RICHARD STEPHENS, General Atomics, DALE WELCH, Voss Scientific
— Integrated simulations using the implicit PIC code LSP# have been performed to study the production of relativistic electrons from ultra-intense (I $\sim$ 7 x 10^{19} W/cm^2) sub-picosecond laser solid interactions including a preformed plasma and the transport of such beam in a thin (50 μm in diameter), 100's μm long wire target. Our 3D simulations show that greater than 40% of laser energy is transferred to fast electrons whose energy spectrum can be fitted to a two-temperature Maxwellian distribution. The fast electrons have a typical propagation length of about 100 μm inside the wire target. A very small fraction of the fast electrons is confined in the wire target surface by strong electric and magnetic fields and these electrons have a much longer range. The simulation results agree well with recent Titan wire experiments [1], as well as with other collisional PIC modeling.
[1] F. N. Beg, Invited talk, 9th International Fast Ignition Workshop, Cambridge, MA, Nov. 3-5, 2006; J. Pasley et al., to be submitted to Phys. of Plasmas. #LSP is a software product of ATK Mission Research.

[1]This work is supported by USDOE under DE-FC02-04ER54789, DE-FG02-05ER54834, and DE-FG03-00ER54606. This work is also partially supported by the NCSA under TG-PHY050034T, TG-PHY060020T.

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Date submitted: 24 Jul 2007 Electronic form version 1.4