Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Relativistic electron transport in wire and foil targets driven by intense short pulse lasers[1] R.J. MASON, Research Applications, R.B. STEPHENS, General Atomics, M. WEI, UCSD, R.R. FREEMAN, J. HILL, L.D. VAN WOERKOM, The Ohio State University — We model intense laser driven electron transport in wires and foils with the new implicit hybrid code e-PLAS. We focus on background plasma heating for Fast Ignitor applications. The model tracks collisional relativistic PIC electrons undergoing scatter and drag in a background plasma of colliding cold electron and ion Eulerian fluids. Application to 10 μm diameter, 250 μm long, fully ionized carbon wires with an attached cone [Kodama et al. Nature **432** 1005 (2004)], exposed to 1 ps, 10^{19}W/cm^2 pulses in a 30 μm centered spot, directly calculates resistive Joule heating of the background electrons in the wire to 1.7 KeV. 150 MG magnetic fields arise at the wire surfaces corresponding to hot electron flow outside the wire and a return electron flow just within it. Shorter wires (25 μm) exhibit hot electron recycling. Preliminary simulations indicate that reduction of the cone to a 30 μm diameter nail head produces little change in these results. We also report on tapered wires, wires attached to foils, and the modifying effects of pre-plasma on electron transport into the foils.

[1]Work supported by the USDOE.

Rodney Mason
Research Applications Corporation

Date submitted: 26 Jun 2006 Electronic form version 1.4