Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Interaction of ultra-intense ultra-short laser light with a magnetized target[1] PHILIPPE LEBLANC, YASUHIKO SENTOKU, RADU PRESURA, University of Nevada, Reno — An ultra-intense short-pulse laser is an important tool capable of isochorically heating a thin solid target to beyond 100eV in a picosecond before hydrodynamic effects force it to expand. The temperature we could achieve depends on the dynamics of hot electron transport inside the target. We have simulated in 2D the hot electron transport in solid density plasmas using a collisional particle-in-cell code, PICLS. Because of rapid lateral motion of hot electrons the target heating is less efficient especially in low Z targets, such as a CH target. We have proposed uniformly magnetized isochoric heating by using a 1MA Z-pinch machine as a MG field generator and have studied the hot electron diffusion across the imposed magnetic field. We found that the external magnetic field was partially expelled from the heated region due to the circular motion of the hot electrons, and was compressed at the edge of the region. That is why the presence of an external MG field is able to slow down the hot electrons' lateral diffusion, and improve the bulk heating efficiency significantly. We will also show the effects of scaling the external magnetic field on the confinement of hot electrons.

[1]This work was supported by DOE/NNSA Grant No. DE-FC52-06NA27616.

Philippe Leblanc
University of Nevada, Reno

Date submitted: 14 Jul 2009 Electronic form version 1.4