Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Numerical modeling of laser isochoric heating of hot dense matter YASUHIKO SENTOKU, ANDREAS KEMP, MIKE BAKEMAN, RADU PRESURA, THOMAS COWAN, Department of Physics, University of Nevada, Reno — Ultra-intense short-pulse lasers are important tools for creating short-lived high energy plasmas, however to date, it has not been possible to create several hundred eV solid density matter because of the rapid transport of the laser-generated hot electrons throughout the target volume. We proposed a new way to isochorically heat matter at solid density to extreme temperatures by magnetic confinement of laser- generated hot electrons for several picoseconds by application of a multi-MG external field. In advance of an experiment at the Nevada Terawatt Facility (NTF), using a 100 TW- class laser, which will be synchronized to a 1MA Z-pinch machine, we have performed theoretical studies using a collisional particle-in-cell codes PICLS, which is optimized for a study of isochoric heating of solid density plasmas. One of the critical issues of the PIC simulation of the the laser isochoric heating is significant numerical heating, which makes difficult to simulate 100 eV solid density plasmas over picoseconds by PIC. In this talk, we introduce a couple of numerical techniques to extend the grid size with suppressing the numerical heating and also the full relativistic collision model to simulate the isochoric heating by ultra-intense lasers. This work was supported by DOE/NNSA-UNR grant DE-FC52-01NV14050.

Yasuhiko Sentoku
Department of Physics, University of Nevada, Reno

Date submitted: 26 Jul 2005 Electronic form version 1.4