Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Simulations of Ultra-HED Plasmas Created by Femtosecond Laser Irradiation of Vertically Aligned Nanowire Arrays[1] V.N. SHLYAPTSEV, Colorado State University, A. PUKHOV, Institut für Theoretische Physik, Heinrich-Heine-Universität Düsseldorf, M.A. PURVIS, R.C. HOLLINGER, C. BARGSTEN, J.J. ROCCA, Colorado State University — We discuss PIC, hydrodynamic, atomic, and radiation transport modeling results of a new approach for the creation of ultra-high energy density multi-Gbar pressure plasmas in the ultrasonic heating regime utilizing femtosecond laser pulse irradiation of vertically aligned nanowire arrays. This regime, initially proposed for sub-critical density plasmas (foam, gas etc targets) and successfully used with large energy ns-duration lasers, was realized here with fs laser pulses by irradiating arrays of vertically aligned metal nanowires which allowed penetration and dissipation of laser radiation in densities 100x the critical density. This leads to the formation of almost classical plasmas that are simultaneously hot and dense, and to the generation of ultra-high pressures and extreme degrees ionizations (eg. Au +52). Applications of such plasma to the efficient generation of a point source of short duration multi-keV X-rays and atomic physics studies will be discussed.

[1]Work supported by Defense Threat Reduction Agency grant HDTRA-1-10-1-0079 and by the HEDLP program of the Office of Science of the U.S Department of Energy. Equipment developed under NSF grant MRI-ARRA 09-561. A.P was supported by DFG-funded project TR18

Reed Hollinger
Colorado State University

Date submitted: 12 Jul 2013 Electronic form version 1.4