Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Spectroscopic characterization of an ultrashort laser driven Ar cluster target incorporating both Boltzmann and particle-in-cell models MANOLO SHERRILL, J. ABDALLAH, G. CSANAK, Theoretical Division Los Alamos National Laboratory, E. DODD, Applied Physics Division, Los Alamos National Laboratory, Y. FUKUDA, Advanced Photon Research Center, Japan Energy Research Institute, Y. FAENOV, Multicharged Ions Spectra Data Center of VNIIFTRI — A model that solves simultaneously both the electron and atomic kinetics was used to generate a synthetic He_α and satellite X-ray spectra to characterize a high intensity ultrashort laser driven Ar cluster target experiment. In particular, level populations were obtained from a detailed collisional-radiative model where collisional rates were computed from a time varying electron distribution function obtained from the solution of the zero dimensional Boltzmann equation. In addition, a particle-in-cell simulation was used to model the laser interaction with the cluster target and provided the initial electron energy distribution function (EEDF) for the Boltzmann solver. This study suggests that an average high density of $N_a = 3.2 \times 10^{20}$ cm^{-3} was held by the system for a time of 5.7 ps, and during this time the plasma was in a highly non-equilibrium state in both the EEDF and the ion level populations. Finally, this work provides evidence that cluster targets could produce X-ray radiation in the 100 femtosecond time scale.

Manolo Sherrill
Los Alamos National Laboratory

Date submitted: 17 Jun 2005 Electronic form version 1.4