Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Atomic rate coefficients in a degenerate plasma VALENTIN ASLANYAN, GREG TALLENTS, Univ of York — The electrons in a dense, degenerate plasma follow Fermi-Dirac statistics, which deviate significantly in this regime from the usual Maxwell-Boltzmann approach used by many models. We present methods to calculate the atomic rate coefficients for the Fermi-Dirac distribution and present a comparison of the ionization fraction of carbon calculated using both models. We have found that for densities close to solid, although the discrepancy is small for LTE conditions, there is a large divergence from the ionization fraction by using classical rate coefficients in the presence of strong photoionizing radiation. We have found that using these modified rates and the degenerate heat capacity may affect the time evolution of a plasma subject to extreme ultraviolet and x-ray radiation such as produced in free electron laser irradiation of solid targets.

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Date submitted: 22 Jul 2015 Electronic form version 1.4