Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Thermonuclear burn model within a molecular dynamics simulation of hot dense plasmas JAMES GLOSLI, LLNL, Livermore CA, MICHAEL MURILLO, LANL, Los Alamos, NM, JOHN CASTOR, LLNL, Livermore CA, CHRIS FICHTL, PAUL GRABOWSKI, LANL, Los Alamos, NM, FRANK GRAZIANI, LLNL, Livermore, CA — Applications of classical molecular dynamics methods to dense plasmas preserve the many-body ion-ion correlations functions that many other theoretical approaches neglect. However, a strictly classical description of a hot dense plasma will fail in modeling thermonuclear burn. To rectify this we introduce a model that allows for fusion events, coupling of the ions and electrons and the production of radiation with in a MD framework. The fusion is incorporated though a stochastic process that allows fusion between nearby ions. The probabilities for this process are chosen to reproduce known nuclear cross-section data. The ion-electron coupling model replaces the electrons with a thermal bath, which couples to the ions via a Langevin process. The Langevin parameters are chosen to slow fast ions according to known dE/dx formulae and to drive the electron and ion temperatures toward a common temperature. Finally, the energy flow to and from the radiation field is modeled simply by a set of ode's that couple the electron bath and radiation field. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Date submitted: 26 Jul 2011 Electronic form version 1.4