Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Ab initio benchmarking of the thermal conductivity models for hydrogen under ICF conditions JEAN CLEROUIN, VANINA RECOULES, FLAVIEN LAMBERT, BENOIT CANAUD, ALAIN DECOSTER, CEA/DAM Île-de-France, Bruyères-le-Châtel, 91297 Arpajon Cedex France — We present the first ab initio evaluation of the thermal conductivity of hydrogen for a density ($\rho = 80$ g/cc) and in a range of temperatures (50 eV $<$ T $<$ 1000 eV) which corresponds to the Inertial Confinement Fusion regime. Such simulations are made possible by the use of nearly coulombic pseudo-potentials whith a high cutoff in energy, and by the high density which translates into a moderate T/T_F ratio (where T_F is the Fermi temperature), and thus a moderate number of electronic orbitals to consider. With rising temperature, the hydrogen plasma evolves from the strongly coupled degenerate regime ($\Gamma = 14$) to the kinetic semi-degenerate regime. The thermal conductivity is computed from the general Kubo-Geenwood expression of the Onsager relations for transport coefficients. Results are compared with the usual Lee-More and Spitzer-Hubbard formulations.

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Date submitted: 16 Jul 2008 Electronic form version 1.4