Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Pressure and electrical resistivity measurements on hot expanded nickel: comparisons with quantum molecular dynamics simulations and average atom approaches JEAN CLEROUIN, CHARLES STARRETT, GERALD FAUSSURIER, CHRISTOPHE BLANCARD, PIERRE NOIRET, PATRICK RENAUDIN, CEA, DAM, DIF 91297 Arpajon Cedex France — We present experimental results on pressure and resistivity on expanded nickel at low density ($0.1\,\mathrm{g/cm^3}$) and high temperature (1-3 eV). These data, corresponding to the warm dense matter (WDM) regime, are used to benchmark different theoretical approaches. A comparison is presented between fully 3-dimensional quantum molecular dynamics (QMD) methods, based on density functional theory, with average atom (AA) methods, that are essentially one dimensional. In this regime the evaluation of the thermodynamic properties as well as electrical properties is difficult due to the concurrence of density and thermal effects which directly drive the metal-non-metal transition. Experimental pressures and resistivities are given in a tabular form with temperatures deduced from QMD simulations.

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Date submitted: 13 Jul 2010 Electronic form version 1.4