Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Super Configuration Accounting Equation of State for WDM and HED plasma[1] T. G. LEE, US Naval Research Lab, M BUSQUET, Research Support Instruments, Lanham, MD 20706, USA, D GILLES, CEA/IRFU/Sap /IRAMIS/LYDIL, F-91191, Gif-sur-Yvette, France, M KLAPISCH, Berkeley Research Associates Inc., 6551 Mid Cities Ave, Beltsville, MD, USA — Rad-Hydro numerical codes require Equation of State (EOS) and opacities. We describe a procedure to obtain an EOS compatible with our STA opacity model. We use our relativistic super-configuration code - STA-2.5 [1] to compute the average <Z>and excitation-ionization internal energy U and chemical potential _. These and other data will serve as basic inputs into a Yukawa Monte-Carlo [2] improved version of quotidian EOS [3], known as YMCQ. The screening in the Yukawa potential describing the ion-ion interaction is modified by the data from STA. This integrated procedure yields the excess internal energy due to the non-ideal behavior of the EOS concordant with our opacity model and allows us to have an EOS model applicable from solid matter to very tenuous plasmas as found in laser fusion, astrophysics, or tokamaks. We shall present its application to Carbon, Aluminum and Iron. [1] M. Busquet, M. Klapisch, Bull. American Phys. Soc. 55, 225 (2010) [2] D. Gilles, F. Lambert, J. Clérouin, G. Salin, HEDP 3, 95 (2007); J. M. Caillol, D. Gilles, J. Stat. Phys. 100, 933 (2000) [3] D. M. More, K. H. Warren, D. A. Young, and G. B. Zimmerman, Phys. Fluids 31, 3059 (1998)

[1]This work is made possible by a financial support from DOE/NNSA.

Teck Ghee Lee
US Naval Research Lab

Date submitted: 13 Jul 2017 Electronic form version 1.4