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Behavior of the coupling parameter under isochoric heating in a high Z plasma JEAN CLEROUIN, PHILIPPE ARNAULT, GREGORY ROBERT, CEA/DAM/DIF, 91297 Arpajon France, JOEL KRESS, LEE COLLINS, Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — We have performed orbital-free molecular dynamics simulations on tungsten along the ρ=40 g/cm^3 isochore corresponding to twice the normal density with temperatures ranging from 10 eV to 5 keV [1]. The structure of the plasma is interpreted with an effective one component plasma model defining an ion-ion coupling constant and an effective ionization. We show that along an isochore the effective ionic coupling parameter is almost constant over a wide range of temperatures (in our case $\Gamma \simeq 20$) due to the competition between rising temperatures and increased ionization. This Γ-plateau effect depends on the chosen density and is well delineated at normal density but almost disappears at five times the normal density. Taking advantage of the Thomas-Fermi scaling laws, we have produced a simple and universal formulation which allows to predict the existence, the coupling, and the the range of temperatures of the plateau. Our predictions are found in reasonable agreement with recent isochoric heating experiments and can be used to obtain well defined and predictable experimental conditions.

[1] J. Clérouin, G. Robert, P. Arnault, J. D. Kress, and L. A. Collins, Phys. Rev. E 87, 061101 (2013).

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