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**Non-LTE equation of state for simulations of laser-plasma interaction** EREZ RAICHER, Soreq NRC, ZOHAR HENIS, ITZHAK KELSON — In this work we present equation of state (EOS) for the free and bound electrons in non-LTE (Local Thermodynamic Equilibrium) conditions typical for laser-plasma interaction. In order to characterize the plasma we solve stationary rate equations for the populations of the bound electrons (since the Saha-Boltzman distribution is not adequate in non-LTE). For this purpose we use screened hydrogenic average atom approximation with l-splitting. Having found the bound state populations and ionization degree, we evaluate the pressure and internal energy. The bound electrons pressure is calculated using the quantum mechanical stress tensor formula and the free electrons are treated as free fermions. This electronic EOS is added to the cold and ionic terms of QEOS model and then implemented to a 1D hydro-radiative code. The simulation results are compared to those with other EOS models.

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