The Uniform Electron Gas at Warm Dense Matter Conditions.

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The availability of an accurate parametrization of the exchange-correlation energy of the uniform electron gas (UEG) on the basis of ground state quantum Monte Carlo simulations has been crucial for the success of density functional theory (DFT) calculations within the local density approximation. However, it is widely agreed [1] that the description of recent experiments with inertial confinement fusion and laser-excited solids within the DFT framework requires to go beyond the ground state. While an explicitly thermodynamic DFT approach is long known, it requires an accurate parametrization of the exchange-correlation free energy of the UEG at warm dense matter conditions. Here we present a novel parametrization that is based on our recent ab initio simulations [2,3,4,5] and compare to various other parametrizations.

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