Excess energy of strongly coupled one-component plasma from variational approach

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The excess energy of the one-component plasma fluid is calculated using the variational approach combined with different variants of the excess entropy of the hard-sphere fluid, which is used as a reference system. Our comparison with recent Monte Carlo results for the excess energy of the one-component plasma identifies the Percus-Yevick virial entropy as the most accurate entropy to be used in the variational calculation of this kind. The reason for this and potential developments of the present analysis are briefly discussed. We demonstrate that the original Rosenfeld-Tarazons scaling of the thermal component of the excess energy of the one-component plasma fluid is in excellent agreement with recent Monte Carlo results.