Bound states broadening in non-ideal hydrogen plasma

A. N. Starostin, V. C. Roerich

Troitsk Institute for Innovation and Fusion Research (TRINITI)
Troitsk, Moscow region, 142190

Equation of state for weakly-non-ideal hydrogen plasma is developed. The correct separate treatment of bound and scattering states contribution (in comparison to Planck-Larkin partition function) allows natural generalization to broadening of atomic states. Influence of broadening on partial contributions of the atomic states, the cutoff of the partition function, the adiabatic exponent and the sound velocity for conditions of the Sun‘ interior are presented. PF limitation was applied basing on characteristic energy - ionization potential ratio. Partial contribution of atomic states decreases due to broadening up to a factor of 2 for conditions of the solar interior. Previous results for the weakly-non-ideal hydrogen plasma model for interior of the Sun without account of broadening in the contribution of bound states are also corrected.