

Abstract Submitted
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Correlated $n^{1,3}S$ states for two-electron atoms in screened potentials LORENZO UGO ANCARANI, Universite de Lorraine, France, KARINA V. RODRIGUEZ, GUSTAVO GASANEO, Universidad Nacional del Sur, Argentina — We investigate two-electron atoms placed in a plasma environment, and consider both exponential cosine screened Coulomb potentials (ESCP) [1] and Debye-Hückel or screened Coulomb potentials (SCP), for which the screening parameter λ is related to the plasma frequency. Using highly correlated Hylleraas-type expansions, Ghoshal and Ho [2] have published the first calculations of the ground states of H^- and He in ESCP and SCP for a wide range of λ values. We have confirmed these results with relatively simpler wave functions within a Configuration Interaction approach with explicitly correlated basis functions satisfying exactly all two-body Kato cusp conditions [3]. The main aim of the present contribution is to extend the findings of Ghoshal and Ho in various directions: (i) we evaluate the energy for the ground and the first $^{1,3}S$ excited states, and provide analytical fits of the energy $E(\lambda)$; (ii) we further extend the investigation to the iso-electronic series considering higher values of the nuclear charge Z and provide a double fit $E(\lambda, Z)$ – thus a practical estimation tool for plasma applications; (iii) we make a systematic investigation of the λ_0 value for which the ground state ceases to exist.

[1] P K Shukla and B Eliasson 2008 Phys. Lett. A 372, 2897

[2] A Ghoshal and Y K Ho 2009 J. Phys. B 42, 075002; 42, 175006

[3] L U Ancarani and G Gasaneo 2007 Phys. Rev. A 75, 032706; 2008 Phys. Rev. A 77, 012705

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