Calculations of long-range three-body interactions for He(n_0 $^{\lambda}$S)- He(n_0 $^{\lambda}$S)-He(n_0´ $^{\lambda}$P)

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Synopsis Long-range three-body interactions for Helium atoms are investigated in this work.

We theoretically investigate long-range interactions between an excited ***P*** state He atom and two identical ***S*** state He atoms, for both spin singlet and triplet states, with highly accurate variationally-generated wave functions in Hylleraas coordinates. Using degenerate perturbation theory for the energies up to second-order, we evaluate the coefficients C_3 of the first order dipolar interaction and the coefficients C_6 and C_8 of the second order additive and nonadditive interactions. Both the dipolar and dispersion interaction coefficients, for this three-body degenerate system, show a dependence on the geometrical configurations of the three atoms. The nonadditive interactions start to appear in second-order [1]. The obtained coefficients C_n may be used to construct potential energy surfaces for three helium atom systems.

References

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