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Three-body correlations in mesonic-atom-like systems

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Mesonic atoms are the Coulomb bound systems of a nucleus and mesons. They interact with short-range strong interactions in addition to the long-range Coulomb potential. Studies of such kind of systems lead to the understanding of the short-range interactions such as meson-nucleon interactions. In Ref. [J.-M. Richard, C. Fayard, Phys. Lett. A 381, 3217-3221 (2017)], a system consisting of identical bosons that interact with schematic long- and short-range attractive potentials was studied as the simplest case. Importance of the three-body correlations was discussed by varying the strength of the short-range interaction. Extending that study, we employ more realistic three-body models. The one consists of identical bosons that interact with the long-range Coulomb and short-range potentials. The other consists of two identical bosons and one different boson that has half mass and opposite charge of the other bosons. We discuss the changes in the binding energy with respect to the strength of the short-range interaction and define the critical strength of the short-range interaction where the three-body correlations are not negligible.

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