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Tetraquarks in meson-meson picture using variational approach

The present study investigates the low-lying doubly-charm tetraquark states in the meson-meson interaction picture. The masses of charm mesons are calculated within the Cornell potential framework, including the spin-spin interaction and using Gaussian wavefunctions that include a variational parameter. Monte Carlo sampling is employed to determine the potential parameters, incorporating the masses of the quarks and the strong coupling constant. Subsequently, these meson masses are minimized with respect to the variational parameter for each state, providing optimized values of the masses of charm mesons. These calculated masses are then used to model the formation of tetraquark states. In this approach, meson-meson interactions are considered with the same potential parameters as those for individual mesons. This study contributes to understanding exotic hadronic states, specifically doubly-charm tetraquarks, and provides insights into the dynamics of multi-quark interactions within a unified potential model.

Field of contribution

Phenomenology

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