

DD^* Spectrum in Lattice QCD from Coordinate-Space Two-Hadron Operators and Long-Range Force Analysis

The DD^* energy spectra are extracted from lattice QCD by utilizing the Coordinate-Space Two-Hadron Operators, named as dumbbell method. Finite-volume energies indicate an attractive interaction in $I = 0$ channel and a repulsive interaction in $I = 1$ channel. To investigate the contribution of the long-range potential, we perform fits using models with and without the long-range potential. We find that the long-range potential plays a crucial role in determining the nature of the pole for the $I = 0$ case. When the long-range potential is included, the pole below the threshold acquires an imaginary part. In contrast, for the $I = 1$ case, the behavior of $p \cot \delta$ with the long-range potential included only exhibits a cusp effect near the left-hand cut.

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