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Charmonium-like channels 1^{+-} and 1^{++} with isospin 1

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Experimentally many exotic charmonium-like mesons have already been discovered, for example, the Z_c mesons. We study the spectrum of such states with isospin 1 focusing on the $\bar{c}c\bar{q}q$ channels with $J^P = 1^+$, $C = \pm$. This is the first study of four-quark states with these quantum numbers, where the total momentum is non-zero. The simulations are performed on two $N_f = 2 + 1$ CLS ensembles with different volumes and $m_\pi \simeq 280$ MeV. We extract the finite-volume energy levels and determine the scattering amplitude assuming decoupled $D\bar{D}^*$ scattering close to the threshold using Lüscher's formalism. Additionally, one-channel $J/\psi\pi$ scattering for $C = -$ is considered, and upper bounds are put on the scattering length and $1/(p \cot \delta)$ in certain energy regions, which constrains the interaction between J/ψ and π .

Topical area

Hadronic and Nuclear Spectrum and Interactions

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