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Lattice study of $ccus$ tetraquark channel in $D(^*)Ds(^*)$ scattering

Monday 3 November 2025 17:00 (20 minutes)

In this work, we investigate the possible existence of a strange partner of the T_{cc} tetraquark with flavor content $cc\bar{u}\bar{s}$ using lattice QCD. We determine the coupled-channel $DD_s^* - D^*D_s$ scattering amplitudes in the axialvector ($J^P = 1^+$) channel, as well as the elastic DD_s scattering amplitude in the scalar ($J^P = 0^+$) channel. The calculations are performed on two ensembles from the CLS consortium with $m_\pi \approx 280$ MeV, lattice spacing $a \approx 0.09$ fm, and spatial extents $L/a = 24$ and 32. The two-meson spectrum in the finite volume is determined for the DD_s , DD_s^* , D^*D_s , and $D^*D_s^*$ channels. This is achieved through a variational analysis of two-point correlation matrices constructed using a large basis of bilocal two-meson operators within the distillation framework. To extract the infinite-volume amplitudes, we employ Lüscher's formalism as well as a Lippmann-Schwinger equation based quantization condition in a plane-wave basis. Despite the presence of nontrivial interactions in both channels, no non-spurious pole singularities are found in the S-wave amplitudes within the constrained energy region.

Parallel Session (for talks only)

Hadronic and nuclear spectrum and interactions

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