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Three-body study of the T_{cc}^+ from lattice QCD

Friday 7 November 2025 17:00 (20 minutes)

In this talk, I discuss an ongoing first lattice study of the doubly-charmed tetraquark $T_{cc}^+(3875)$ via a fully three-body approach. We investigate the $DD\pi$ system in the $I = 0, C = 2$ sector, where the T_{cc}^+ appears as a pole in the $J^P = 1^+ DD\pi$ elastic scattering amplitude. The approach automatically incorporates two-body DD^* and three-body $DD\pi$ effects and treats left-hand cuts due to single π exchanges. Two CLS ensembles, X252 and X253, with pion mass $m_\pi \approx 280$ MeV, are used and an operator set comprised of two-hadron, three-hadron and tetraquark operators is employed to extract finite-volume energies. Additional inputs are required for the three-body finite-volume analysis, in the form of amplitudes for the $I = 1 DD$ and $I = 1/2 D\pi$ two-body subsystems. I present preliminary results for these subchannels and perform exploratory three-body spectra determinations for simple choices of the three-particle K-matrix $\mathcal{K}_{3,\text{df}}$, allowing a first comparison to the lattice spectrum.

Parallel Session (for talks only)

Hadronic and nuclear spectrum and interactions

Authors: BAIAO RAPOSO, Andre (Ruhr-Universität Bochum); STUMP, Andres (Humboldt-Universität zu Berlin); ROMERO-LOPEZ, Fernando (University of Bern); ALHARAZIN, Herzallah (Ruhr-Universität Bochum); GREEN, Jeremy (DESY, Zeuthen); BULAVA, John; Dr SALG, Miguel (University of Bern); DAWID, Sebastian (Indiana University); SHARPE, Stephen (University of Washington)

Presenter: BAIAO RAPOSO, Andre (Ruhr-Universität Bochum)

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