



Contribution ID: 57

Type: **Parallel Talk**

Doubly charmed tetraquark T_{cc}^+ in (2+1)-flavor lattice QCD near physical point

Monday, 31 July 2023 14:10 (20 minutes)

The doubly charmed tetraquark T_{cc}^+ recently discovered by the LHCb collaboration is studied on the basis of (2 + 1)-flavor lattice QCD simulations of D^*D system with nearly physical pion mass $m_\pi = 146$ MeV. The interaction of D^*D in the isoscalar and S -wave channel, derived from the hadronic spacetime correlation by the HAL QCD method, is attractive for all distances and leads to a near-threshold virtual state with a pole position $E_{\text{pole}} = -38(73)_{(-53)}^{(+20)}$ keV and a large scattering length $1/a_0 = -0.05(5)_{(-2)}^{(+2)}$ fm⁻¹. The virtual state is shown to evolve into a loosely bound state as m_π decreases to its physical value by using a potential modified to $m_\pi = 135$ MeV based on the pion-exchange interaction. Such a potential is found to give a semi-quantitative description of the LHCb data on the $D^0D^0\pi^+$ mass spectrum.

Topical area

Hadronic and Nuclear Spectrum and Interactions

Primary authors: AOKI, Sinya (Yukawa Institute for Theoretical Physics, Kyoto University); Dr LYU, Yan (Peking University)

Co-authors: Dr DOI, Takumi (RIKEN); Dr HATSUDA, Tetsuo (RIKEN); Dr IKEDA, Yoichi (Osaka University); Dr MENG, Jie (Peking University)

Presenter: AOKI, Sinya (Yukawa Institute for Theoretical Physics, Kyoto University)

Session Classification: Hadronic and Nuclear Spectrum and Interactions