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Quark mass dependence of the $T_{cc}(3875)^+$ pole

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Recently, several LQCD simulations have proven that the interaction in the isoscalar channel in DD^* scattering is attractive. This channel is naturally connected to the $T_{cc}(3875)^+$ which is observed in the $D^0D^0\pi^+$ invariant mass distribution. However, it remains an open question whether the virtual bound state found in these several LQCD simulations is actually linked to the LHCb experimental observation. In this article we perform an EFT-based analysis of the LQCD data and demonstrate that a proper chiral extrapolation leads to a T_{cc} pole compatible with experiment. At the physical pion mass, we find a virtual bound state with a binding energy $\Delta E = -0.06\,\binom{+1.30}{-2.20}\,\binom{+0.50}{-1.11}$. Moreover, we extract from a global analysis both the light and heavy quark mass dependence of the T_{cc} pole, and study the role of the ρ- and π-meson exchanges.

Collaboration

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