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The relativistic three-body scattering and the D^0D^{*+}-D^+D^{*0} system

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Scattering amplitudes involving three-particle scattering processes are investigated within the isobar approximation which respects constraints from two- and three-body unitarity. The particular system considered is the D^0D^{+}-D^+D^{0}, where the D^{+}~(D^{0}) enters as a p-wave D^+\pi^0 or D^0\pi^+~(D^0\pi^0 or D^+\pi^-) resonance. The interaction potentials in the coupled-channel D^0D^{+}-D^+D^{0} system contain the \sigma, \rho, \omega and \pi-exchange. The analytic continuation of the amplitudes across the three-body unitary cuts is investigated to search for poles on the unphysical Riemann sheets. Associated with an unstable particle D^{+}~(D^{0}) is a complex
two-body unitarity cut, through which one can further analytically continue into another unphysical Riemann sheet. Dynamical singularities emerged from the π-exchange potential are stressed. The pole generated from the D^0D^{+}-D^+D^{0} interaction and its line shape in D^0D^0\pi^+ break-up production are in agreement with double-charmed tetraquark T_{cc}^+ observed by the LHCb Collaboration.

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