

XVth Quark Confinement and the Hadron Spectrum



Contribution ID: 92

Type: Oral

General behavior of near-threshold hadron scattering for exotic hadrons

Monday 19 August 2024 16:40 (20 minutes)

Recently, exotic hadrons have attracted much attention. Most exotic hadrons appear near the threshold; $X(3872)$ near the $D\bar{D}^*$ threshold, T_{cc} near the DD^* , P_c near the $\Sigma_c\bar{D}^{(*)}$. It is important to study the hadron scattering near threshold in order to clarify the nature of exotic hadrons. Based on this observation, we discuss the general behavior of the near-threshold scattering amplitude with channel couplings.

Currently, the Flatte amplitude is often used to analyze the experimental data. However, it is known that some condition is imposed on the Flatte amplitude near the threshold [1]. In this study, we first compare the Flatte amplitude with the Contact amplitude [2] derived from the effective field theory with contact interaction, and clarify the constraint imposed on the Flatte amplitude. Furthermore, we show that the Contact amplitude cannot reduce to the Flatte amplitude directly.

To solve the above problems, we propose the General amplitude [3] that can reduce to both the Contact amplitude and the Flatte amplitude. By using the General amplitude, we find that the cross section may show the dip structures that cannot be reproduced by Flatte amplitude.

[1] V. Baru et al., Eur. Phys. J. A 23, 523 (2005)

[2] T.D. Cohen, B.A. Gelman, U. van Kolck, Phys. Lett. B 588, 57 (2004)

[3] K.Sone and T.Hyodo, EPJ Web Conf. 291, 05004 (2024)

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Session Classification: Heavy Quarks

Track Classification: C: Heavy Quarks