Contribution ID: **10** Type: **not specified**

Internal structure of exotic hadrons with coupled channel potential in relation with scattering observables

Wednesday 20 August 2025 14:30 (15 minutes)

We study the internal structure of exotic hadrons, especially focusing on the relation between the compositeness and physical observables [1, 2]. Defined as the probability of finding hadronic molecular components in the wave function, compositeness serves as a quantitative measure of the internal structure of exotic hadrons. We utilize the coupled-channel potential model incorporating both quark and hadron degrees of freedom, which naturally generate the "bare state" responsible for the elementary component as the bound state in the quark channel. The behavior of the compositeness under the variation of the model parameters is investigated by using the $X(3872)$ as an example. In particular, we analyze the associated scattering phase shifts and the bound state wave functions to discuss the relation between the compositeness and the scattering observables for a shallow bound state.
Reference
[1] I. Terashima and T. Hyodo, Phys. Rev. C, 108, 035204 (2023).
[2] I. Terashima and T. Hyodo, arXiv:2505.17657 [hep-ph].

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Session Classification: Young researcher session