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Model-independent determination of the compositeness of near-threshold quasibound states.

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Understanding of the structure of exotic hadrons is an important topic of the current hadron physics. The existence of many exotic hadrons, especially the XYZ particles, indicates that the internal structure of hadrons can be more complicated than the ordinary hadrons described by qqbar or qqq. For a stable shallow bound state, Weinberg has derived the model-independent relation between the compositeness and the observables. To study the structure of the exotic hadrons, we focus on this model-independent determination of the compositeness. Though the internal structure of the bound state is directly related to the experimental observables, the relation cannot be applied when the state has a finite decay width or the CDD pole lies as near threshold as the pole of the state. To settle these problems, using the nonrelativistic effective field theory, we extend the model-independent weak-binding relation to be applicable for the unstable quasibound state with including the CDD pole contribution. Finally we apply the generalized relation to Lambda(1405) and scalar mesons, and discuss their internal structures from the experimental observables.

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