

Pion properties in the Bethe-Salpeter formalism with a separable kernel

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The pion, as an exchange particle, plays a great role in the description of nuclear dynamics, since it has a small mass compared to other mesons. In the report, the Bethe-Salpeter formalism with a separable kernel is applied to describe the quark-antiquark system. The solution of the Bethe-Salpeter integral equation for the pion vertex function is obtained analytically by applying the separable interaction. Using this solution, the physical constants and dynamical observables of the pion are obtained. The four-dimensional integrals are calculated by using three independent numerical methods: the Cauchy's theorem method, the Feynman parameterization method, and the Wick rotation method. A set of model parameters is selected to describe both physical constants and dynamical observables of the pion decay and scattering in good agreement with experimental data.

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