



Contribution ID: 2

Type: not specified

Kaon in the nuclear medium

Using the light-front kaon wave function based on a Bethe-Salpeter amplitude model for the quark-meson interaction, we study the electromagnetic form factors, decay constants and charge radii of the kaon in nuclear medium within the framework of light-front QCD theory.

The kaon model we adopt is well constrained by previous studies to explain the kaon properties in vacuum. The above mentioned observables are evaluated for the $+$ component of the electromagnetic current, J_+ , in the Breit frame.

In order to consistently incorporate the constituent up and strange quarks of the kaon immersed in symmetric nuclear matter, we use the Quark-Meson Coupling model, which has been widely applied to various hadronic and nuclear phenomena in a nuclear medium with success.

We predict the in-medium modifications of the kaon electromagnetic form factor, charge radius and weak decay constant in symmetric nuclear matter.

Study also the sensitivity of the electromagnetic form factors and charge radius to the model's parameters; namely, the quark masses, m_u , m_s , and the regulator mass, m_R .

It is found that after a fine tuning of the regulator mass, i.e. $m_R = 0.6$ GeV, the model is suitable to fit the available experimental data within the theoretical uncertainties of kaon in medium.

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