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Thermal Behaviors of the Strong Form Factors of Charmonium and Charmed Beauty Mesons from Three Point Sum Rules

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Abstract : In order to understand the nature of strong interactions and QCD vacuum, investigation of the meson coupling constants have an important role. The knowledge on the temperature dependence of the form factors is very important for the interpretation of heavy-ion collision experiments. Also, more accurate determination of these coupling constants plays a crucial role in understanding of the hadronic decays. With the increasing of CM energies of the experiments, researches on meson interactions have become one of the more interesting problems of hadronic physics. In this study, we analyze the temperature dependence of the strong form factor of the BcBcJ/ψ vertex using the three point QCD sum rules method. Here, we assume that with replacing the vacuum condensates and also the continuum threshold by their thermal version, the sum rules for the observables remain valid. In calculations, we take into account the additional operators, which appear in the Wilson expansion at finite temperature. We also investigated the momentum dependence of the form factor at T = 0, fit it into an analytic function, and extrapolate into the deep time-like region in order to obtain a strong coupling constant of the vertex. Our results are consistent with the results existing in the literature.

Keywords : QCD sum rules, thermal QCD, heavy mesons, strong coupling constants
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