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The holographic potential model of the quarkonium and its dissociation

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We explore analytically the screening property of the heavy-quark potential within the framework of AdS/QCD. The results show that under a fairly general conditions of the metric underlying AdS/QCD, the screening remains kink-like, like that of the super Yang-Mills. In other words, AdS/QCD cannot provide a exponentially screening potential in the plasma phase. We shall also point out the kink-like screening potential may violate fundamental principles of quantum field theories.
Furthermore, we considered the relativistic effect on basis of the NR limit, and calculated the first order correction of the quarkonium dissociation temperature using the holographic potential model from AdS/CFT. Starting from the Hamiltonian of the two body Dirac equation, under the Foldy-Wouthuysen transformation. Respect to the perturbative calculation, in spite of the large constituent mass, the correction is significant in size, especially for J/Ψ. In addition, the first order relativistic correction will lower the dissociation temperature with a holographic potential.

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