

J/Ψ at high temperatures in anisotropic lattice QCD

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Abstract: The high-temperature J/Ψ mode above the QCD critical temperature T_c is studied using anisotropic quenched lattice QCD. We aim to clarify whether the J/Ψ state above T_c is a localized resonance state or a $c\bar{c}$ scattering state. We investigate $c\bar{c}$ modes for $1.1T_c < T < 2.1T_c$ using the $O(a)$ -improved Wilson quark action at $\beta = 6.10$ with renormalized anisotropy $a_s/a_t = 4$. To distinguish localized states and scattering states, we calculate the $c\bar{c}$ correlators on finite lattices with different spatial boundary conditions, i.e., the periodic and the anti-periodic boundary condition. (Note that the $c\bar{c}$ threshold is raised up in the anti-periodic boundary condition.) As a result, almost no energy difference is found for the lowest J/Ψ mode between the periodic and the anti-periodic boundary conditions at for $1.1T_c < T < 2.1T_c$. This fact indicates that the lowest J/Ψ mode can survive as a localized state even above T_c in quenched QCD.