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Lattice QCD study on quark mass dependence of quarkonium properties at finite temperature

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As a consequence of the melting of quarkonia due to the color Debye screening in a hot medium, suppression of quarkonium yields is expected to be observed in the quark gluon plasma produced in relativistic heavy ion collision experiments at RHIC and LHC. In fact, suppression of the J/Ψ yield has already been observed both at RHIC and LHC and thus theoretical understanding of charmonium properties at high temperature is important to explain experimental results. Moreover, recently, sequential Υ suppression at LHC has been reported by the CMS collaboration [1], which inspires theoretical interest of in-medium bottomonium behavior.

In this talk we report our lattice QCD study on quarkonium properties at finite temperature, which extends our previous study [2] with a couple of lattice spacings toward the continuum limit. Similarly to a previous charmonium study [3], we perform numerical simulations on large and fine isotropic lattices by using quenched gauge field configurations. To investigate differences between charmonium and bottomonium states, we vary the quark masses in the range between the charm and bottom masses. Spatial and temporal meson correlation functions are computed at temperatures in a range from $0.8T_c$ to $1.6T_c$ at both vanishing and finite momenta. We will discuss the temperature and quark mass dependence of the screening masses and the change and dissociation of various quarkonium states in the QGP. The spectral properties obtained in this study also provide information on a transport coefficient, the heavy quark diffusion coefficient, and its temperature and mass dependence.

[1]S. Chatrchyan *et al.* [CMS Collaboration], Phys. Rev. Lett. **109**, 222301 (2012) [arXiv:1208.2826 [nucl-ex]].

[2]H. Ohno, arXiv:1311.4565 [hep-lat].

[3]H.-T. Ding, A. Francis, O. Kaczmarek, F. Karsch, H. Satz and W. Soeldner, Phys. Rev. D **86**, 014509 (2012) [arXiv:1204.4945 [hep-lat]].

On behalf of collaboration:

None

Author: ONO, Hiroshi (University of Tsukuba)

Presenter: ONO, Hiroshi (University of Tsukuba)

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