

Charmonium spectral functions at finite momenta in the quark-gluon plasma from lattice QCD

Tuesday, May 24, 2011 4:20 PM (20 minutes)

From phenomenological considerations, J/ψ suppression was proposed as a signature of QGP production in relativistic heavy ion collisions, and has been considered as one of the most promising ones [1].

However recent lattice QCD calculations show that charmonia survive even above the critical temperature [2], which presents the possibility that the scenario of J/ψ suppression in relativistic heavy ion collisions may change.

To understand the relativistic heavy ion collision physics we need to take into account dynamics of the fireball which is produced after collisions. Therefore the detailed study on spectral functions of charmonia at finite momenta from the first principle calculation would shed light on the understanding of the J/ψ suppression mechanism in relativistic heavy ion collisions.

We study the charmonium spectral functions at finite momenta in the quark-gluon plasma on $64^3 \times N_t (=96(T/T_c=0.78), 54(1.38), 46(1.62), 40(1.87), 32(2.33))$ quenched anisotropic lattices with anisotropy $a_s/a_t = 4$, analyzing correlation functions of charmonia by the maximum entropy method (MEM) which is a very useful and powerful tool to analyze spectral functions from lattice QCD simulations [3]. We show detailed features of charmonium spectral functions of pseudoscalar and vector channels and modification of the dispersion relation at finite momenta and discuss medium effect on them in QGP.

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Primary author: Prof. NONAKA, Chiho (Nagoya University)

Co-authors: Prof. KITAZAWA, Masakiyo (Osaka University); Prof. ASAKAWA, Masayuki (Osaka University); Mr KOHNO, Yasuhiro (Osaka University)

Presenter: Prof. NONAKA, Chiho (Nagoya University)

Session Classification: Heavy flavors

Track Classification: Heavy flavor and quarkonia production