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Heavy meson mass spectrum at finite temperature based on AdS/CFT

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In heavy-ion collisions, the medium experiences hard and soft scatterings as it expands and a temperature cools down. Therefore the temperature of the medium plays a key role for getting the dynamical information of the medium, such as the energy/momentum distributions of emitting hadrons.
Existing meson types at each stage can provide the temperature information of the medium since each meson has its own melting temperature. These temperatures can be estimated from their masses at those temperatures but the only experimental information is given at zero temperature. At non-zero temperatures, there are several models to estimate the meson masses, where the temperature-dependence of quark-quark interactions is necessary. Most calculations use the free energies from Lattice results or their modifications, for this input. Recently, AdS/CFT offered the temperature-dependent potentials between quarks by introducing infrared cut-off on the AdS Schwarzschild space, which inhibit the two characteristic features, confinement at long rages and asymptotic freedom at small ranges. We adopted these temperature-dependences on our model potential, which is composed of a screened Coulomb-type strong potential plus a Coulomb potential as a vector potential and the linear plus constant potential as a scalar potential. Here the temperature dependence of the screening radius and tangent of the linear potential is determined based on AdS/CFT. For two quark system, we used the Dirac's constraint dynamics to get the Schrodinger-type equations with all dynamical and spin-dependent terms expressed by our model potential.
In this presentation, we calculated the meson mass spectrum, especially for quarkonia and B_{c} meson. Heavy meson masses are almost constant for T=0˜0.4T_{c} but decrease after 0.4T_{c} as temperatures increase up to 1.4T_{c}, especially linearly after T=T_{c}. Our results are consistent with others based on the Lattice calculation.

On behalf of collaboration:

NONE

Primary author: KIM, Minjung (Inha University (KR))

Co-authors: YOON, Jin Hee (Inha University (KR)); KWEON, Min Jung (Inha University (KR))

Presenter: KIM, Minjung (Inha University (KR))

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