

# Quarkonium spectral functions in a bulk-viscous quark gluon plasma

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In recent years, the bulk viscosity of a quark gluon plasma is gaining increasing attention concerning the beam energy scan program, since the bulk viscous effect is expected to be enhanced near a critical point. Here we address the question of whether heavy quarkonia, which are produced at the early stage of the heavy ion collisions, are sensitive to the bulk viscous nature of the quark gluon plasma. If this is the case, we might be able to use heavy quarkonia as a probe of the non-equilibrium properties of the plasma. We incorporate the bulk-viscous nature of the medium by deforming the distribution functions of thermal quarks and gluons, with which the dielectric permittivity is computed within the hard thermal loop approximation. The modified dielectric permittivity is used to calculate the in-medium heavy quark complex potential, which includes both perturbative Coulombic as well as non-perturbative string-like terms. Based on the modified heavy quark complex potential, we compute the quarkonium spectral function, with which the physical properties such as binding energies and decay widths are computed. We estimate experimental observables such as the  $\psi'$  to  $J/\psi$  ratio and the nuclear modification factor  $R_{AA}$  and discuss the implication of bulk viscous effect on them.

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