Contribution ID: **77** Type: **not specified**

Shear viscosity of classical Yang-Mills field with use of scaling invariance

Thursday, 6 August 2020 14:40 (20 minutes)

We report on our recent results of the shear viscosity η of the classical Yang-Mills (CYM) field on a lattice by using the Green-Kubo formula, where the shear viscosity is calculated from the time-correlation function of the energy-momentum tensor in equilibrium. The point of our investigation consists in utilization of the inherent scale invariance of CYM, and thereby the possible lattice-spacing dependence of the numerical results was circumvented. Thus the dependence of the shear viscosity $\eta(g,T)$ on the coupling g and temperature T is represented by a scaling function $f_\eta(g^2T)$ as $\eta(g,T) = Tf_\eta(g^2T)$ due to the scaling-invariant property of the CYM. The explicit functional form of $f_\eta(g^2T)$ is successfully determined from the calculated shear viscosity: It turns out that $\eta(g,T)$ of the CYM field is proportional to $1/g^{1.10-1.88}$ at weak coupling, which has a weaker dependence
on g than that in the leading-order perturbation theory but consistent with that of the “”anomalous viscosity””
$\eta \propto 1/g^{1.5}$ under the strong disordered field.
The obtained shear viscosity is also found to be roughly consistent with that estimated through the analysis of the anisotropy of the pressure of the CYM dynamics in the expanding geometry with recourse to a hydrodynamic equation.

Primary author: MATSUDA (*), Hidefumi (Kyoto University)

Co-authors: KUNIHIRO, Teiji; M\"{U}LLER, Berndt; OHNISHI, Akira; TAKAHASHI, Toru T.

Presenter: MATSUDA (*), Hidefumi (Kyoto University)

Session Classification: QCD at nonzero Temperature and Density

Track Classification: QCD at nonzero Temperature and Density