Contribution ID: **196** Type: **Poster**

Viscous effects of a hot QGP medium in time dependent magnetic field and their phenomenological significance

Momentum transport in a medium is characterized quantitatively by its shear and bulk viscosities. The shear viscous coefficient (η) governs the momentum transport transverse to the hydrodynamic flow while its bulk counterpart (ζ) does the same along the flow. In the context of quark gluon plasma (QGP), both η and ζ are very important transport coefficients, controlling phenomenologically important quantities such as the QGP thermalization time, sound attenuation length, elliptic flow, etc.

It is now well known that large initial magnetic fields (which subsequently decay) are produced in the heavy-ion collisions at RHIC and LHC, which have been shown to influence the evolution of the QGP medium. However, most studies in the literature are made with the assumption of a constant magnetic field.

In this work, we have studied, for the first time, the impact of a realistic picture of a time dependent electric and magnetic field on the shear and bulk viscosities of the medium. Both the electric and magnetic fields are considered to be exponentially decaying with time, and the study is valid in the regime where the magnetic field strength is weak ($eB \ll T^2$). The evaluation has been done in the kinetic theory framework wherein we have solved the relativistic Boltzmann equation within the relaxation time approximation type collision kernel. We have shown that the constant weak field results as well as the $B = 0$ results in the literature can be obtained as special cases of our general results. We have observed that the shear and bulk viscosities increase with time and conversely decrease with the strength of the magnetic field. To connect these observations with the experiment we have obtained the thermalization time, the sound attenuation length and other various phenomenologically significant quantities, using our results of η and ζ.

Category

Theory

Collaboration (if applicable)

Author: K K, Gowthama (Indian Institute of Technology Bombay)

Co-authors: NANDI, Basanta (Indian Institute of Technology Bombay); DEY, Debarshi (Indian Institute of Technology Roorkee); DASH, Sadhana (IIT- Indian Institute of Technology (IN))

Presenter: K K, Gowthama (Indian Institute of Technology Bombay)

Session Classification: Poster session 2

Track Classification: Electromagnetic probes