Theoretical Physics Seminars

Collective modes of a hot anisotropic QCD medium with Bhatnagar-Gross-Krook collision term

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In the heavy ion collision experiments the initial geometry of the hot QCD matter created is approximately almond shaped with only spatial anisotropy. Due to the expansion, the different pressure gradients in different directions cause a momentum anisotropy to develop which is present throughout the hydrodynamical expansion of the hot QCD matter. Therefore, it is inevitable to include such anisotropic effects while modeling a hot QCD medium. Collisions among the hard particles are responsible for the dissipation and needed for the hot QCD matter to reach the stage of equilibrium. Therefore, one simply can not ignore the collisions. Collective modes/excitation of hot QCD plasma can be understood as the collective motion that the plasma possesses due to the fluctuations in the equilibrium stage. The modes carry crucial information about the equilibrated QGP and play an important part in its dynamical evolution. The spectrum of the collective modes of the QGP can be studied with the help of the self-energy of the medium. In the seminar I shall discuss how the gluon self-energy of a hot anisotropic QCD medium (when medium interactions are also present) can be obtained using the semi-classical transport equation with Bhatnagar-Gross-Krook (BGK) collision term. I shall also discuss how the tensor decomposition of the gluon self energy leads to the structure functions which eventually control the dispersion relations and the collective mode structure of the medium.

All are welcome