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Direct Photon and Lepton Pair Production from Viscous quark-gluon plasma

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We have studied the effect of shear viscosity effects on direct photons as well as lepton pair production from Quark Gluon Plasma (QGP). The production rate for both these two thermodynamic signals gets modified due to: (i) changed space-time evolution of the viscous fluid and (ii) non-equilibrium correction to the equilibrium distribution function. The non-equilibrium correction grows with viscosity as well as transverse momentum. Viscous effects on photon production are strong [1]. The space-time evolution of QGP was obtained by solving Israel-Stewart's second order hydrodynamics for $\sqrt{NN}=200$ GeV Au+Au collisions. Effect of viscosity is to stiffen the dilepton spectra and reduce the elliptic flow [2]. Although, the rate of applicability is limited in the p_T range due to non-equilibrium effects, the thermometric signals can limit the initial temperature and viscosity, the ratios of dileptons to photons it is expected, can be a fairly good measure of viscosity without the uncertainty of initial conditions. Shear viscosity per entropy, it seems, does not change appreciably going from RHIC to LHC. We intend to explore this puzzle.

[1] A.K. Chaudhuri and Bikash Sinha, Phys. Rev. C 83, 03405 (2011)

[2] A.K. Chaudhuri and Bikash Sinha, to be published

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