Contribution ID: **164** Type: **Poster**

# Photon and dilepton production from viscous QGP

Photons and dileptons are important probe for the lattice QCD predicted deconfined matter, commonly called Quark-Gluon-Plasma (QGP). Unlike the strongly interacting hadrons, which can give information about the 'last scattering surface', electromagnetically interacting photons and dileptons give information about the matter at the deep interior. Viscous effects on photon and dilepton production is studied recently [1,2]. However, the model [1,2] appears to have some inconsistency that viscous effects on fluid evolution were not accounted for. In a recent work, we have removed the inconsistency [3]. Photon production rate from Compton and annihilation processes was convoluted over the space-time evolution of the QGP, obtained by explicitly solving Israel-Stewart's 2nd order theory of hydrodynamics. In viscous dynamics, photon/dilepton production is modified due to (i) changed space-time evolution of the fluid and (ii) non-equilibrium correction to the equilibrium distribution function. The non-equilibrium correction grows with viscosity as well with transverse momentum. Applicability of viscous hydrodynamics requires that the non-equilibrium correction is small. Viscous effects on photon and dilepton production are strong [3,4]. Even for AdS/CFT lower bound of viscosity ($\eta$/s=0.08), strong viscous correction render the hydrodynamics inapplicable beyond pT ˜ 1.5 GeV. If QGP viscosity is larger than the Ads/CFT limit, then limitation will be even more severe. Photon production as a function of initial time, also suggest that if the inverse slope parameter of the photon spectra, is measured within an accuracy of ˜20-80 MeV, one can possibly estimate the initial time and viscosity within reasonable limit. We also find that for dilepton invariant mass M˜600-900 MeV, the dilepton to photon ratio is sensitive to viscosity to entropy ratio of the medium. The dilepton to photon ratio can possibly serve as a 'viscometer' for QGP.

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**Track Classification:** Electromagnetic probes