Contribution ID: **19** Type: **Theory**

Effects of quark chemical equilibration on thermal photon elliptic flow

Friday 26 September 2014 17:50 (20 minutes)

Large hadronic elliptic flow v_2 is an evidence for the existence of a strongly-coupled QGP fluid in high-energy heavy-ion collisions. Since the medium is electromagnetically transparent, thermal photon v_2 was speculated to be much smaller than hadronic ones due to the contribution from the earlier stages where azimuthal flow is small. However, it has recently been found to be much larger than hydrodynamic estimations in both RHIC and LHC experiments, which is recognized as "photon v_2 puzzle" [1].

In this study, I discuss the implication of late quark chemical equilibration on the thermal photon v_2 [2] because the system in transition from a gluon-rich color glass condensate to an equilibrated QGP would have smaller number of quarks at the beginning [3]. The elliptic flow of thermal photons would be enhanced by the chemical imbalance because the photons are emitted from the quarks produced after sizable azimuthal anisotropy has developed in the flow. Numerical analyses with a newly-developed (2+1)-dimensional hydrodynamic model coupled to the rate equations for quark and gluon number changing processes imply that the thermal photon v_2 can be visibly enhanced. The mechanism would also lead to large v_3 which is revealed in the latest RHIC data. They indicate that interplay of the equilibration processes and the collective expansion would be important in explaining the heavy-ion phenomenon.

References:

[1] A. Adare et al. [PHENIX Collaboration], Phys. Rev. Lett. 109, 122302 (2012).

[2] A. Monnai, arXiv:1403.4225 [nucl-th].

[3] A. Monnai and B. Mueller, arXiv:1403.7310 [hep-ph].

Primary author: Dr MONNAI, Akihiko (RIKEN BNL Research Center)

Presenter: Dr MONNAI, Akihiko (RIKEN BNL Research Center)

Session Classification: Session 10