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Elliptic flow of thermal photons in chemically non-equilibrated QCD medium

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Heavy-ion collisions provide unique opportunities to explore the phenomenology of the quark-gluon plasma (QGP), a deconfined phase of QCD. The hot medium is considered to be a strongly-coupled system because the hadronic elliptic flow – azimuthal anisotropy in momentum space – is large and in quantitative agreement with the hydrodynamic models with very small viscosity. The elliptic flow of direct photons is expected to be much smaller than that of hadrons as the medium is indicated to be electromagnetically transparent. However it has recently been found that the quantity is a few times larger than hydrodynamic predictions both in RHIC and LHC experiments [1, 2], posing a theoretical challenge to heavy-ion physics.

In this study, I present a possible explanation for the enhancement of thermal photon elliptic flow based on late quark chemical equilibration [3]. The hot medium in transition from a gluon-rich color glass condensate to an equilibrated quark-gluon plasma should have fewer quarks in the beginning [4]. Since quarks are the source of photon emission, thermal photons are mainly produced in later stages where large anisotropy has already developed in the background medium. The numerical estimations of the (2+1)-dimensional hydrodynamic model with the quark and gluon number changing processes indicate that the slow chemical equilibration visibly enhances the elliptic flow of thermal photons. The results indicate that quark chemical equilibration plays an important role in high-energy heavy-ion collisions.

References:
[1] A. Adare et al. [PHENIX Collaboration], Phys. Rev. Lett. 109, 122302 (2012)
[2] D. Lohner [ALICE Collaboration], J. Phys. Conf. Ser. 446, 012028 (2013).
[3] A. Monnai, arXiv:1403.4225 [nucl-th]
[4] A. Monnai and B. Mueller, arXiv:1403.7310 [hep-ph]

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