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Effect of initial state on thermal photons in heavy ion collisions

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The experimental measurement of the direct photon v_2 and the theoretical prediction for the same differ by a large margin both at RHIC and at the LHC energies. This is known as the "direct photon puzzle". We investigate the effect of initial conditions on the production and elliptic flow of photons from relativistic heavy ion collisions in detail.

It is well known that the inclusion of fluctuations in the hydrodynamic initial condition explains the experimental data on hadronic spectra and elliptic flow better compared to a smooth initial condition and it also increases the production and v_2 of photons significantly. In the same spirit, we consider another realistic constraint; initial state nucleon shadowing in the Monte-Carlo Glauber model and investigate the effect of shadowed initial condition on the production and elliptic flow of thermal photons at RHIC and LHC collision conditions [1].

In addition, we calculated the p_T spectra and elliptic flow of thermal photons for two different orientations of fully overlapping uranium nuclei at 193A GeV at RHIC using a hydrodynamic model [2]. We see that the elliptic flow from body-body collisions of uranium nuclei is large and comparable to the photon v_2 obtained from mid-central collisions of gold nuclei at 200A GeV. We show that the photon results from fully overlapping U+U collisions are complementary to the results from Au+Au collisions at RHIC.

[1] P.~Dasgupta, R.~Chatterjee, S.~K.~Singh and J.~E.~Alam, arXiv:1704.05715.
[2] P.~Dasgupta, R.~Chatterjee and D.~K.~Srivastava, Phys.\ Rev.\ C {\bf 95}, no. 6, 064907 (2017).

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