

# The direct photon puzzle and the weak magnetic photon emission

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We propose a novel effect that accounts for the photon emission from a quark-gluon plasma in the presence of a weak external magnetic field. Although the weak magnetic photon emission from quark-gluon plasma only leads to a small correction to the photon production rate, the induced photon spectrum can be highly azimuthally anisotropic, as a consequence of the coupled effect of the magnetic field and the longitudinal dynamics in the background medium. With respect to a realistic medium evolution containing a tilted fireball configuration, the direct photon elliptic flow from experiments is reproduced. In comparison to the experimental data of direct photon elliptic flow, in heavy-ion collisions, the magnitude of the magnetic field at very early stages can be extracted. For the top energy of RHIC collisions, right after the pre-equilibrium evolution,  $|eB|$  is found no larger than a few percent of the pion mass square. [\[arxiv:2302.07696\]](#)

## Theory / experiment

Theory

## Group or collaboration name

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