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Production rate and ellipticity of lepton pairs from a rotating hot and dense QCD medium

Using a current-current correlation function (CF), the photon polarization tensor is calculated for a rotating hot and dense QCD medium [1]. The spectral function (SF) and the dilepton rate (DR) are estimated therefrom. Numerical results show that both SF and DR are enhanced in a rotating medium, especially in a low invariant mass region. SF and DR are also explored in the consequences of the interplay among the angular velocity, temperature and chemical potential. We also estimated the electromagnetic screening by calculating the Debye mass and it shows a suppression for a rotating QCD medium. The most interesting observation is the azimuthal anisotropy of the dilepton production, i.e, the elliptic flow v_2 of the lepton pair induced by the rotation as an external field. The competition between the centrifugal effect and the spin polarization effect due to rotation results in a convex down behaviour of the elliptic flow as a function of the transverse momentum in a relatively large magnitude of angular velocity. It is noticed that quark spin polarization induces a negative v_2 in the case of large angular velocity.

1. M. Wei, C. A. Islam and M. Huang; PRD 105, no.5, 054014 (2022)[arXiv:2111.05192].

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