Contribution ID : **25** Type : **Oral Presentation**

Anisotropic photon and dilepton yield in a thermalized quark-gluon plasma under spatial magnetic fluctuations

Friday, 5 December 2025 09:00 (0:30)

Content

Ultrarelativistic heavy-ion collisions (HIC) allows us to probe the properties of strongly correlated quantum matter, at high energy density and pressure, as examined under the rationale of Quantum Chromodynamics (QCD). Even though thermalization occurs quite early in the resulting deconfined quark-gluon plasma (QGP) phase, strong transient effects depending on nearly random initial conditions prior to the collision emerge. Among those, the presence of very intense, however, fastly decaying magnetic fields arising from the initial spatial asymmetry in the overlap region of nuclei, particularly in non-central collisions, is a subject of major concern for the interpretation of the experimental signals detected and the corresponding physical properties of the resulting magnetized medium. In this scenario, it is clear that the simplifying assumption of a stationary and spatially uniform magnetic field background is quite far from reality, and it should be improved in order to better inte rpret the experimental signals in HIC. In this work [1], we analyze the effects of stochastic spatial magnetic fluctuations with respect to an intense uniform average magnetic field background over the yields for photon and dilepton emission processes in a thermalized quark-gluon plasma phase. Such stochastic fluctuations model the effects of nearly random initial conditions for the nuclei participating in noncentral heavy-ion collisions, which are the sources of the background magnetic field. Our theoretical results predict significant anisotropic effects due to stochastic magnetic noise over the angular distribution for photon and dilepton production rates in this scenario, as captured by the flow coefficients vn [1]. Our results may then contribute to interpret some aspects of the so-called "photon puzzle".

Reference [1] J. D. Castaño-Yepes and E. Muñoz, Physical Review D 111, 076028 (2025)

Primary author(s) : Prof. MUÑOZ, Enrique (Pontificia Universidad Católica de Chile)

Co-author(s) : Dr. CASTANO-YEPES, Jorge (Universidad del Valle)

Presenter(s) : Prof. MUÑOZ, Enrique (Pontificia Universidad Católica de Chile)