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Flow excited by full jet shower in QGP fluid and its effect on jet shape

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The structures of jets in heavy ion collisions are significantly modified by strong interactions with quark-gluon plasma (QGP) during the propagation, i.e., collisional energy loss, transverse momentum broadening and induced parton radiation. Through the collisional energy loss and the transverse momentum broadening of the jets, the energy and momentum are deposited into the QGP and induce flows propagating with the jets. Particles originating from the jet-induced flows are observed as a part of the jet and contribute to the modification of the jet shape in the actual experiments. Studying this contribution is not only important for the precise interpretation of the experimental data but also provides a novel opportunity to investigate the collective response of the QGP.

We study the full jet structure modification in QGP including the effect of the jet-induced flows by using the full jet+hydro model. In the model, we describe the evolution of jets by solving transport equations for the three-dimensional momentum distributions of quarks and gluons contained in the full jet shower[1]. The transport equations cover all the processes of the collisional energy loss, transverse momentum broadening and partonic splittings for all partons within the full jet shower. The evolution of the QGP is described by (3+1)-dimensional ideal hydrodynamic equations with source terms. The source terms transfer the deposited energy and momentum to the QGP fluid and are constructed with the evolving distributions of the partons in jets obtained as solutions of the transport equations. We study the jet shape function in Pb+Pb collisions at the LHC and present the role of the flows in QGP induced by the energy-momentum deposition from the jets.

References:
[1] N. B. Chang and G. Y. Qin, arXiv:1603.01920 [hep-ph].

Summary

We study the modification of full jet structure in QGP including the effect of the medium response. The evolution of the full jet shower is described by the differential transport equations. We also describe the space-time evolution of the QGP with the deposited energy and momentum from jets by combining the hydrodynamic model with the transport model for jets. We study the medium response to full jet shower and present how the jet-induced flow contributes the final state measured jet shape function in Pb+Pb collisions at the LHC.

Presentation type

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