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The wake of jets from linearized hydrodynamics

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A jet is a group of collimated high energy particles. Its production in high energy collisions has been used to study the QCD evolution in vacuum. The evolution is modified in heavy ion collisions because of the existence of quark-gluon plasma (QGP). Jets are produced early in the initial hard scattering. As the produced quarks and gluons of the jets travel through the QGP, they lose energy and get kicked transversely by interacting with the QGP. As a result, the jet production in heavy ion collisions is suppressed (a phenomenon called jet quenching) with a broader transverse momentum distribution. So we can learn the QGP properties by studying jets.

Recently, jet substructure observables have been widely used in the study of jets. Some observables are sensitive to the wide angle soft particles within the jet, for example, the Lund plane distribution with different jet radii and soft drop parameters. For these observables, the effect from the wake of jets becomes crucial. As the jet loses energy and momentum during the evolution inside the QGP, these energy and momentum depositions will evolve inside the medium and hadronize into particles in the end. These produced particles are correlated with the jet direction and may be grouped into the jet by the reconstruction algorithm. Since these particles are generally soft with wide angles with respect to the jet axis, they can significantly modify those jet substructure observables that are sensitive to the soft physics. Therefore, it is important to understand how the medium responds to the wake of jets.

In this talk, we will try to address this question by treating the energy and momentum loss as perturbation in the background of a Bjorken flow. By expanding the perturbation to the linear order and solving the resulting evolution equations numerically in the momentum space, we study how the wake evolves inside the QGP. We will also discuss the impact of the wake on phenomenological observables and effect of the transverse flow.

Is this abstract from experiment?

No

Internet talk

Yes

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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