

Effects of jet-medium interactions on angular correlations of jet-particle pairs at different energy scales

Tuesday 2 October 2018 11:45 (20 minutes)

Energetic heavy quarks passing through the hot and dense medium of a quark-gluon plasma (QGP), represented by the resulting mesons, are viewed as a suitable probe for the interactions inside of the QGP, in particular the mechanisms of energy loss, as they are less likely to thermalize within the medium and are mostly created at early stages of the medium evolution.

However, models of both, purely collisional energy loss as well as combinations of collisional and radiative energy loss are equally successful for reproducing the nuclear modification factor R_{AA} and the elliptic flow v_2 [1]. In an attempt to discriminate between the two different energy-loss mechanisms, an alternative observable, the angular correlations between two mesons were investigated. Azimuthal correlations between pairs of heavy mesons, like $D-\bar{D}$ pairs, allow for distinguishing the energy-loss scenarios [2].

We continue these studies by investigating the angular correlations between pairs of heavy and light mesons (D and π), originating from a heavy quark jet. This is motivated by the fact that the emitted gluon in radiative collisions hadronizes and these hadrons are correlated to the emitting heavy quark.

We created a Monte-Carlo code for the parton splitting in the vacuum together with an effective medium model. This program represents a consistent framework to study the influences of either collisional or radiative processes on parton propagation, and the resulting two-particle correlations. As experimental data for angular correlations of soft particles has become available [3,4], we extended our studies to angular correlations of charged particle pairs in various p_T ranges. We particularly focused on describing angular jet-broadening effects in the collisional and radiative models simultaneously for correlations in longitudinal as well as azimuthal directions.

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[3] ALICE Collaboration, Phys. Rev. Lett. 119 (2017) 102301.

[4] ALICE Collaboration, Phys. Rev. C96 (2017) 034904.

Summary

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Session Classification: Parallel 2