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Azimuthal angular decorrelations for quark and gluon jets with energy loss due to scattering and coherent medium induced radiation

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The hot and dense medium of a quark gluon plasma (QGP) that can be recreated by ultrarelativistic heavy ion collisions, can be examined only by indirect means, e.g. via highly energetic strongly interacting particles.
Studying the mechanisms of energy loss of partonic jets, i.e. collimated and highly energetic sprays of strongly interacting
particles provides an excellent means to access the QGP.

Main mechanisms of jet-energy loss can be considered as scatterings of the jet particles off medium particles as well as emissions induced by scatterings off medium particles. These coherent medium induced radiations can be formed while
multiple scatterings off medium particles occur, giving rise to interference effects, first described
in QCD by Baier, Dokshitzer, Mueller, Peigne, Schiff and Zakharov (BDMPS-Z).

For the present work a Monte-Carlo algorithm for jet-evolution in the medium via both scatterings and coherent medium induced radiations
was implemented. This algorithm was used together with initial jet particles originating in hard nuclear collisions
obtained via the KaTie Monte-Carlo algorithm in order to study dijet observables in heavy ion collisions.
In particular, dijet azimuthal decorrelations were studied. As compared to the results for proton-proton collisions the
dijet azimuthal decorrelations for jets in the medium are both suppressed and broadened. In addition to previous results for gluon jets
alone the same broadening and suppression behavior is also found for results that consider gluon jets as well.
The results are also compared to the dijet azimuthal decorrelations resulting from jets, where momentum components transverse to the jet axis were
selected from a Gaussian distribution.
It was found that in particular the broadening behavior is a result of a Non-Gaussian broadening of momentum components transverse to the jet-axes.

Primary author: ROHRMOSER, Martin (Cracow University of Technology)

Presenter: ROHRMOSER, Martin (Cracow University of Technology)

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