

Perturbative vs non-perturbative aspects of jet quenching: the role of color flow

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Providing a unified description of the various “jet-quenching” observable nowadays available represents a deep challenge.

Several model calculations are available on the market, mostly based on the factorization between an energy loss occurring at the partonic level in the medium and a standard time-delayed non-perturbative hadronization stage taking place in the vacuum.

Two important features of QCD were so far ignored in the literature of jet-quenching, namely the correlations between successive gluon emissions (what is known in the vacuum as angular-ordering) and the analysis of color-flow.

I will briefly illustrate how the above features are essential to understand important QCD results in elementary collisions, so that studying how they are modified in the presence of a medium looks mandatory: this will be the main topic of my talk.

I will start reminding (very briefly) the audience recent findings on the “anti-angular ordering” of QCD antenna radiation in the medium. Then I will move to the problem of medium modification of color flow. I will show how radiative energy-loss calculations can be given a rigorous color-differential formulation and illustrate the implications of the modified color connections of the radiated gluons (with respect to a shower developing in the vacuum) at the hadronization stage. The phenomenological relevance for the interpretation of experimental results on quenching of hadron spectra and jet-fragmentation in AA collisions will be discussed.

Primary author: BERAUDO, Andrea (CERN)

Co-authors: Dr MILHANO, Guilherme (CERN); Prof. WIEDEMANN, Urs (CERN)

Presenter: BERAUDO, Andrea (CERN)

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