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Advanced jet modification observables explored with Monte Carlo models

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The highly increased quality and statistics of the experimental data on jet production in heavy-ion collisions, collected in recent years at RHIC and LHC, allow investigation well beyond that of jet suppression in terms of the nuclear modification factor. Of particular interest are multi-particle correlation observables that probe medium-induced modifications either in the trigger-recoil di-jet system or in intra-jet structure.

Utilizing available Monte Carlo models of jet quenching, such as YaJEM [1] and JEWEL [2], we explore novel strategies to study the in-medium modification of hard probes, and focus on jet-hadron correlations and jet substructure using the Soft Drop algorithm [3].

Studies of jet-hadron correlations with models are essential in order to understand the trigger properties, i.e. the correlation between the trigger jet and the corresponding hard parton, and the related issue of surface biased jets. We present studies of jet-hadron correlations and surface biases both at RHIC and LHC energies, compare results of different models, and discuss implications for the analysis and interpretation of experimental data.

Another promising approach to explore jet modification is to study the jet substructure. We assess the performance of the Soft Drop jet substructure algorithm in heavy ion collisions. Sensitivity of the algorithm to the possible medium-induced modification of the QCD splitting kernel will be discussed. Furthermore, the performance of the background subtraction techniques will be presented. These studies provide a necessary foundation and help to guide on-going data analysis efforts.

1. T. Renk, PRC 84 (2011) 067902.
2. K. Zapp et al. JHEP 1303 (2013) 080, EPJC C60 (2009) 617.
3. A. J. Larkoski, S. Marzani, G. Soyez, J. Thaler JHEP 05 (2014) 146.
4. A. J. Larkoski, S. Marzani, J. Thaler PRD 91, 111501(R).

Summary

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