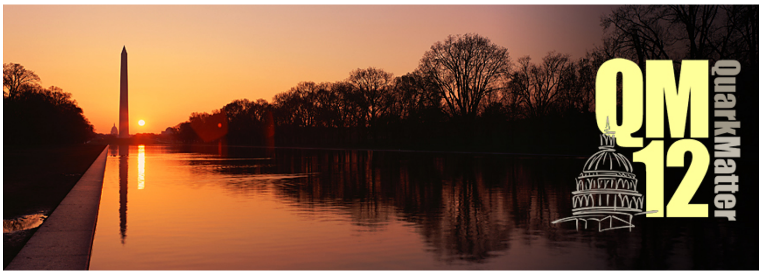

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Systematic Monte-Carlo studies of dijets at the LHC and RHIC

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Recent results from Pb+Pb collisions at the LHC have shown evidence of dramatic medium modification of di-jets. Although asymmetric di-jets are also seen in p+p collisions, di-jets with a large energy asymmetry are found much more often in Pb+Pb collisions. E.g., events with a 200 GeV leading jet and a 80 GeV subleading jet were frequently observed. The increase in the average energy asymmetry is believed to be caused by in-medium energy loss that arises from the interaction of the colored jet constituents with the hot deconfined matter formed is the collision. The modified di-jets provide a means to study the nature of the high energy interactions of this deconfined matter.

The observed di-jet suppression has been quantified in terms of the asymmetry A_j, the ratio of the difference between the two jet energies to their sum. It is not a priori clear that this is the observable best suited to extract information about the modification of the di-jets and the nature of their interactions with the deconfined medium. Understanding the sensitivity of di-jet observables to properties of the deconfined medium and to experimental factors is vital if they are to become a useful tool for jet tomography of hot QCD matter.

We have examined the response of the di-jet asymmetry and other di-jet observables to variations in the jet modification mechanism and to variations of the observables. We present a systematic study of di-jet suppression at RHIC and the LHC using the VNI/BMS parton cascade. VNI/BMS is a jet+medium Monte-Carlo code which provides a controllable testbed with sufficient complexity to model jet modification without confounding results with fluctuations from hydrodynamics and hadronization.

We consider the medium modification of the di-jet asymmetry A_j and the energy distribution within the di-jets (jet shape). Di-jets are examined under the modification of: the jet transport coefficient qhat; the path length of leading and sub-leading jets; cuts on the jet energy distributions; jet cone angle and the jet-medium interaction mechanism and the strong coupling constant. We find that, while the jet asymmetry and jet shape are similarly sensitive to the in-medium path length, the jet-shape is more sensitive to the nature of the interaction with the medium and the value of q-hat than the jet asymmetry.

Author: COLEMAN-SMITH, Christopher (Duke Physics)

Co-authors: Prof. MUELLER, Bernd (Duke University); Prof. BASS, Steffen A. (Duke University)

Presenter: COLEMAN-SMITH, Christopher (Duke Physics)

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