

Santa Fe Jets and Heavy Flavor Workshop

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ATLAS jet quenching measurements from Run 1 at the LHC

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In relativistic heavy ion collisions a hot and dense medium of unscreened color charges is produced. Jets arising from hard scattering processes occurring in the early stages of the collisions become attenuated as they propagate through this medium, and thus jets are a crucial tool in characterizing the medium's properties. Connecting experimental results to a theoretical picture and quantitative extraction of medium transport coefficients has proved challenging. The energy loss is expected to depend on the structure of the jet's parton shower, which can vary significantly on a per jet basis. Showers initiated by gluons, light quarks and heavy quarks are expected to be affected differently by the presence of the medium. In this talk I will present a comprehensive series of measurements involving jets performed by the ATLAS Collaboration during Run 1 at the LHC. This series includes measurements of single jet and hadron suppression, jet fragmentation functions and dijet momentum correlations. I will discuss the complementarity of these observables and how the transverse momentum and rapidity dependence investigated in these measurements may be used to elucidate the role of the structure of the parton shower in the energy loss. Finally, I will discuss how the conclusions of the Run 1 measurements, along with improved experimental capabilities, will bear on future measurements at the LHC.

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