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Medium modification of jet substructure for inclusive, photon-tagged and heavy flavor jets in heavy-ion collisions

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Recent measurements of jet substructure provide insights into how the hard and soft parts of the jets are modified by jet-medium interaction. One can also learn the flavor dependence of jet quenching via comparisons between boson tagged jet, inclusive jet and heavy flavor jet. In this study, with the Linear Boltzmann Transport (LBT) model, we investigate the jet shape, jet splitting function, and groomed jet mass in single jet, photon-jet and heavy flavor jet events. In order to identify the effect of jet induced medium response on jet substructure, we first fit the jet modification factor both with and without the medium response for a precise study.

Our study on jet shape function shows that the medium modifications for the core of quark jets and gluon jets are quite different and the broadening of jet profile at the edge of the jet cone is mainly carried by soft particles from medium recoil. We also find that the distributions of radiated gluon and recoiled parton are modified strongly by their rescatterings in the medium. The groomed jet study shows that jet induced medium response is responsible for the enhancement of large groomed mass tail while the jet-medium interaction generally leads to a smaller groomed mass of jets in heavy ion collisions. With different grooming setting, we explore the medium modification of different phase space to distinguish the contributions from medium induced radiation and medium recoil in gluon jet, quark jet and heavy flavor jet events. We further implement different scenarios of coherent and incoherent energy losses in LBT simulation and find that they have a significant impact on the p_T dependence of the nuclear modification of jet splitting function.

Collaboration (if applicable)

Track

Jets and High Momentum Hadrons

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Primary authors: LUO, Tan (IGFAE); CAO, Shanshan (Wayne State University); HE, Yayun (Central China Normal University); QIN, Guang-You (Central China Normal University); WANG, Xin-Nian (Central China Normal University (China)) / Lawrence Berkeley Na

Presenter: LUO, Tan (IGFAE)

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