Recent jet measurements from STAR

Tanmay Pani
Rutgers University
for the STAR Collaboration

July 3, 2024

Jets originating from hard-scattered partons in the early stages of heavy-ion collisions travel through the Quark Gluon Plasma (QGP) and are modified or quenched relative to a p+p collision baseline. Jet quenching studies have evolved rapidly from measuring modification of jet-production cross-sections in heavy-ion collisions to probing jet substructure. Jet substructure measurements capture the more intricate details of intra-jet energy distribution, arising from complex interplay of perturbative and non-perturbative QCD regimes during jet evolution. The STAR collaboration's contribution in this direction has been crucial in exploring the physics of jet-quenching in various systems and in energy ranges complimentary to the LHC. Novel machine learning based techniques such as Multifold have allowed us to perform simultaneous studies of multiple variables at once, and explore new ways to quantify jet quenching. Measurement of jet acoplanarity with respect to a recoil trigger provide new qualitative insights into the nature of interactions between jets and the QGP. Measuring generalized jet angularities in $p + p$ and Au + Au collisions show overall modification of jet-fragmentation and parton showering in medium. Study of spatial energy correlation within jets in $p + p$ collisions explore the transition between the parton shower and hadronization in jet evolution. Extending these studies with charm-tagged jets explore the flavour dependence of jet quenching. In this talk, we will be discussing these recent studies and taking an outlook at proposed measurements from newer datasets going into 2025.