Contribution ID: **40** Type: **not specified**

Fractional momentum loss of high-pT hadrons in QGP at RHIC-PHENIX

Sunday, 7 November 2021 16:17 (17 minutes)

The phase transition from hadronic matter to quark-gluon plasma (QGP) is a phenomenon that occurs under extreme conditions of high temperature and high density. The QGP causes energy loss of high momentum particles which is observed as suppression of high momentum hadron production in A+A collisions relative to p+p collisions. PHENIX, one of the relativistic heavy ion collider (RHIC) experiments at Brookhaven National Laboratory, aims to measure various QGP signals from nuclear collision reactions. The study presented in this talk uses PHENIX data to evaluate the energy loss of partons in QGP in various collision systems. We systematically study the energy loss with π^0s in Au+Au and Cu+Au and Cu+Cu at $\sqrt{s_{NN}}$ = 200 GeV and charged hadrons in Au+Au at $\sqrt{s_{NN}}$ = 200 GeV using two quantities, S_{loss} and S'_{loss}. S_{loss} represents the fractional momentum loss of high-p_T hadrons. This quantity comes from the difference in particle yield in A+A and p+p collisions. Whereas, S'_{loss} represents the fractional momentum loss of high-p_T hadrons considering azimuthal anisotropy, v_2. This quantity comes from the difference in particle yield in-plane and out-of-plane. Previous studies reported the scaling properties of S_{loss} depending on path-length. In this analysis, we study the p_T and system size dependences of S_{loss} and S'_{loss} for π^0 and charged hadrons in various collision systems.
We will discuss the interpretation of these results and their impact on our understanding of the path-length dependence of energy loss in the QGP.

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Session Classification: Contributed session 4

Track Classification: Track group 2: Experiment