An Investigation of Flavor Dependence of Jet Shape Modifications in Au+Au Collisions at $\sqrt{s_{NN}} = 200$ GeV

Diptanil Roy
For the STAR Collaboration

July 12, 2022

1 Abstract

Partons, *i.e.*, quarks and gluons, in heavy-ion collisions interact strongly with the Quark-Gluon Plasma (QGP), and hence have their energy and shower structure modified compared to those in vacuum, e.g., those produced in proton-proton collisions. Theoretical calculations predict that the radiative energy loss, which is the dominant mode of energy loss for gluons and light quarks in the QGP, is suppressed for heavy quarks, such as charm and bottom, at low transverse momenta (p_{T}). The measurement of the $D^0(c\bar{u})$ meson radial profile in jets from the CMS experiment at the LHC hints at its modification at low D^0 p_{T} in heavy-ion collisions, which is qualitatively different from that of the lighter hadrons. The excellent secondary vertex resolution provided by the Heavy Flavor Tracker in the STAR experiment at RHIC enables reconstruction of D^0 mesons at low p_{T} with high signal significance over the background.

We report the first measurements of the D^0 meson tagged jet p_{T} spectra and the D^0 meson radial profile in jets reconstructed from Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV, collected by the STAR experiment in 2014. Such measurements can shed light on parton flavor and mass dependencies of jet energy loss, and therefore constrain theoretical models.