

An Investigation of Charm Quark Jet Spectra and Shape Modifications in Au+Au Collisions at $\sqrt{s_{NN}} = 200$ GeV

Diptanil Roy, Matthew Kelsey
For the STAR Collaboration

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1 Abstract

Partons (quarks/gluons) interact strongly with the 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 also predict that 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). A measurement of the $D^0(c\bar{u})$ meson radial profile in jets from the CMS experiment hints at a low p_T modification in the medium at LHC energies, that is qualitatively different from that of the light flavor hadrons. The precise tracking by the Heavy Flavor Tracker detector in the STAR experiment at RHIC enables a low background and high statistics sample of D^0 mesons, especially at low p_T , making STAR ideal for similar measurements.

We will report the first measurements of the D^0 -meson tagged $p_{T,\text{jet}}$ spectra and D^0 meson radial profile in anti- k_T jets from Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV at RHIC, collected by the STAR experiment in 2014, and comparisons to PYTHIA-8 predictions at $\sqrt{s} = 200$ GeV. We will also report the nuclear modification factor R_{CP} for these D^0 -meson tagged jets. Such measurements are expected to shed light on parton flavor and mass dependencies of jet quenching, and constrain theoretical models.