

D⁰ Meson Tagged Jets in Au+Au Collisions at $\sqrt{s_{\text{NN}}} = 200 \text{ GeV}$

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1 Abstract

The properties of the Quark Gluon Plasma (QGP) produced in heavy-ion collisions can be studied by using the jets generated in hard scattering processes at the early stages of the collision. These jets lose energy and have their shower structure modified compared to those in vacuum by a process called ‘jet quenching’.

Jet fragmentation function is related to the transverse momentum fraction of identified hadrons ($z = p_{\text{T,hadron}}/p_{\text{T,jet}}$) along the jet axis inside jets. The fragmentation function connects the production of the quarks and gluons in the perturbative regime with the hadronized final state particles that make up the jets. In vacuum, this observable can reveal important information about the processes which produce the hadrons. In the QGP medium, modifications to the fragmentation function can provide a better characterisation of the underlying contributions to jet quenching. Such modifications have been observed at the CMS and ATLAS experiments at the LHC for inclusive jets. A study of the fragmentation function for charm meson tagged jets can reveal further details about the flavor dependence of medium induced parton energy loss.

We report the first measurements of D⁰ meson tagged anti- k_{T} jets with $R = 0.4$ reconstructed from Au+Au collisions at $\sqrt{s_{\text{NN}}} = 200 \text{ GeV}$, collected by the STAR experiment at RHIC. We show the transverse momentum (p_{T}) spectra of the D⁰ jets and a new measurement of the transverse momentum fraction (z) of D⁰ mesons in the jets. Such flavor tagged measurements can help discriminate between different models of energy loss in the medium and determine the precise properties of the QGP.