

Measurement of D^0 and \overline{D}^0 directed flow using KFParticle in Au+Au collisions at $\sqrt{s_{\text{NN}}} = 200$ GeV from STAR

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Abstract

Charm quarks, owing to their large mass, are predominantly created through initial hard scatterings in relativistic heavy-ion collisions and thus are ideal probes to study early time dynamics of these collisions. Recent results from STAR show that the slope of D^0 mesons directed flow (v_1) versus rapidity is about 25 times larger than that of charged kaons, providing important constraints on the initial geometry and charm quark transport in the QGP. It has also been predicted that the transient electromagnetic field generated at early time can induce a difference between the v_1 of charm and anti-charm quarks, and the magnitude of this difference can be much larger than those of light-flavor hadrons due to the early formation of charm quarks.

In this poster, we will present a new measurement of the directed flow for D^0 and \overline{D}^0 mesons in Au+Au collisions at $\sqrt{s_{\text{NN}}} = 200$ GeV using data collected with the Heavy Flavor Tracker during the 2014 RHIC run. The D^0 (\overline{D}^0) mesons are reconstructed by an algorithm based on the Kalman Filter (KF Particle Finder package), which provides estimation of not only the tracking parameters themselves but also the corresponding covariance matrix as well. By using such additional information in the D^0 reconstruction, the signal significance is improved considerably. The D^0 and \overline{D}^0 meson v_1 and their difference will be presented as a function of rapidity and p_T , and compared with the results for light-flavor hadrons. These results will also be compared to model predictions and physics implications will be discussed.