Current status of open heavy flavor measurements in RHIC-PHENIX RUN14

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The Quark Gluon Plasma (QGP) existed in the early universe. We are studying the physical property of the QGP at RHIC-PHENIX. It can be characterized by the quark energy loss mechanism. Especially heavy quarks (charm and bottom) are important probes of the QGP. They are predominantly produced during hard scattering in the initial stage of a heavy-ion collision produces them dominantly, since the charm and bottom masses are larger than the temperature of the QGP. Additionally the energy loss of heavy quarks would be expected to be smaller than that of light quarks due to lower collisional energy loss and the Dead-Cone-Effect that leads to a strong suppression of small angle gluon radiation. The silicon vertex tracker (VTX) was installed and used to measure the first data in 2011. It can separate the charm and bottom hadron decay electrons with the distance of closest approach (DCA). The DCA of a track is calculated separately in the transverse plane (DCA_T) and the beam direction (DCA_L) as shown in Fig.1.

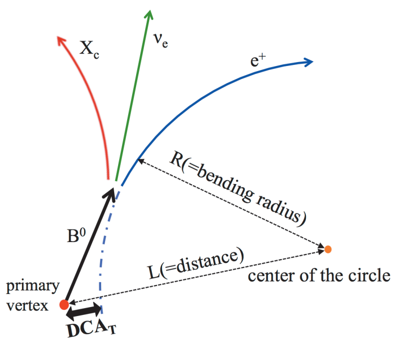

Fig. 1. DCA_T is defined as DCA_T = L - R in the transverse (bending) plane

We focus on DCA_T for the analysis because DCA_T has a better resolution than DCA_L in the design performance. In order to estimate the charm and bottom hadron invariant yields separately, we use a DCA cocktail method subtracting all background components estimated by simulations and data, and a Bayesian inference technique based on a Markov Chain Monte Carlo (MCMC).

PHENIX reported the nuclear modification factor R_{AA} of electrons from charm and bottom hadron decays separately based on Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV recorded in 2004 and 2011.[1,2] We found that suppression of electrons from bottom hadron decays is lesser than that from charm for the region $3 < p_T < 4$ GeV/c.[3,4] Accordingly, we plan to measure the centrality dependence of R_{AA} over a broader p_T range with high statistics data recorded in 2014. It is expected to have 10 times more statistics than the data recorded in 2011. VTX performances was the same in 2014 and 2011, as a result of comparing DCA_T resolutions as shown in Fig.2. We finished the calibration

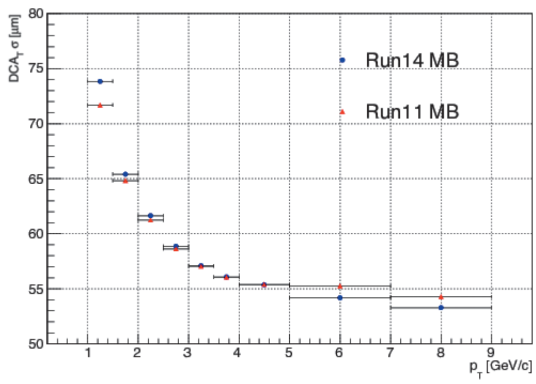

Fig. 2. DCA_T resolution as a function of p_T in Run14 AuAu (blue) and Run11 AuAu (read). The comparison shows that detector performances are much the same.

and quality assurance of the 2014 data and obtained the electron DCA_T distribution in each centrality bin. The next step is to estimate the normalization and shape of all background components in order to decomvolute the electron DCA_T distribution. Eventually we will obtain the invariant cross section of both charm and bottom hadrons, and compare it with the p+p collision data recorded in 2015 to estimate R_{AA}.

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