QUARK MATTER 2015
Sep. 27 – Oct. 3, 2015 Kobe, Japan

Contribution ID: **263** Type: **Contributed talk**

Charge-dependent anisotropic flow in Cu+Au collisions

Monday 28 September 2015 17:00 (20 minutes)

At the early stages of non-central heavy-ion collisions, a strong magnetic field perpendicular to the reaction plane is created. In asymmetric Cu+Au collisions, due to the difference in the number of spectators, not only the magnetic field but also a strong electric field (E-field) would be created along the reaction plane and pointing from the Au-nucleus to Cu-nucleus. The lifetime of the E-field would be short, of the order of a fraction of a fm/c. The quarks and antiquarks that have been already produced at this time would experience the Coulomb force, which result in charge separation of directed flow. Thus, the measurement of the charge-dependent directed flow in Cu+Au provides an opportunity to test different quark (charge) scenarios, e.g Pratt's two-wave quark production, and shed light on the (anti-)quark production mechanism in heavy-ion collisions in general. Understanding the time evolution of the quark densities in heavy-ion collisions is also very important for detailed theoretical predictions of the Chiral Magnetic Effect and Chiral Magnetic Wave, which various experiments are actively searching for.
The transverse-momentum dependence of the directed (dipole) flow in Cu+Au collision is also very sensitive to the system initial density gradients in the transverse plane, which can only be observed in symmetric systems as a result of density fluctuations. Measurements of the higher-harmonic flow also allows further study of hydrodynamics and the properties of QGP.
In this talk, the charge-dependent directed flow in Cu+Au collisions at ¥sqrt{s_{NN}} =200 GeV measured in the STAR experiment will be presented. The results are compared with existing model predictions and implications for the dynamics of quarks production and system evolution will be discussed. Higher-harmonic flow will be also presented and compared with A+A collisions.

On behalf of collaboration:

STAR

Primary author: Dr NIIDA, Takafumi (Wayne State University)

Presenter: Dr NIIDA, Takafumi (Wayne State University)

Session Classification: Initial State Physics and Approach to Equilibrium II

Track Classification: Initial State Physics and Approach to Equilibrium