**Abstract for SQM 2024**

**Title: Measurement of charge-dependent directed flow in STAR Beam Energy Scan (BES-II) Au+Au and U+U Collisions**

An ultra-strong magnetic field (B ≈ 1018 Gauss) is anticipated during the early stages of heavy ion collisions. Such a strong magnetic field holds significant importance in QCD, including understanding topology of QCD vacuum, QCD phase transition, and nucleon structure. The directed flow or the first harmonic flow coefficient (v1), serves as a powerful tool not only for detecting the magnetic field but also for understanding its effects in the Quark-Gluon Plasma (QGP) medium (such as electrical conductivity). Additionally, v1 can capture information from the initial geometry of the system and also offer means to understand baryon transport. Recently, the STAR collaboration reported a substantial splitting of directed flow between positively and negatively charged identified particles in peripheral Au+Au and isobar (Ru+Ru and Zr+Zr) collisions. These results are consistent with the dominance of Faraday induction and Coulomb effect from the initial strong magnetic field [1].

In this presentation, we shall discuss the rapidity dependence of v1 and dv1/dy for π±, K± and p(p̅) in Au+Au collisions at 7.7, 11.5, 14.6, and 19.6 GeV from Beam Energy Scan Phase-II, as well as in U+U collisions at 193 GeV measured by the STAR experiment. The v1 values will be reported as a function of transverse momentum, rapidity, and centrality. Additionally, the dv1/dy and the charge dependent difference, Delta dv1/dy, of identified particles in U+U collisions will be compared to those in Au+Au and isobar (Ru+Ru and Zr+Zr) collisions. These findings will offer further insights into the initial electromagnetic field as well as baryon transport at various system sizes and beam energies.

**[1].** STAR Collaboration, arXiv: 2304.03430