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Measurement of ϕ meson directed flow in $\sqrt{s_{NN}} = 3 - 19.6$ GeV Au+Au collisions from RHIC-STAR

The STAR Beam Energy Scan II (BES II) program at RHIC is crucial for exploring the phase structure of strong interactions and understanding the properties of quark-gluon plasma (QGP). Directed flow (v_1) has been suggested as a sensitive probe of the equation of state of hot and dense matter. The ϕ meson, with its mass close to that of the proton but with strange quark content ($s\bar{s}$), provides a unique test for understanding the differences between net-baryon and meson directed flow due to its small hadronic cross-section.

In this poster, we present measurements of ϕ meson directed flow in Au+Au collisions at $\sqrt{s_{NN}} = 3.0, 3.2, 3.5, 3.9, 4.5, 7.7, 9.2, 11.5, 14.5, 17.3,$ and 19.6 GeV from the RHIC-STAR experiment, utilizing both Fixed Target and Collider datasets of the STAR BES II program. Additionally, we report directed flow measurements for $p, K, \Lambda,$ and $\bar{\Lambda}$ as a comparison to ϕ meson. We discuss the centrality and energy dependence of the v_1 slope, along with insights into the QCD phase structure.

Category

Experiment

Collaboration (if applicable)

STAR

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