Measurement of J/ψ polarization in Ru+Ru and Zr+Zr collisions at $\sqrt{s_{NN}} = 200$ GeV at STAR

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Abstract

J/ψ serves as an important probe to study the properties of the quark-gluon plasma (QGP) created in heavy-ion collisions. In Ru+Ru and Zr+Zr collisions at $\sqrt{s_{NN}} = 200$ GeV, it has been observed that the J/ψ yield is strongly suppressed and its elliptic flow (v_2) is consistent with zero, indicating J/ψ's strong coupling with the medium and its potentially small regeneration contribution. Besides those measurements, the J/ψ polarization can shed new light on the QGP properties and the J/ψ production mechanism in heavy-ion collisions. For example, it has been hypothesized that J/ψ can be polarized due to the spin-orbit coupling between J/ψ and QGP's large angular momentum in non-central heavy-ion collisions. The early production of J/ψ also makes its polarization potentially sensitive to the strong magnetic field at the early stage.

In this poster, we will present the first measurement of J/ψ polarization in heavy-ion collisions at RHIC. The J/ψ polarization in the Helicity frame and Collins-Soper frame, as well as with respect to the event-plane, in Ru+Ru and Zr+Zr collisions at $\sqrt{s_{NN}} = 200$ GeV will be presented, and its physics implications will be discussed.