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Nuclear modification factor of inclusive charged particles in Au+Au collisions at URQMD and HYDRO model

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The Quantum ChromoDynamics (QCD) phase diagram, often represented using coordinates of temperature (T) and baryonic chemical potential (μ_B), includes a transition from a hadronic gas phase to a quark-gluon plasma (QGP) phase. The Beam Energy Scan (BES) program at Relativistic Heavy Ion Collider (RHIC) varies the gold-gold collision energy aiming to explore the phase diagram and pinpoint the critical point. As part of the Beam Energy Scan I (BES-I) program conducted from 2010 to 2014, the STAR experiment presented results on the nuclear modification factor for the Au+Au system at energies $\sqrt{s_{NN}} = 7.7-27$ GeV/c. In 2018, the STAR experiment initiated the second phase of the BES-II program, which is expected to have a tenfold increase in statistics compared to the first phase. This will enable a deeper understanding of the nuclear modification factor and improve its description. In this talk, we present new measurements of charged particle production and the nuclear modification factor R_{CP} based on model data from the URQMD and HYDRO models. We compare these new results with the findings from BES-I to evaluate how well the theoretical models describe the behavior of the nuclear modification factor. Additionally, we analyze how the nuclear modification factor behaves in the region of higher transverse momenta, which allows for a deeper investigation of potential jet suppression effects and is significant for understanding the formation and properties of the quark-gluon plasma (QGP) at lower energies.

Summary

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