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Nuclear modification of charged hadrons and jets in isobar collisions at $\sqrt{s_{NN}}$ =200 GeV at STAR

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Partonic scatterings with high momentum transfer occur before the formation of the quark-gluon plasma (QGP) in heavy-ion (A+A) collisions and result in collimated collections of hadrons called jets. The modification of the parton shower in the QGP compared to that in proton-proton (p+p) collisions offers insight into the nature of the medium's interaction with colored probes. Typically, this is measured as a ratio of hadron or jet spectra in A+A and p+p collisions called the R_{AA}. The nominal RHIC A+A collision species is gold (Au) with 197 nucleons, but the high-statistics 2018 STAR isobar data from Zr+Zr and Ru+Ru collisions, each with 96 nucleons, offer the opportunity to study the system size dependence of nuclear modification of hard probes.

In this talk, we present a measurement of the inclusive charged hadron R_{AA} differentially with average number of participants ($<N_{\mathrm{part}}>$) in isobar collisions at STAR. The large available range of $<N_{\mathrm{part}}>$ in these data allows for comparisons to small systems and Au+Au results. We also present ongoing work to control the path length of the partons through the medium via event shape engineering. Events are categorized by their eccentricity, and within a given eccentricity and centrality class, jets traveling in the event plane direction are compared to those traveling perpendicular to it, in order to study the dependence of jet energy loss on the collision geometry.

Experiment/Theory

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