Investigating system size dependence of strange hadron production at $\sqrt{s_{\rm NN}} = 200$ GeV at STAR

Xionxiong Xu (Tsinghua University) and
Weiguang Yuan (Tsinghua University) for the STAR Collaboration

There are significant discussions in the field about the initial conditions, including the size of the system, needed to generate a quark-gluon plasma (QGP). Strangeness production serves as a sensitive probe into the properties of the QGP. For example, it is expected that the Ω/ϕ ratios in different colliding systems may reveal the minimum colliding system size required to produce QGP. In Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV and Pb+Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV, significant Ω enhancement over ϕ have been observed at intermediate transverse momentum in central collisions, which can be explained by their productions through coalescence of strange quarks in the QGP. The new datasets of isobar(Ru+Ru and Zr+Zr), O+O and d+Au taken by the STAR detector provide us with an opportunity to look into different colliding systems to investigate the dependence of strange hardron production on system size.

We will present the measurements of strange hadron (ϕ,Ω,$\overline{\Omega}$) production in Au+Au, isobar(Ru+Ru and Zr+Zr), O+O and d+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV at mid-rapidity($y < |0.5|$), including transverse-momentum spectra and nuclear modification factors. Additionally, the Ω/ϕ ratios in those colliding systems will be shown. The Au+Au, d+Au, and O+O systems have the extended kinematic coverage benefit from the iTPC upgrade, which extended the rapidity coverage and enhanced the particle identification capability compared to previous results.