System size dependence of strange hadron production at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV at STAR

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Strangeness production serves as a sensitive probe of the properties of the quark-gluon plasma (QGP). In particular, it is proposed that the Ω/ϕ ratios in different colliding systems may reveal the minimum colliding system size required to produce the QGP. In Au+Au collisions at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV significant Ω enhancement over ϕ has been observed at intermediate transverse momentum (p_T) in central collisions, which can be explained by their production through the coalescence of strange quarks in the QGP. In addition, an intriguingly smooth increase in (multi)strange hadron to pion yield versus multiplicity was first reported at LHC energies, and it is critical to investigate this ratio at RHIC energies. Finally, strange hadron to strange anti-hadron ratio can be used to constrain the strangeness and baryon chemical potentials at chemical freeze-out temperature. The versatility of RHIC to change the size of the colliding ions provides an unprecedented opportunity to investigate strangeness production as a function of system size. In 2021, STAR collected a large O+O dataset at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV. O+O is a unique symmetric small system allowing for a more straightforward geometry mapping with centrality than with asymmetric small systems. In addition, the high-quality O+O dataset will allow us to precisely map the (multi)strange hadron to pion yield versus multiplicity.

In this talk, measurements on strange hadrons (K_s^0,ϕ, Λ,$\overline{\Lambda}$,Ξ,$\overline{\Xi}$,Ω,$\overline{\Omega}$) in O+O and Au+Au collisions will be presented, including their p_T spectra, nuclear modification factors R_{CP} and antibaryon-to-baryon ratios. Additionally, we will compare the centrality dependence of the Ω/ϕ ratios in five different collisions systems at $\sqrt{s_{\mathrm{NN}}} = 200$ GeV : Au+Au, O+O, Zr+Zr, Ru+Ru, d+Au. Finally, we will investigate the (multi)strange hadron to pion yield ratio as a function of multiplicity for these aforementioned collision systems.