Strangeness production in Au+Au collisions at $\sqrt{s_{NN}} = 200\,\text{GeV}$ with the STAR experiment

Xiongxiong Xu (for the STAR collaboration)
Tsinghua University

Strangeness production serves as a sensitive probe into the properties of the quark-gluon plasma(QGP). With the thermal model, strange hadron yields at top RHIC energy can be utilized to extract the temperature and baryon chemical potential at the chemical freeze-out, contributing to the low-baryon-chemical-potential region on the QCD phase diagram, where lattice QCD predicted a smooth cross-over at T_c around 158 MeV. Also, the ratios of strange particle to anti-particle yields can be used to obtain the ratios of strangeness and baryon chemical potentials to the chemical freeze-out temperature(μ_S/T_{ch} and μ_B/T_{ch}), allowing us to make the comparison between experimental results of μ_S/μ_B versus μ_B/T_{ch} and lattice QCD predictions[1].

In this talk, we will present new measurements of strange hadron (K^0_S, Λ, $\bar{\Lambda}$, Ξ, $\bar{\Xi}$, Ω, $\bar{\Omega}$) production in Au+Au collisions at $\sqrt{s_{NN}} = 200\,\text{GeV}$ at mid-rapidity ($y < |0.5|$), including transverse-momentum spectra, nuclear modification factors and antibaryon-to-baryon ratios. The data analyzed were collected by STAR in 2019, when the iTPC was in operation. The usage of iTPC extends the rapidity coverage and enhances the particle identification capability compared to previous results. In addition, chemical freeze-out parameters will be extracted and compared with lattice calculations.

References

[1] BOLLWEG D, GOSWAMI J, KACZMAREK O, et al. Second order cumulants of conserved charge fluctuations revisited: Vanishing chemical potentials[J]. Phys. Rev. D, 2021, 104(7). DOI: 10.1103/PhysRevD.104.074512.