Contribution ID: **176** Type: **Oral report**

Measurement of charged hadron production in relativistic ion collision systems

Tuesday, 21 September 2021 16:40 (25 minutes)

Measurement of charged hadron production in relativistic ion collision systems is one of the main methods to study hadronization of quark gluon plasma (QGP) - a state of matter, which is thought to consist of asymptotically free quarks and gluons [1]. According to QCD calculations, conditions in small collision systems are not sufficient for QGP formation, but flow studies in the PHENIX experiment established the evidence of possible QGP formation in such systems [2]. Therefore, investigation of charged hadron production in small collision systems is important to distinguish cold nuclear matter effects and possible QGP effects.

Theoretical calculations of charged hadron production in small collision systems can be provided by Angantyr model in Pythia8 [3], which is generalized the formalism for pp collisions to an event generator for nuclei collisions and consequently considers only cold nuclear matter effects. Therefore this model can serve as an effective tool for studying non-collective background to observables sensitive to collective behavior.

This talk will present PHENIX results on identified hadron production in small collision systems. Nuclear modification factors and ratios of identified charged hadrons ($\pi^{\pm}$, $K^{\pm}$, p and $\bar{p}$) as a function of p_T and centrality measured in p+Al and ^{3}He+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV will be presented. Comparison of obtained experimental data with theoretical predictions based on the Angantyr model in Pythia8 will be discussed.

1. A. Adare et al., Phys. Rev. C 83, 064903 (2011)
2. PHENIX Collaboration, Nat. Phys. 15, 214–220 (2019)
3. C. Bierlich et al., High. Energ. Phys. 2018, 134 (2018)

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Session Classification: Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics

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