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$K^*(892)$ meson production in heavy and small collision systems at $\sqrt{s_{NN}} = 200$ GeV

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The quark-gluon plasma (QGP) [1] is a state of matter that exists at extremely high temperatures, exceeding T > 170 MeV [2], and at energy densities greater than ~1 GeV/fm³ [3]. This deconfined phase of quarks and gluons can be created during the phase transition of hadronic matter, which occurs in collisions of ultrarelativistic heavy ions [4, 5].

The QGP exhibits several distinctive experimental signatures, such as strangeness enhancement [6] and jet quenching [7]. These phenomena can be effectively studied through the production of the $K^*(892)$ meson [8], a resonance containing a strange quark. A comparison of $K^*(892)$ meson production in ultrarelativistic nucleus-nucleus and proton-proton (p+p) collisions, quantitatively expressed through nuclear modification factors, provides valuable insight into the properties of the QGP.

In addition to studies in heavy-ion collisions, investigating $K^*(892)$ production in smaller systems is particularly important for exploring the minimum conditions required for QGP formation. Since signatures like strangeness enhancement and jet quenching are expected to manifest even in light systems if QGP is created, measurements of $K^*(892)$ meson production offer a sensitive probe for such effects.

The present study focuses on measurements of the $K^*(892)$ meson invariant transverse momentum (p_T) spectra and the corresponding nuclear modification factors as functions of p_T in both heavy and light collision systems at the energy of $\sqrt{s_{NN}} = 200$ GeV/c.

The results of the work can be expanded for use in the MPD experiment of the NICA project. The authors acknowledge support from the Ministry of Science and Higher Education of the Russian Federation, state assignment for fundamental research (code FSEG-2025-0009).

1. Ding H T, Karsch F and Mukherjee S, Int. J. Mod. Phys. E **24**, 1530007 (2015).
2. A. Adare *et al.*, Phys. Rev. Lett. **104**, 132301 (2010).
3. F. Karsch, E. Laermann and A. Peikert, Phys. Lett. B **478**, 447 (2000).
4. M. Gyulassy and L. McLerran, Nucl. Phys. A **750**, 30 (2005).
5. E. V. Shuryak, Nucl. Phys. A **750**, 64 (2005).
6. Redlich, K., Nuclear Physics A **698**, 1-4 (2002).
7. Gyulassy M and Wang X N, Nucl. Phys. B **420**, 583–614 (1994).
8. Navas, S. *et al.*, Phys. Rev. D **110**, 3 (2025).

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