

XXV International Baldin Seminar on High Energy Physics Problems "Relativistic Nuclear Physics and Quantum Chromodynamics"



XXV International Baldin Seminar
on High Energy Physics Problems
Relativistic Nuclear Physics & Quantum Chromodynamics

September 18 - 23, 2023, Dubna, Russia

Contribution ID: 39

Type: **not specified**

Perspectives for the study of hyperon and hypernuclei production in heavy-ion collisions at NICA/MPD

Tuesday, 19 September 2023 15:30 (20 minutes)

NICA (Nuclotron-based heavy-Ion Collider fAcility) is a new flagship project at JINR (Dubna, Russia) aimed at the construction of a new accelerator complex for heavy ions and polarized particles [1]. Collisions of relativistic ions with energies up to 11 GeV (center-of-mass) will be studied with the MultiPurpose Detector MPD providing accurate precise tracking and reliable particle identification in high-multiplicity events [2]. Hyperons and hypernuclei are among the most valuable probes in heavy-ion reactions. Production of particles with strangeness is sensitive to the deconfinement phase transition as well as to in-medium hyperon-nucleon potentials [3,4]. Statistical thermal models predict the highest production rates of (hyper)nuclei in the NICA energy range [5], thus the NICA/MPD program offers a unique possibility to investigate the properties of strongly interacting matter in the region of high net-baryon density.

In this talk we'll overview the prospects of the NICA physics program for the study of hyperons and hypernuclei and discuss the recent results of a detailed feasibility study for the reconstruction of hyperons and hypernuclei with the MPD detector in Bi+Bi collisions. In particular, the expected detector performance for the reconstruction of Lambda-hyperon invariant p_T - spectra and $3H\Lambda$ as well as $4He\Lambda$ invariant mass distributions in centrality selected Bi+Bi collisions will be discussed.

References

- [1] Kekelidze V., Lednicky R., Matveev V. et al. Three stages of the NICA accelerator complex. *Eur. Phys. J. A.* 2016, 52, 211.
- [2] MPD Collaboration. Status and initial physics performance studies of the MPD experiment at NICA. *Eur. Phys. J. A* 2022, 58, 7.
- [3] Johann Rafelski. Discovery of quark-gluon-plasma: strangeness diaries. *The European Physical Journal Special Topics* 2020, 229, 1-140.
- [4] Koch V., Majumder A., Randrup J. Baryon-strangeness correlations: a diagnostic of strongly interacting matter. *Phys. Rev. Lett.* 2005, 95, 182301.
- [5] Steinheimer, J., Gudima, K., Botvina, A., et al. Hypernuclei, dibaryon and antinuclei production in high energy heavy ion collisions: Thermal production vs. Coalescence. *Phys. Lett. B.* 2012, 714, 85.

Primary authors: KOLESNIKOV, Vadim (VBLHEP, JINR); VASENDINA, Veronika (JINR); ZINCHENKO, Alexander (Joint Institute for Nuclear Research)

Presenter: KOLESNIKOV, Vadim (VBLHEP, JINR)

Session Classification: Parallel: Relativistic heavy ion collisions