

Title: Performance of the MPD detector in the study of strangeness production and event-by-event fluctuations in Au+Au collisions at NICA

Abstract: The future heavy-ion collider NICA (JINR, Dubna) will provide a variety of beam species in the energy range of 4 – 11 GeV. New experimental data on strangeness production and event-by-event fluctuations from NICA allow addressing important QCD properties such as the nature of the deconfinement phase transition and existence of the Critical End Point (CEP). Heavy-ion collisions at NICA will be measured with a multi-purpose detector – MPD, which provides precise reconstruction of multiple physics channels.

NICA physics goals and MPD concept will be presented with an emphasis to detector performance in strange mesons reconstruction as well as in the measure of high order moments of the net-proton and net-kaon event-by-event multiplicity distributions.

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Oral report (20 m) - ONLINE

RFBR Grants for NICA

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Title: Feasibility study for the net-proton and net-kaon event-by-event fluctuations measurements with the MPD detector

Abstract: Multi Purpose Detector (MPD) is designed as a 4π -spectrometer capable of detecting charged hadrons in the energy range of NICA collider. Main physics goals of NICA and the concept of the MPD detector will be presented in this talk, with an emphasis on detector performance in the measurements of high-order moments of net-proton and net-kaon multiplicity distributions.

Authors: A. Mudrokh

Oral report on 22nd October (20 m)

1) Introduction

- QCD phase diagram, CEP
- MPD for A+A collisions @ NICA
- MPD PID

Figure is ready

Figure is not ready yet

2) Results

2.1 Net-proton fluctuations

Last presentation on 19th Lomonosov Conference (August 2019)

Net-proton spectra are measured for central (0-1 fm) Au+Au events with UrQMD 3.4 model at $\sqrt{s_{NN}} = 4, 7, 9$ and 11 GeV.

Cumulant measurements are carried out within

- 1) $|y| < 0.5$ and $0.4 < p_T < 0.8$ GeV/c
- 2) $|y| < 0.5$ and $0.4 < p_T < 2.0$ GeV/c

Figures: phase-space region, net-proton multiplicity distributions, moments and cumulant ratios

2.2 Net-kaon fluctuations

Net-kaon spectra are measured for central (0-3 fm) Au+Au events with PHSD model at $\sqrt{s_{NN}} = 4, 6.2, 7.6, 8.8$ and 12.3 GeV.

Cumulant measurements are carried out within $|y| < 0.5$ and $0.4 < p_T < 0.8$ GeV/c

Figures: phase-space region, net-kaon multiplicity distributions, moments and cumulant ratios
Additional Figures (backup?): DCA distributions, C_n^{RECO} / C_n^{MC} VS N_{hits} , refit, (binomial) detector response

3) Conclusions