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The MPD experiment at JINR: construction status and physics performance

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The Multi-Purpose Detector is under construction at the Joint Institute for Nuclear Research, as part of the NICA Accelerator Complex. It aims to study the phase diagram of QCD matter at maximum baryonic density, determine the nature of the phase transition between the deconfined and hadronic matter and search for the critical point in the diagram. The current status of the construction of MPD subdetectors will be reported on, as well as progress in preparations of the software and computing infrastructure.

The designed physics performance of the detector components will be discussed. Spectra of identified hadrons, including hyperons and hypernuclei will be presented, which emphasis on differential measurement and total yield extraction. The quality of directed and elliptic flow determination will be discussed, with comparison to model expectations. The sensitivity of event-by-event fluctuations and femtoscopic measurements to the nature of the phase transition and the presence of a critical point will be given. Performance of the electromagnetic calorimeter working in conjunction with the tracking system for the di-lepton measurements and the potential for identification of charmed mesons will be described. The novel method of spectator nucleons energy reconstruction, based on the transverse gradient measurements of the energy deposition in the forward calorimeter FHCAL is also presented showing its capabilities to resolve the ambiguity in the energy deposition for central/peripheral A-A collisions. In summary, all the main components of the physics program of the MPD Collaboration will be presented.

Author: KISIEL FOR THE NICA/MPD COLLABORATION , Adam (Warsaw University of Technology (PL))

Presenter: KISIEL FOR THE NICA/MPD COLLABORATION , Adam (Warsaw University of Technology (PL))

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