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A MAPS based Inner Tracking System of the Multi-Purpose Detector at the NICA collider

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The Multi-Purpose Detector (MPD) is being constructed to study the properties of extremely dense nuclear matter formed in relativistic nucleus-nucleus collisions at NICA energies. The yields of strange and charmed particles are the important observables sensitive to critical phenomena in phase transitions of the QGP-matter at high net-baryon density. Highly efficient registration of such short-lived products of nuclear interactions using vertex silicon detectors will play a key role in the analysis of the possible onset of deconfinement in nuclear matter.

An Inner Tracking System (ITS) based on the Monolithic Active Pixel Sensors (MAPS) is under design by the emerging MPD ITS collaboration in Dubna and Wuhan. The ultra-light carbon fiber structure carries five layers of CMOS ALPIDE sensors recently elaborated by the ALICE collaboration. The two layers of the Outer Barrel (OB) are built out of 42 staves developed for the new ALICE ITS to be installed at CERN next year. The MPD ITS mainframe mechanics and the OB installation is planned to be completed in 2023. The Inner Barrel (IB) will use novel MAPS sensors of enlarged area and reduced thickness to be developed together with the ALICE collaboration within 2020-2025 and installed after the reduction of the diameter of the MPD beam pipe to optimal value of 38 mm will become possible. The poster presents the main details of the MPD ITS layout, computer simulations of the pointing resolution gained with the system, as well as a quality assessment of the MPD tracking system including ITS and Time Projection Chamber used for the reconstruction of the multi-strange hyperons and the D-mesons produced in the central Au-Au collisions at $\sqrt{s_{NN}} = 9$ GeV.

Authors: Dr MURIN, Yuri (JINR, Dubna); Mr SHEREMETEV, Alexei (JINR, Dubna); ZINCHENKO, Alexander (JOINT INSTITUTE FOR NUCLEAR RESEARCH (JINR), DUBNA, RUSSIA); IGOLKIN, Serguei (St Petersburg State University (RU)); KONDRATEV, Valeri (St Petersburg State University (RU)); WANG, Yaping (Central China Normal University CCNU (CN))

Presenter: Dr MURIN, Yuri (JINR, Dubna)

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