

A “vector finder” approach to track reconstruction in the Inner Tracking System of MPD/NICA.

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At present, the accelerator complex NICA [1] is being built at JINR (Dubna). It is intended for performing experiments to study interactions of relativistic nuclei and polarized particles (protons and deuterons). One of the experimental facilities MPD (MultiPurpose Detector) [2] was designed to investigate nucleus-nucleus, proton-nucleus and proton-proton interactions.

As one of the possible MPD upgrade steps, an Inner Tracking System (ITS) based on the next generation silicon pixel detectors [3] is being considered to be installed between the beam pipe and the Time Projection Chamber (TPC). It is expected that such a detector will increase the research potential of the experiment for both the proton-proton (high luminosity) and nucleus-nucleus (high particle multiplicity) interactions. According to the proposed design, the MPD ITS will consist of five layers of silicon pixel detectors. The main purpose of the ITS is to provide a better precision of the primary and secondary vertex reconstruction and improve track reconstruction in the MPD in the region close to the interaction point.

The existing in the MPD track reconstruction method is based on the Kalman filter in the TPC. Its simple extension to the ITS is not adequate to fully exploit the potential of the new detector, therefore such a method cannot be considered as a good tool to study ITS performance. That is why another algorithm, based on the “vector finder” approach, was developed. This paper describes the proposed track finding algorithm for the ITS of MPD and presents its performance results obtained on Monte-Carlo generated data of nucleus-nucleus collisions.

[1] Nuclotron-based Ion Collider fAcility web-site: <http://nica.jinr.ru>

[2] MultiPurpose Detector web-site: <http://mpd.jinr.ru>

[3] B.Abelev et al [ALICE Collaboration], J. Phys., G41 (2014) 087002

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