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Software development for Monte-Carlo simulation and hit-reconstruction for tracking detectors in the next runs of the BM@N experiment in 2021-2022

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In this report we present the software that has been prepared for generation and processing of data sets in conformity with the features of the main tracking detectors with respect to the configuration of the BM@N setup in 2021-2022. This software has been integrated to the BmnRoot framework which was developed by the BM@N group and is used as the main software for simulation, reconstruction and analysis in the BM@N experiment.

Carrying out the experiment in the period mentioned above involves implementation of two parts of its scientific program: the first part is directed to study collisions of relativistic ion beams with fixed targets and the second part is aimed at studying the Short Range Correlation (SRC). Each part of the experiment has its own configuration of tracking detectors. In our report we will describe these configurations and what has been done concerning software development for the detectors of the central tracker comprising such detectors as FSD (Forward Silicon Detector), GEM (Gas Electron Multiplier) and CSC (Cathode Strip Chamber).

In the work particular attention is paid to preparing the detailed ROOT geometry of these detectors as the initial step of the simulation procedure based on the Monte-Carlo methods. Furthermore, the complete description of the detectors includes, in addition to the ROOT geometry, some information about parameters specific to each one of them. For this purpose in the BmnRoot framework, we make special files based on an XML format to store detector parameters for each configuration. These parametrization files are used for further digitization and hit-reconstruction procedures which are also reviewed in the report.

Primary author: BARANOV, Dmitry (tuta)

Presenter: BARANOV, Dmitry (tuta)

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