

Alignment of TOF-400 detector at BM@N experiment

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The BM@N experiment is the first working installation at the NICA collider complex. The aim of the experiment is to study the properties of baryonic matter in the collision of heavy nuclei with a fixed target. During a physical session in December 2022-February 2023, about half a billion Xe nuclei interaction events with a stationary CsI target were collected. For correct processing of experimental data, it is necessary to know exactly the positions in the space of the detectors of the experimental setup.

The initial detector positions are determined from knowing the geometry as it is described the technical design of the detector. The uncertainties on the positions of the detector elements, introduced during assembly, can worsen the accuracy of hits reconstruction in the detector. The alignment procedure corrects those initial position values, so they are consistent with the actual detector elements placement.

The goal of the work is to perform the alignment procedure for TOF-400 detector at BM@N after the physical session, using the collected experimental data. The method applied is analyzing distributions of residuals versus tangents of track entry angles for every plane of TOF-400, and there are 20 planes in total. Using this method, one can obtain misalignment value of planes along beam axis. The result of the TOF-400 alignment procedure is presented and discussed.

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