

Event reconstruction method in a hybrid muon hodoscope

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The method of event reconstruction and obtaining of muonographs by a new hybrid muon hodoscope is considered. The design of the developed hodoscope is described. The first results of measurements, as well as the obtained estimates of the angular and coordinate accuracy of the detector are discussed.

The muonography method is based on the registration of the penetrating component of cosmic rays (muons) and makes it possible to obtain images of various objects. In order to implement the muonography method for studying large-scale objects, a new wide-aperture precision hybrid muon hodoscope was created. This hodoscope consists of two complementary recording systems - a scintillation strip detector and a drift tube detector. Alternating coordinate planes of the detectors, each with a sensitive area of 3×3 m², are fixed in a common frame placed on a movable wheeled turntable.

To reconstruct events in the drift detector, the method of spatio-temporal clustering of signals by the drift time in the tubes is used. After the selection of hits from single cosmic muons, the search for intersections of tangent lines between the coordinate planes of the hodoscope, the reconstruction of the muon track, and the subsequent obtaining of muonographs follow. In the scintillation hodoscope, for the reconstruction of the muon track, a two-coordinate method of searching for a straight line from triggered scintillation strips is used.

Keywords: Cosmic ray muons, hybrid particle detectors, drift tubes, muon hodoscope, muonography, muon tomography.

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