Contribution ID: 84

Type: Poster

Mobile muon hodoscope for investigating the structure of objects using the muonography method

Nowadays, the muonography method (by the analogy with the X-Ray radiography) has become widely used for studying various natural and industrial objects: the atmosphere and heliosphere, the mountains and volcanoes, the blast furnaces and nuclear reactors, the historical heritage sites, and others. The method is based on the "scanning" of thick layers of matter using the penetrating flux of cosmic-ray muons. Implementation of this technique requires the development of the easy-to-use high-precision mobile muon hodoscopes. At the Scientific and Educational Center NEVOD (National Research Nuclear University MEPhI), a mobile muon hodoscope (MMH) has been developed. It represents a multi-channel detection system consisting

of single-projection coordinate planes (SPCP). Each plane has an area of about 1 m² and includes 192 long polystyrene-based scintillator strips doped with p-terphenyl and POPOP. The scintillators are arranged in two layers. One layer of the plane is offset by a half of the strip width relative to another layer. The light collection is performed using the wavelength-shifting optical fibers (Kuraray Y-11) coupled to the silicon photomultipliers (SiPM, Joinbon TN-3050 SMT). The signals from each SiPM are read out using 32-channel boards based on the ASIC Petiroc2A (6 boards per plane).

Six planes are assembled into three pairs with orthogonal strip orientation and are mounted on a common frame ensuring the adjustment for different zenith angles.

In the report, the detector design is presented. The results of testing the detecting elements and the first detection plane of the hodoscope, which were obtained using the specialized test benches developed at the Scientific and Educational Center NEVOD, are discussed.

The work is carried out with the support of the Program of Strategic Academic Leadership "Priority-2030".

Primary author: TSELINENKO, Maxim (Национальный исследовательский ядерный университет «МИФИ»)

Co-authors: KOMPANIETS, Konstantin (MEPhI); MIRKHEEV, Said (NRNU MEPhI); PASYUK, Nikita (NRNU MEPhI); SNYTKO, Leonid (NRNU MEPhI); SHUTENKO, Victor (National Research Nuclear University MEPhI); YASHIN, Igor (National Research Nuclear University MEPhI)

Presenter: TSELINENKO, Maxim (Национальный исследовательский ядерный университет «МИФИ»)

Session Classification: Poster Session

Track Classification: Cosmo- and geophysical aspects of cosmic rays at the ground level