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Measurement of low-energy cosmic muons with multilayer lead-scintillator telescope

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Measuring differential energy spectra for muons from cosmic rays in the energy range of 100 MeV –1 GeV is of particular interest for studying the properties of the heliosphere, magnetosphere and atmosphere of the Earth. Variations in the flux of low-energy muons from the decay of pions and kaons formed in the Earth's atmosphere due to the interaction of primary cosmic rays should be most sensitive to these properties. Continuous monitoring of the flux of such muons will allow for a more detailed study of its dependence on such parameters as pressure, humidity and temperature of the atmosphere, as well as geomagnetic disturbances caused by solar activity.

To carry out such measurements, a hadron calorimeter module developed and manufactured at INR RAS was used as a muon telescope. Such modules as part of forward hadron calorimeters are used in a number of experiments on relativistic nuclear physics, including the BM@N and MPD experiments at the NICA accelerator complex at JINR. The module consists of alternating layers of lead absorbers and scintillation plates with individual light read-out by silicon photomultipliers (SiPM).

The report will present the first experimental results on measuring the low-energy part of the cosmic ray muon spectrum, measured at zero zenith angle, and will show a comparison of the obtained results with world data.

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