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Investigation of the flux of albedo muons with NEVOD-DECOR experimental complex

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Results of investigation of the near-horizontal muons are presented in the range of zenith angles of 85 – 95 degrees. In this range, so-called 'albedo'muons (atmospheric muons scattered in the soil into the upper hemisphere) are detected.

Measurements have been conducted with the NEVOD-DECOR experimental complex located on the campus of MEPhI. The basis of the complex is the Cherenkov water detector NEVOD with the volume of 2000 m³ equipped with a dense spatial lattice of quasi-spherical modules (91 in total). Each module consists of six FEU-200 PMTs with flat photocathodes directed along the axes of the orthogonal coordinate system. The coordinate detector DECOR is deployed around the NEVOD. DECOR includes eight vertically suspended eight-layer assemblies of plastic streamer tube chambers with resistive cathode coating with the total sensitive area 70 m². Chamber planes are equipped with two-coordinate external strip readout system. Detector DECOR allows to localize tracks of a near-horizontal muons with high angular (better than 1 degree) and spatial (about 1 cm) accuracy and allows to determine the muon direction by time-of-flight technique with probability of error of the order 10⁻². More reliably, muon direction can be obtained from the NEVOD data using the directionality of Cherenkov light. The combination of these two independent methods allows to determine the muon direction with the probability of error less than 10⁻⁸.

The results of the measurements of the flux of albedo muons for experimental series with the duration of about 20,000 hours 'live'time and comparison of them with different models of muon scattering in soil are presented.

Collaboration

- not specified -

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