

Prospects of “muon puzzle” solution with the NEVOD-DECOR-TREK complex

Tuesday, 8 June 2021 11:05 (25 minutes)

Muon puzzle is a growing with cosmic ray energy excess of muons in EAS in comparison with simulations performed using various models of hadron interactions and even assuming a heavy composition of cosmic rays. The main contribution to investigation of the energy dependence of the muon excess was done by NEVOD-DECOR experiment. To separate two possible reasons of muon excess appearance (cosmophysical or nuclear-physical ones), measurements of the energy deposit of muon bundles are required. Such experiment is conducted at the NEVOD-DECOR complex, and the first results evident in favor of the nuclear-physical reason. But both detectors NEVOD and DECOR have some drawbacks: non-symmetric arrangement of modules of PMTs in Cherenkov water detector NEVOD and small area (about 70 sq. m) and insufficient spatial accuracy of muon track measurements (~ 1 cm) in coordinate-tracking detection DECOR. Nowadays, the complex is being complemented with a new coordinate detector TREK with area 250 sq.m based on multiwire drift chambers that will have spatial accuracy of 1 mm. In parallel, modernization of the Cherenkov water detector NEVOD will be fulfilled. NEVOD-DECOR-TREK complex will allow us investigate the muon component of inclined extensive air showers in a very wide energy region from 10^{14} to 10^{19} eV and to solve the muon puzzle by means of simultaneous measurements of the number of muons in DECOR-TREK system and their energy deposit in Cherenkov water calorimeter NEVOD.

Primary author: ZADEBA, Egor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Co-authors: KOKOULIN, Rostislav (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); PETRUKHIN, Anatoly (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); Dr KHOKHLOV, Semyon (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); YASHIN, Igor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Presenter: ZADEBA, Egor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Session Classification: Multicomponent EAS investigations

Track Classification: Multicomponent EAS investigations