Measurements of the average muon energy in inclined muon bundles in the NEVOD-DECOR experiment

Executive Summary

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1. What is the contribution about?

The average energy of muons in the bundles in inclined extensive air showers (EAS) obtained from the data of long-term experiment (more than 7 years observations) at the NEVOD-DECOR setup.

2. Why is it relevant / interesting?

Now actual problem in EAS is the “muon puzzle” (the excess of multi-muons events in data in comparison with the predictions), and investigation of the energy characteristics of muon bundles is one of approaches to investigate this problem.

3. What has been done?

Experimental estimates of the average muon energy in the bundles and its dependence on zenith angle and local muon density in the range of primary energies from 10 PeV to 1000 PeV have been obtained and compared with the results of calculations performed using the CORSIKA-based simulation using two models of hadronic interactions: QGSJET-II-04 and SIBYLL-2.3c.

4. What is the result?

For large muon densities, corresponding to primary energies greater than 10^{17} eV, an increase in the average energy of muons in the bundles in comparison with the calculation results is observed.