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# Variations of atmospheric muons and background measured with Large Volume Detector

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The analysis of atmospheric muons detected in the LVD underground low-background experiment (Gran Sasso, Italy) has been completed. The average intensity of the registered muons is 3.31 × 10−4 m −2 s −1. The paper presents measurements of seasonal variations of muons in different directions.
The low-energy background, which is registered by the detector, also experiences seasonal (annual) changes. This background is created by gamma quanta from decays of 222Rn daughter nuclei. Gamma radiation is generated mainly by bismuth nuclei, which, due to-decay, transform into polonium with a characteristic time of 19.7 min. The energy spectrum of gamma radiation covers the range from 0.6 to 2.5 MeV. The detector also observes daily and weekly background variations. Variations are due to seasonal fluctuations in radon concentration and additional injection of radon from groundwater associated with tectonic activity.
With deformations of the earth's crust, stress arises, the number of microcracks increases, which leads to an increase in the concentration of radon. At the LVD experiment, research is underway to identify the relationship between the behavior of radon fields and seismic activity. The paper will discuss various sources of variations associated with geophysical aspects (the influence of the moon's motion; changes in pressure, humidity and temperature; seismic activity).

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