Contribution ID: **71**   Type: **Oral talk (15 min + 5 min questions)**

MEASUREMENT OF RADON DECAYS WITH THE LVD-SETUP FOR NEUTRINO SEARCHING

Thursday, 14 July 2022 16:00 (20 minutes)

The Large Volume Detector (LVD), located at the Gran Sasso Low Background Laboratory in Italy, is built to search for neutrinos from stellar core collapses in our galaxy. [1, 2].

The peculiarity of the search for rare events requires close attention to the background of the experiment, such as the natural radioactivity of the rock and detector materials [3] and particles of the interaction of cosmic ray muons underground [4].

The LVD detector measures gamma quanta from the decay of radon daughter nuclei.

Radon is the main source of the variable background component in the underground hall, whose concentration variations are composed of several components. Long-term, seasonal variations are associated with changes in rock moisture [5]. The daily variations of radon are affected by air mixing due to the opening of the gates in the hall [6]. We convincingly show the connection between the change in the concentration of radon nuclei in the experimental hall and the change in the count rate of background pulses from gamma rays in the detector. We also point out the existence of another source of radon change, this is seismic activity. An increase in radon emanation a few days before an earthquake poses the problem of the possibility of predicting seismic events. We present some typical LVD time series patterns during major earthquakes in Italy in recent years.

1. G. Bari, M. Bazile, G. Bruni et al. Nucl. Instrum. Meth. Phys. Res. A. 264, 5 (1988).

2. N. Y. Agafonova et al. (LVD Collaboration). Astrophys. Jour. 802, 47 (2015)

3. C. Bucci et al. Eur. Phys. J. A 41, 155 (2009).

4. R. Persiani, PhD Thesis, Bologna: Univ. Bologna, (2011).

5. N.Yu. Agafonova et al. Bulletin of the Russian Academy of Sciences: Physics. 83, 614 (2019).

6. N.Yu. Agafonova, V.A. Alekseev, E.A. Dobrynina, et al., Preprint of the Inst. Nucl. Res., Russ. Acad. Sci., Moscow, no. 1071/2001 (2001).

The speaker is a student or young scientist

No

Section

1. Applications of nuclear methods in science and technology

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