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Autonomous instrument system for monitoring radioactivity, underground gases and environmental parameters underground

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For experiments on searching for rare underground events, such as detection of solar neutrinos, neutrinos from supernovae, neutrinoless beta decay, the main problem is the background variation. Regardless of the detector power supply, two types of backgrounds can be specified: muons and natural radioactivity of construction materials, rock, as well as a variable component of radioactivity - underground gases. Emissions of radioactive gases can be a consequence of both impending earthquakes and changes in local humidity and pressure. We have created an autonomous station capable of monitoring environmental parameters such as temperature, humidity, pressure, CO₂ concentration, radon, density of positive and negative air ions, and measuring vibration levels in different frequency ranges. The universal complex displays all parameters online on the monitor screen and saves them to a file for further processing. A diagram of the developed complex and the limits of the measured parameters are presented. The measurement results for the underground room of the experimental hall of 40 m³ at a depth of 10 m are given.

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