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for the measurement of low activities of ^{37}Ar based on the detection of liquid argon scintillation

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One of the most conclusive evidences of a violation of CTBT is the presence in the subsoil air of elevated concentrations of ^{37}Ar radionuclide, which is formed in large quantities in the interaction of neutrons with calcium in rocks.

Traditionally, to measure the activity of ^{37}Ar , proportional gas counters are used, which are filled with a counting gas prepared from samples of argon with the addition of methane. Further reduction of the detection limit of ^{37}Ar is limited by the difficulty of a significant increase of argon sample volume placed in a proportional counter.

Installation for the detection of argon-37 low activities based on the liquid scintillation principle was developed at the Khlopin Radium Institute under contract with the CTBTO. The role of the scintillator in this installation is performed by the liquefied preparation of extracted from soil air argon itself. The use of liquefied argon samples allows one to multiply the volume of the measured samples without increasing the size of the measuring cell and shield elements, and allows significant reduction of detection limits of ^{37}Ar .

The presentation contains a description of the installation and the results obtained after its testing.

Promotional text

One of the main objectives of the conference is to identify opportunities and possible solutions for the continuous improvement of the control and verification of nuclear tests. The theme of our presentation is fully consistent with the achievement of this goal.

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