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APPLICATION OF LITHIUM-DOPED CRYSTALS IN TASKS OF SEPARATE DETECTION OF GAMMA-RAYS AND NEUTRONS

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Modern trends of radiation control instruments development require creation of highly efficient high autonomy detection devices with minimal dimensions, which allows radiation safety services to perform inspection of various objects in the most efficient way.
Currently, 3He counters are used in most of the neutron detection devices. An alternative is the use of lithium-doped crystal scintillators, which combine the functions of gamma spectrometry and neutron detection. The main representatives of detectors of this class are CLYC [Cs2LiYCl6(Ce)], NaIL [NaI (Li+Tl)] and CLLB [Cs2LiLaBr6(Ce)].
The ATOMTEX SPE is developing probes for separate detection of neutron and gamma radiation on the basis of CLYC and NaI(Li+Tl) detectors. According to the results of the studies, NaI(Li+Tl) scintillator is more promising for use in the absence of strict requirements to the resolution capability due to simpler discrimination of radiation types and lower cost of the detector.
The use of the CLYC scintillator is associated with the need to solve the problem of optimal light collection, because this scintillator has light output twice less than NaI(Li+Tl) and its emission spectrum is shifted to UV region. Also the process of classification of the registered radiation is more complicated and requires the use of digital signal processing methods.
The report presents the analysis of pulses of CLYC, NaI(Li+Tl) detectors obtained from the photomultiplier tube and considers methods of pulse processing for separate detection of gamma-radiation and neutrons on these scintillators. The prospects of application of separate gamma-radiation and neutron detection units for various tasks are considered.

The speaker is a student or young scientist

No

Section

1. Nuclear technology and methods in medicine, radioecology

Primary author: Mr LAGUTSKIY, Ilya (ATOMTEX SPE)

Co-authors: KOMAR, Damian; Mr ANTONOV, Andrey (ATOMTEX SPE); Mr ANTONOV, Vladimir (ATOMTEX SPE)

Presenter: Mr LAGUTSKIY, Ilya (ATOMTEX SPE)

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