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Experimental Study of LaBr₃(Ce) Gamma-Ray Detector Performance in Mixed Radiation Field ALEXANDER BARZILOV, PHILLIP WOMBLE, JON PASCHAL, LINDSAY HOPPER, RYAN MOORE, ERIC HOUCHINS, JEREMY BOARD, Western Kentucky University — High energy gamma-ray spectrometry has a number of practical applications. Neutron-based explosives detection systems are the important part of active interrogation technology. Pulse neutron technique is excellent choice to rapidly determine bulk elemental content of the cargo in non-destructive and non-intrusive manner. Pulse mode of operation provides simultaneous detection of gamma-rays from neutron inelastic scattering and thermal capture reactions. The physical parameters of chosen detectors govern parameters of system. A gamma-ray detector must be suitable for operation in mixed radiation fields consisting of neutrons and photons. It must have high Z-value to detect photons with energies in 4.4 MeV -10.8 MeV range emitted from neutron scattering reactions on carbon and nitrogen nuclei. In this paper, we discuss results of experimental study of LaBr₃(Ce) detector operation with the d-T neutron generator. This lanthanum halide scintillator is activated by neutrons in mixed field under 14.1-MeV neutron irradiation showing the beta spectrum with endpoint energy ~ 2 MeV.

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