

NEUTRON DETECTION EFFICIENCY OF SCINTILLATION DETECTORS

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The results of measurements of neutron detection efficiency $\varepsilon(En)$, $En \approx 0.1 - 6$ MeV for detectors of MULTI setup [1, 2] are presented. The measurements of $\varepsilon(En)$ for scintillation detectors (CeBr₃, NaI(Tl), CsI(Tl), stilbene) were carried out by tagged neutron method using

²³⁹Pu/⁹Be and ²³⁸Pu/¹³C n- γ sources and Trigger-detector (see 2 in Fig.1). Trigger-detector was used for registering γ -quanta with $E_\gamma = 4.43$ MeV and 6.13 MeV from sources ²³⁹Pu/⁹Be and ²³⁸Pu/¹³C respectively. Neutron energy values was taken from the time of flight TOF. Time scale of TOF was calibrated by γ - γ coincidence measuring (Single escape and Double escape peaks in Trigger detector and annihilation γ -peak in tested detectors).

The measurements have shown that CeBr₃, NaI(Tl), and CsI(Tl) detectors have a relatively high neutron detection efficiency which is weakly dependent on the energy at $En \approx 0.5 - 6$ MeV and can be used for neutron detection by TOF. For example, efficiency is $\varepsilon(En) \approx 36\%$ at $En = 0.5 - 6$ MeV for CeBr₃ $5 \times 5 \times 5$ cm³ detector.

Stilbene detectors have good n- γ pulse shape separation, but sharp energy dependence of the efficiency $\varepsilon(En)$ at energy range $En \approx 0.5 - 6$ MeV ($\varepsilon \approx 50\%$ and 10% for $En = 0.5$ MeV and 6.0 MeV, respectively).

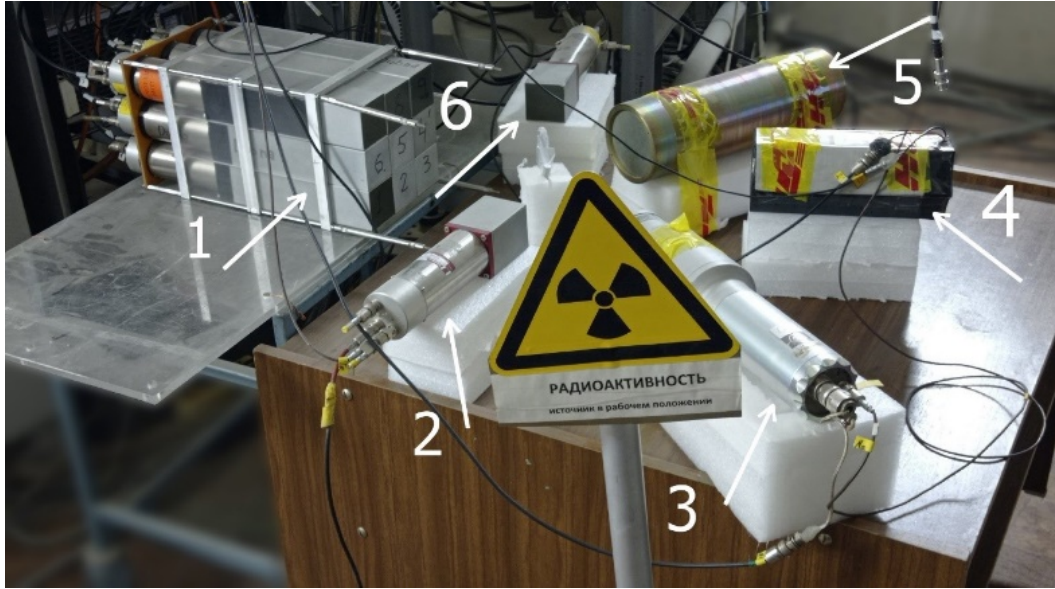


Fig.1 Scheme of measurement 1-CeBr₃-NaI(Tl) phoswich, 2-CeBr₃№1(Trig.), 3-NaI(Tl), 4-CsI, 5-C₁₄H₁₂ (stilbene), 6-CeBr₃№2

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