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Joint report: DISTORTIONS OF THE REGISTRATION OF DELAYED NEUTRONS FROM 238U FOTOFISSON BY A SCINTILLATION SPECTROMETER IN Pb PROTECTION BETWEEN LEA PULSES AND POSSIBILITY OF ISOLATING A COMPONENT WITH T1 / 2 = 1 ms.

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In previous works [1–3], we measured spectra of delayed neutrons (DNs) from photofission of 238U and looked for short-lived components in these DNs (with half-life T1/2 down to 1 ms) in time intervals between pulses of the linear electron accelerator at the energy of incident on metal U-target electrons Ee = 10 MeV. Fast neutrons were registered by scintillation stilbene (thickness 50 mm, diameter 50 mm) spectrometer with discrimination of background g-quanta using differences in shapes of scintillation pulses. This spectrometer has Pb-shielding (thickness 5 cm). In order to avoid negative influence on the used scintillation detector from background of g-quanta and neutrons, produced by beam pulses, the controlled divider of power supply for the photomultiplier tube of the scintillation detector [4] was used (especially important for short-lived groups of DNs). For more details see [1–4] and references therein.
In the present work we considered distortions in registered spectra of DNs using Monte Carlo simulation for transport of DNs by codes LOENT and SHIELD [5–7] taking into account, first of all, interactions of DNs with atomic nuclei of Pb-shielding for stilbene spectrometer.


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Fission of actinide nuclei produces fast neutrons, mainly "prompt"neutrons (PNs), but also (2%) "delayed" neutrons (DNs with different half-lives T1/2). Usually, for the sake of convenience, DNs are divided into 6–8 groups according to their T1/2-values at approximately 0.2 s < T1/2 < 56 s (see, e.g., [1]). But there are some indications that it is necessary to search for short-lived DNs with T1/2 down to 1 ms (see, e.g., [2]).
In previous works [3–5], we tried to find such short-lived DN-components in time intervals between pulses of the linear electron accelerator LUE-8-5 of the INR RAS [6] at the incident electron energy Ee = 10 MeV, the duration of each beam pulse 3 (10ˆ-6)s, and their repetition rates (50–300)s(ˆ-1). As we showed in [4], under such conditions, after about 7 min of irradiation with beam with stable parameters, flux of all DNs with 0.2 s < T1/2 < 56 s will be almost constant at an aggregated saturation level (except for some statistical fluctuations). Under these conditions, the sought short-lived component of DNs will give an addition to this level which will decrease exponentially with increasing of t –time after beam pulse (from t = t0 –start of each measuring interval).
In the present work, we considered possibility for separating a short-lived component with T1/2 = 1 ms from total quantity of DNs at photofission of 238U in dependence on as characteristics of DNs (namely, ai –the relative part of the i-th group of delayed neutrons), as characteristics of used registration process (values of t0 and levels of accumulated "statistics").


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