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The systematic shift of the timing mark for an organic scintillator and its effect to the prompt fission neutron spectrum.

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An analysis of the experimental and theoretical works devoted to the spectra of prompt fission neutrons (PFN) showed serious contradictions in the obtained results. Most authors attribute the discrepancy in the measurement results to the influence of a number of systematic errors, the contribution of which is most pronounced at neutron energies below 1 MeV and above 6 MeV.
The vast majority of experiments on measuring the PFN spectra are carried out by the time-of-flight method. One of the possible sources of systematic error for this measurement method is associated with uncertainty in determining the timing mark from detector.
In the time-of-flight method any (even small) shift in the determination of the timing mark can lead to a significant change in the measured spectrum shape and, as a consequence, a change in the average energy of PFN. This work presents the results of a detailed study of the dependence of the systematic shift of the timing mark on the energy of the registered protons.
It is shown that a timing mark shift takes place, and its value is essential for the correct determination of the spectrum of PFN, especially for small path length.

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