The Measurement of the Neutron Beam Background of 1-st Channel of the IBR-2 by Means of Transmission Method

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A new method for measuring the neutron lifetime was proposed in [1]. It also notes the need for accurate measurement of the neutron background, especially the background of the delayed neutrons of the IBR-2 reactor, and formulated a proposal for experiments to measure the neutron background. The ratio of the background neutron count to the slow neutron flash must be less than 10^{-6}. According to [2], about 7 percent of the IBR-2 reactor power is released between the pulses of the reactor power, and since the number of neutrons is proportional to power, the background from delayed neutrons will also be 7%.

As a detector for measuring time-of-flight spectra, we used SNM-18, mounted on a span of ~ 29.6 m, as well as an ionization chamber with a layer of ^{235}U. When working with the SNM-18 counter, a reduction in the intensity of the neutron beam was required. To do this, using a lead collimator coated with cadmium and set to 12 m, a narrow, 2 mm wide, neutron beam was formed. At the 26-meter span of the base was installed 10 mm gap of borated polyethylene. The signals from the neutron detector were sent to a fast preamplifier, then to a fast amplifier (1501), and then to the discriminator pulse shaper in the NIM standard. The time analysis of signals, the collection and accumulation of experimental spectra were carried out using the "TIMECODER" system developed at the FLNP JINR [3].

The measurements of the transmission spectra with various samples were carried out, and the background magnitude and its measurement accuracy were estimated.

References

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