Contribution ID: **38**   Type: **not specified**

Compact Time-of-Flight Neutron Spectrometer with Digital Signal Processing

Tuesday, 27 May 2025 15:05 (15 minutes)

A compact time-of-flight neutron spectrometer was developed as a part of the BM@N setup at the Nuclotron accelerator (JINR). The aim of the spectrometer is study of neutron emission from target spectator decay in heavy-ion collisions at 2 –4 A GeV. The neutron spectra are measured at large angles in the energy range of 2 –200 MeV using small flight path of 20 –30 cm. Neutron detectors are based on stilbene scintillators coupled with four silicon photomultipliers. The time and shape of detector pulses are processed and recorded using TQDC modules developed in JINR. The characteristics of the spectrometer were studied in the last BM@N run with Xe + CsI collisions at 3.8 A GeV. The obtained time resolution of the detectors is $\sigma t \approx 110 -120$ ps. A high degree of gamma-quanta suppression was achieved by the pulse shape discrimination method with a factor FOM ≥ 2. A careful study of γ-ray and neutron background was an important part of the experiment. It was shown that the developed TOF spectrometer can provide reliable measurement of neutron spectra. An example of neutron energy spectrum obtained for Xe + CsI collisions is shown and discussed.

Primary authors: LASHMANOV, Nikita (JINR); Dr YUREVICH, Vladimir (JINR); Mr ROGOV, Victor (JINR); Dr SEDYKH, Sergey (JINR); Dr SERGEEV, Sergey (JINR); Dr KAPISHIN, Mikhail (JINR); Mr PIYADIN, Semen (JINR); BAZILEV, Sergey (JINR); SLEPNEV, Ilia (JINR); VELICHKOV, Valyo (JINR); TIKHOMIROV, Vladimir (JINR); TIMOSHENKO, Alexander (JINR); FILIPPOV, Ivan (JINR); SHUTOV, Alexey (JINR); SHCHIPUNOV, Andrey (JINR)

Presenter: LASHMANOV, Nikita (JINR)

Session Classification: Parallel Session 2: Nuclear data for applied and scientific purposes/Neutron detection & Methodical aspects

Track Classification: Parallel session: Parallel session 2