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The "Neutron Beta Decay" installation for the reactor PIK

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The neutron instrument complex "Neutron Beta Decay" is currently being manufactured to be located on the beam of polarized cold neutrons on the GEK-3 N0 channel. The facility is designed to measure the electron, neutrino, and electron-neutrino asymmetries of neutron beta decay. The experiment is necessary because the results of the most recent, most precise neutron decay experiments, conducted at an accuracy level of 10^{-3} , cannot be described within the Standard Model. The basis of the facility is a superconducting solenoid, which generates a uniform magnetic field of 0.35 T. Electrons and protons produced during neutron decay move in a magnetic field along magnetic field lines. To select a specific electron emission angle, a magnetic mirror effect is used by creating a region with a stronger magnetic field, with an induction of 0.88 T. The decay region is selected by protons, which are further accelerated by an electric field. This is achieved by using an electrostatic system that increases the voltage in the decay region to 30 kV. Detectors at the input and output of the neutron beam are used to record the electrons and protons. The aim of the experiment is to improve the accuracy of measuring correlation coefficients by ~ 3 times. Comprehensive simulation of the experiment was carried out.

Primary author(s) : SEREBROV, Anatolii (NRC "Kurchatov Institute" - PNPI); FOMIN, Alexey (PNPI NRC KI); BUDANOV, Nikita; ZHEREBTSOV, Oleg (NRC «Kurchatov Institute» - PNPI); Mr. KAYAIIKIN, Vadim (NRC "Kurchatov Institute" - PNPI); Mr. KOPTYUKHOV, Artem (NRC "Kurchatov Institute" - PNPI); LYAMKIN, Vitaliy (NRC "Kurchatov Institute" - PNPI); Mr. MURASHKIN, Aleksandr (NRC "Kurchatov Institute" - PNPI); Mr. PRUDNIKOV, Dmitriy (NRC "Kurchatov Institute" - PNPI)

Presenter(s) : FOMIN, Alexey (PNPI NRC KI)

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