

First results of the nuGeN experiment

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The nuGeN project is aimed to study neutrino scattering at the close vicinity of the reactor core of Kalinin Nuclear Power Plant (KNPP). Its main interests are connected with the detection of coherent elastic neutrino-nucleus scattering (CEvNS) and the search for the magnetic moment of neutrino. The experimental setup is constructed under reactor unit #3 of KNPP at a distance of about 10 m from the center of the 3.1 GWth core. In this way, we obtain an enormous antineutrino flux of more than 5×10^{13} $\nu/\text{cm}^2/\text{s}$. Materials of the reactor surrounding provide about 50 m w.e. overburden, that serves as a good shielding against cosmic radiation. In combination with low ambient background, it gives us a unique opportunity to investigate antineutrino properties at the best location in the world. A special lifting mechanism allows moving the spectrometer towards the reactor core changing the neutrino flux and thus suppressing main systematic errors caused by possible long-term instability and insufficient knowledge of neutrino flux. To detect signals from the neutrino scattering we use high-purity low-threshold germanium detectors surrounded by passive and active shieldings. A specially developed acquisition system allows suppressing noisy events. A detailed description of the experimental setup will be presented. In 2021 we finished optimization of the experimental setup and performed the first dedicated search of the CEvNS in the framework of our project by comparing the experimental spectra taken with regimes of reactor ON and OFF.

Primary author: LUBASHEVSKIY, Alexey (JINR)

Presenter: LUBASHEVSKIY, Alexey (JINR)

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