



Contribution ID : 107

Type : Oral talk

Study of Reactor Antineutrino Spectral Characteristics and Fuel Evolution of a VVER-1000 Reactor with the iDREAM Detector at the Kalinin Nuclear Power Plant

Wednesday, 28 October 2026 16:35 (15)

We present measurements of the integral and spectral characteristics of the reactor electron antineutrino ($\bar{\nu}_e$) flux obtained with the iDREAM detector at Unit 3 of the Kalinin Nuclear Power Plant, which operates a VVER-1000 reactor. The measured positron spectrum from $\bar{\nu}_e$ interactions with protons in the iDREAM liquid scintillator is compared with a prediction based on the isotope-dependent $\bar{\nu}_e$ spectra of the KI model, a spatial model of the VVER-1000 reactor core, and a Monte Carlo simulation of the detector response. In the energy range of approximately 4–6 MeV, a local excess of the measured spectrum over the prediction is observed, confirming the presence of the reactor $\bar{\nu}_e$ spectral anomaly. The iDREAM data also confirm a decrease in the inverse beta-decay interaction rate normalized to the reactor thermal power as ^{235}U is depleted and ^{239}Pu accumulates in the reactor core during fuel burnup. Using the measured $\bar{\nu}_e$ interaction rate, the evolution of the ^{235}U and ^{239}Pu fission fractions is reconstructed while the contributions from ^{238}U and ^{241}Pu are kept fixed. These results are further used to obtain a model-dependent estimate of the relative change in the ^{239}Pu mass in the reactor core over the course of the fuel cycle.

Primary author(s) : ZHUTIKOV, Ivan (MEPhI/NRC KI)

Presenter(s) : ZHUTIKOV, Ivan (MEPhI/NRC KI)

Session Classification : Neutrino physics

Track Classification : Neutrino physics