Contribution ID: **547** Type: **Poster Sessions**

Antineutrino Detector for On-Line Monitoring of Nuclear Reactor Parameters and search for short range neutrino oscillations

Saturday 7 July 2012 18:00 (1 hour)

A solid scintillator detector DANSS (Detector of Anti-Neutrino based on Solid Scintillator) designed for remote on-line diagnostics of nuclear reactor parameters and a search for short range neutrino oscillation is under construction now. It will be installed at the Kalinin Nuclear Power Plant next year. DANSS is a 1 m3 plastic scintillator detector divided into 2500 cells and surrounded with combined passive and active shielding to suppress external radiation backgrounds. The basic element of the detector is the scintillator strip 4×1×100 cm3 in size with thin gadolinium coating. Light from the strip is collected by wave length shifting fibers 1.2 mm in diameter and transported to small-size photomultipliers and multipixel photodiodes operated in the Geiger mode (SiPMs) used to read out scintillation signals. The estimates of the DANSS parameters are presented: efficiency (˜70%), counting rate of neutrino events (˜8500 per day), and expected background level (below 1%). We demonstrate that a detector with such properties is capable to measure the nuclear reactor thermal power with an accuracy of about 1.3% in one day and to determine the fuel composition and 239Pu production with an accuracy of ˜ 4%. In addition, the antineutrino detector allows monitoring the 239Pu-enriched rod extraction procedure. DANSS is placed on a movable platform. It can change the distance from the detector to the reactor core from 12 to 17 meters. The detector can be also placed at larger distances from the reactor core but this requires reassembling of the detector in a different hall. Measurements of the neutrino flux and energy spectrum at different distances should allow to study a large fraction of a sterile neutrino parameter space indicated by recent experiments and reanalysis of the reactor neutrino fluxes.

Summary

Design and sensitivity of a solid scintillator antineutrino detector are presented. The sensitivity is sufficient to measure the fuel composition and to study a large fraction of a sterile neutrino parameters dicussed for the explanation of recent experiments and neutrino reactor flux reanalisis.

Primary authors: Dr KOBYAKIN, A.S. (ITEP); Dr STAROSTIN, A.S. (ITEP); Dr TARKOVSKY, E.I. (ITEP); Dr DEMIDOVA, E.V. (ITEP); Dr TIKHOMIROV, I.N. (ITEP); Dr SHIRCHENKO, M.V. (JINR); Prof. DANILOV, Mikhail (Institute for Theoretical and Experimental Physics (RU)); Dr MIZUK, R. (ITEP); Dr VASIL'EV, R.V. (JINR); Dr BRUDANIN, V.B. (JINR); Dr EGOROV, V.G. (JINR); Dr SINEV, V.V. (INR); Dr RUSINOV, V.Yu. (ITEP)

Presenter: Prof. DANILOV, Mikhail (Institute for Theoretical and Experimental Physics (RU))

Session Classification: Poster Session

Track Classification: Track 13. Detectors and Computing for HEP