

New Trends in High-Energy Physics



Contribution ID: 120

Type: not specified

Actual status of “DANSS” project

DANSS is a one cubic meter highly segmented solid scintillator detector. It consists of 2500 scintillator strips (100x4x1 cm³), covered with gadolinium loaded reflective coating and read out with SiPMs via wave length shifting fibers. Groups of 50 strips are also read out by conventional PMTs. The detector does not contain dangerous liquids and therefore has no safety restrictions on location close to an industrial reactor. It is mounted just under the cauldron of the 3 GW_{th} reactor WWER-1000 of Kalinin NPP (Russia) on a special lifting platform which varies the distance to the reactor core from 10.7 to 12.7 m within few minutes once per 2-3 days. Due to such location, DANSS is perfectly shielded against cosmic neutrons by 50 m.w.e. of reactor body, cooling pond and other hydrogen-containing elements of the building. The inverse beta decay (IBD) process is used to detect antineutrinos. DANSS detects about 5000 IBD events per day with the background from cosmic muons at the level of few percent. Sterile neutrinos are searched for assuming a 4 neutrino model (3 active and 1 sterile neutrino). The data analysis consists in comparison of the neutrino energy spectra measured at different distances, it does not use any theoretically calculated spectrum and therefore is completely model-independent; systematic errors caused by long-term variation of the reactor fuel and detector efficiency are eliminated as well. In one year of the detector operation we have collected more than 1,000,000 IBD events and could exclude a big part of sterile neutrino parameters region. In particular, the Reactor Antineutrino Anomaly optimum point is excluded with a confidence level higher than 5 σ .

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