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Cryogenic scintillation CsI(pure) detector of low energy neutrino

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Detection of low energy neutrino is a challenging task for advanced studies of coherent neutrino scattering processes or for the observation of neutrino magnetic momentum. For this purpose, the detector must be capable to register the deposited energies starting from a hundred of eV. One of the options is the development of CsI(pure) scintillation detector operating at the temperature of liquid nitrogen. It is known, that this scintillator could achieve the record light yield of about 120 thousand photons per one MeV of deposited energy. It means that 100 eV energy deposition corresponds to 12 photons, that can be detected by advanced photodetectors. In this work we present the performance of small CsI(pure) scintillation cell which is readout by compact silicon photomultipliers (SiPM) with high detection efficiency. The SiPM thermal noises and the achieved light collection efficiency are presented. It will be shown that signal of about 30 photoelectrons/keV is attainable in such configuration of detector.

Primary author(s) : Mr. STRIZHAK, Alexander (INR RAS, MIPT); Mr. BARANOV, Alexander (INR RAS, MEPHI)

Presenter(s) : Mr. STRIZHAK, Alexander (INR RAS, MIPT)

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