

Liquid xenon detector with VUV-sensitive MPPCs for MEG II experiment

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The MEG II experiment is an upgrade of the MEG experiment to search for the charged lepton flavor violating decay of muon, $\mu^+ \rightarrow e^+ \gamma$. The MEG II experiment is expected to reach a branching ratio sensitivity of 4×10^{-14} , which is one order of magnitude better than the sensitivity of the current MEG experiment. The resolutions of the all detectors will be improved by a factor of 2, to cope with the increased beam rate in MEG II. The performance of the liquid xenon (LXe) γ -ray detector will be greatly improved with a highly granular scintillation readout realized by replacing 216 photomultiplier tubes (PMTs) on the γ -ray entrance face with 4092 Multi-Pixel Photon Counters (MPPCs). For this purpose, we have developed a new type of MPPC which is sensitive to the LXe scintillation light in vacuum ultraviolet (VUV) range, in collaboration with Hamamatsu Photonics K.K. The MPPC has been tested, and an excellent performance has been confirmed including high photon detection efficiency (> 15%) for LXe scintillation light. Based on the measured properties of the MPPC, an excellent performance of the LXe detector has been confirmed by Monte Carlo simulation. The construction and the commissioning of the detector is in progress. The performance of the VUV-sensitive MPPC will be reported, as well as the preliminary results during the detector commissioning.

Primary author: OGAWA, Shinji (T)

Presenter: OGAWA, Shinji (T)

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