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Liquid Xenon Photon Detector with Highly Granular Scintillation Readout for MEG II Experiment

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The MEG II experiment is in preparation to search for the lepton flavour violating decay, $\mu \to e + \gamma$, aiming at the world's highest sensitivity of 6×10^{-14}, which is ten times better than that of the MEG experiment.
An improved photon measurement is a key to the high sensitivity of the MEG II experiment.
A liquid xenon (LXe) photon detector with highly granular scintillation readout with 4092 VUV-sensitive MPPCs (139\,mm^2 each) has been constructed.
The highly granular and uniform scintillation readout by the VUV-MPPCs will improve the energy and position resolutions by a factor of two compared to the MEG LXe detector based on readout by 2"PMTs.
The VUV-MPPC was developed in collaboration with Hamamatsu Photonics K.K for the MEG II LXe detector, showing an excellent performance in LXe including a high photon detection efficiency (15–20%) for LXe scintillation light, high gain, low probability of optical cross-talk, low dark count rate and a good single photoelectron resolution.
The commissioning of the LXe detector is in progress.
Calibrations and performance studies using various calibration sources and muon beam are in progress although the number of readout channels is limited due to a delay of the production of the full electronics.
The performance measured in the commissioning of the detector and the plan for the engineering run with the full MEG II detector next year being followed by physics data-taking will be presented.

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