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MEG II experiment and the liquid xenon detecotr

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The MEG II experiment aims to discover the charged lepton flavor violation decay, μ+⟶e+γ, using high intensity continuous muon beam in the PSI. The MEG II began physics run since 2021 and we published first result with the an upper limit on the branching ratio of B(μ+ ⟶ e+γ) < 7.5 × 10ˆ{−13} (90 % C.L.). We continue to take physics run also in 2022 and 2023, and will continue by 2026. Currently the analysis of 2022 data is ongoing and we aim to publish next result soon.
The liquid xenon calorimeter measures the energy, timing and position of signal gamma-ray. Approximately 800 L of liquid xenon is filled in a cryostat and generates scintillation lights by incident gamma-ray. The scintillation photons are detected by photo sensors attached on the cryostat wall and surrounding the liquid xenon. On the incident face of
gamma-ray, 4092 VUV-sensitive SiPMs are used and 668 VUV-sensitive PMTs are used for the other faces. The detector stability during beam time was regularly monitored using LED, alpha-ray, cosmic-ray, and mono-peak (9 MeV and 17.6 MeV) gamma-ray sources. Detector responses such as position dependence, energy resolution, and timing resolution were also studied using gamma-ray from charge exchange reaction between charged pion and hydrogen (55 MeV, 80 MeV). In the presentation, these detector performance evaluated by these calibration run are reported.
Photon Detection Efficiency (PDE) decrease of SiPMs during beam time was observed probably caused by radiation damage. We tried to recover the PDE decrease by annealing during beam-off period. This recovery process and result are also presented.

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