Poster Session - "Champagne Grand Cru" - P02-21

Development of new method to measure SiPM saturation

Speaker: MURATA

T. MURATA[1], W. OOTANI[1], N. TSUJI[1]

[1] The University of Tokyo

The saturation of SiPM can be an issue for scintillation detectors with SiPM readout. When many photons are injected to a SiPM, the output can be saturated due to the limited number of pixels. To convert the output of the SiPM into the number of incident photons correctly, it is necessary to understand the behavior of the saturation. The saturation of the SiPM is usually measured by directly injecting fast visible-light pulse to a SiPM. However, this method does not include the effect of the time constant of the scintillation light emission, which is not negligible compared to the recovery time of SiPM pixels and hence mitigates the saturation. A new method to measure the SiPM saturation including all the relevant effects has been developed. The saturation of the SiPM coupled to a scintillator is directly measured with the scintillation light excited by injecting fast UV-light pulse to the scintillator. A large recovery of SiPM is observed. A new model of the SiPM saturation has also been developed. The new model includes the effect of the properties of SiPMs such as crosstalk, after-pulse, and pixel recovery. It is found that the new model well describes the measured saturation.