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Development and Characterization of 16-channel SiPM Prototype with sub-mm pixels for high resolution PET System

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Abstract:

SiPMs (Silicon Photomultipliers) are promising photo detectors for high resolution PET system because of its high gain and its fast timing. The resolution of modern PET systems is now in the range of mm. We have newly developed a prototype of 16-channel SiPM with the pitch of 500 μm . One pixel of the developed SiPM consists of 676 APD-geiger mode cells with the size of 15 μm by 15 μm . The cathode of 16-channels SiPM is shared in the die and the anode signals are pulled out in parallel. Each channel is confirmed to be successfully working. The breakdown voltage of the detector is 22.77V and the operational range is from 24 V to 30 V. The absolute PDE calculated from the standard KETEK SiPM is 34% and the peak wavelength is around 420 nm. The measured dark count rate is from 5 to 50 kHz depending on the bias voltage.

The basic characteristics of PDE, dark count rate and cross-talk will be presented. The basic performance of 16-channel SiPMs coupled with sub-mm crystal array of Ce:GAGG will be also presented in the conference.

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