

11th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD11) in conjunction with 2nd Workshop on SOI Pixel Detectors (SOIPIX2017) at OIST, Okinawa, Japan

Contribution ID: 120

Type: POSTER

Study of Silicon drift sensor for Gamam-ray Compton Camera

Sunday, 10 December 2017 20:00 (1 minute)

Compton camera used in the Hitomi SGD is a useful detector for soft gamma-ray in space observation. Si-pixel sensor with 3.4 mm pixels are used as scatterer in the SGD Compton camera. But this pixel size does not allow us to measure a direction of Compton-recoil electrons in the Si sensor, and thus the sensitivity is limited. To improve, it is important to measure the direction of recoil electrons and constrain the incoming direction of photons to a part of Compton ring. It is an advantage to use silicon drift sensor for this point. Silicon drift sensor has a strip-like readout channels and a drift time of signal electrons gives information of hit positions in another axis. There are three advantages compared with si-pixel sensor. One is that high position resolution are expected by measuring drift time and a smaller channel pitch. The second is that high energy resolution is expected by smaller capacitance. The third is that a low power consumption due to a smaller numbers of readout channels. Low power consumption is very important for satellite.

We made the prototype silicon drift sensor whose size is 1846.50.5 mm³ and 64 readout channels and 0.1*0.07 mm² channel size with Hamamatsu Photonics. We confirmed that the X-ray energy of 59.5 keV can be measured with this sensor. In this poster, we will report the results of the basic experiments on this sensor.

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Session Classification: POSTER

Track Classification: Technologies