

Development of the Pixel OR SOI Detector for High Energy Physics Experiments

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A Silicon-On-Insulator (SOI) technology is suitable for vertex detector for high energy physics experiments since complex functionalities can be fabricated on the SOI wafer with small material thanks to the monolithic structure.

We developed a new sensor processing scheme "PIXOR(PIXel OR)" for pixel detectors using a Lapis 0.25um SOI process.

An analog signals from each pixelated sensor is divided into two dimensional directions, and $2n^2$ signal channels from small n by n pixel matrix are taken OR as n column and n row channels, then the signals are processed by readout circuit in each small matrix.

This PIXOR scheme reduces number of readout channels and avoids a deterioration of intrinsic position resolution due to large circuit area, that was common issue for monolithic pixel detectors.

This feature allows high resolution, low occupancy and on-sensor signal processing at the same time.

We present the successful results of the PIXOR readout scheme using the first prototype.

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