

P-in-n and n-in-p sensor performance study of SOI monolithic pixel detectors

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We are developing monolithic pixel detectors with a 0.2 μm Fully-Depleted (FD) silicon-on-insulator (SOI) CMOS technology. The substrate layer is high-resistivity silicon, and works as a radiation sensor having p-n junctions. The SOI layer is 40-nm silicon, where readout electronics is implemented. There is a buried oxide layer between these silicon layers. This structure is ideal for a monolithic pixel detector. We developed p-in-n and n-in-p SOI pixel sensors with Czochralski (CZ) or Float Zone (FZ) silicon substrate. We operated the 500- μm -thick, FZ SOI pixel detectors under full depletion voltage. In this presentation we show recent test results of the SOI pixel detectors about the characteristics such as sensitivity, spatial resolution, energy resolution and radiation tolerance.

Author: Prof. MIYOSHI, Toshinobu (Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization (KEK))

Presenter: Prof. MIYOSHI, Toshinobu (Institute of Particle and Nuclear Studies, High Energy Accelerator Research Organization (KEK))

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