

10th Anniversary "Trento" Workshop on Advanced Silicon Radiation Detectors

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Studies and status of CMOS-based sensors research and development for ATLAS strip detector upgrade

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The talk will give an overview of the studies and status of CMOS-based sensors research and development for ATLAS strip detector upgrade.

CMOS sensor can provide higher granularity, costs less in sensor fabrication compared to conventional planar sensor.

Furthermore, CMOS-based sensors collect charge from thin depleted region, and it has potential to be thinned down to 50um for reducing material the new ATLAS tracking detector.

CMOS technology been chosen for investigation for ATLAS strip detector upgrade. A test chip that comprises several pixel matrices with different geometry, as well as built-in amplifier and stand-alone amplifier arrays has been fabricated in a 0.35 μm high-voltage CMOS process.

This talk will focus on the study of the test chip characteristics.

We did a very careful measurement on the tiny leakage current from a single pixel to characterize the its basic diode properties before and after gamma radiation.

We also measured the inter-pixel resistance for different doses of gamma radiation to investigate electrode isolation in high radiation environment.

The total capacitance of a pixel diode as a function of pixel size is also measured for pixel diode size optimization.

The plan of the CMOS sensor development for ATLAS strip detector in next three years will be covered in this talk as well.

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