

CMOS Monolithic Active Pixel Sensors for High Energy Physics

Tuesday, September 3, 2013 3:00 PM (30 minutes)

Monolithic detectors integrate sensor and readout in one piece of silicon and therefore favorably compare with hybrid detectors in terms of detector assembly, production cost and detector capacitance. Several functional devices on high resistivity silicon have been developed but often require fabrication steps incompatible with high volume manufacturing in standard semiconductor foundries. Recently more standard CMOS technologies have received significant attention to implement monolithic detectors, which now are starting to be deployed in high energy physics experiments.

An overview will be presented of different approaches to realize of monolithic detectors in CMOS technologies for high energy physics, which include in reality a variety of developments. Device, circuit and architecture mutually influence each other. Design tradeoffs and their impact on performance, power consumption and radiation tolerance will be presented, including the challenge to integrate more complex circuitry within the pixel for alternate architectures and the role of reverse substrate bias. An effort will be made to point out perspectives and challenges to be overcome for CMOS monolithic sensors to be adopted more widely in high energy physics.

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Track Classification: Pixels (including CCD's) - Charged particle tracking