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High-Voltage CMOS Detectors

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High-voltage CMOS (HVCMOS) detectors are depleted active pixel detectors implemented in standard commercial CMOS processes. The sensor element is the n-well/p-substrate diode. The sensor electronics are entirely placed inside the n-well which is at the same time used as the charge collection electrode. High voltage is used to deplete the part of the substrate around the n-well.
HVCMOS sensors feature fast charge collection by drift and high radiation tolerance.
The development of HVCMOS sensors has started as a small R&D project in Heidelberg. Presently there are more than 10 institutes that are developing such type of sensors.
High-voltage CMOS sensors will be used in Mu3e experiment and are considered as an option for ATLAS strip and pixel layers and CLIC.
Experimental results obtained with small prototypes are encouraging. We measure for instance detection efficiency of more than 99%. The efficiency is only slightly affected by radiation damage. Bumpless signal transmission works reliably, thinned sensors have been produced.
In this talk the status of the HVCMOS developments will be presented. New improvements like the use of high resistivity substrates and time walk compensation will be described.

Collaboration

for HVCMOS collaboration

Primary author: Prof. PERIC, Ivan (KIT Karlsruhe Germany)

Co-authors: EHRLER, Felix (KIT); LEYS, Richard (KIT); BLANCO, Roberto (KIT)

Presenter: Prof. PERIC, Ivan (KIT Karlsruhe Germany)

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