

Pixel ibridi epitassiali e readout triggerless in tecnologia CMOS 130nm per il microvertice di Panda.

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ABSTRACT: The Panda experiment, at the future Fair facility, is aimed at the study of the antiproton physics. The Micro Vertex Detector (MVD) is the innermost part of the detector, sitting around the beam pipe, and the sensors are organized in a barrel section with two pixel and two strip layers, and a forward section featuring 6 disks with mixed pixel and strip sensors. A hybrid solution with thinned epitaxial sensors was chosen and the main requirements for the readout include: a pixel size of $100 \cdot 100 \mu\text{m}^2$, an amplitude resolution of 12b, a working frequency of 155.5MHz, and a triggerless data acquisition. The readout of the pixel detector, named Topix, is under development. The Asic will provide the time position with a resolution of 6.43ns and a charge measure with a Time Over Threshold (TOT) technique, it will consist of a matrix of $116 \cdot 110$ cells and a 311Mb/s serializer as a data output. A CMOS 130nm technology has been used to reduce the pixel circuitry size and to provide tolerance for the total ionizing dose, besides single event upset protection techniques have been implemented. A Topix prototype, with the full pixel cell has been designed and tested after irradiation. A new release has been submitted with bump bonding pads, to build a reduced scale assembly. The stringent requirements in terms of space for the cabling of the MVD lead to an architecture based on optical links. The GigaBit Transceiver (GBT) under development at CERN has been chosen as baseline solution for the interface to the data acquisition. Low mass cables based on aluminum on polyimide are under development for the interconnections.

KEYWORDS: Front end electronics for detector; Digital electronic circuits