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Toward a vertex detector suited to a future Higgs factory based on CMOS pixel sensors

Wednesday 5 October 2022 14:00 (18 minutes)

Small electrode CMOS Pixel Sensors (CPS) developed at IPHC-Strasbourg provide one the most promising approaches for vertexing and tracking devices suited to a Higgs Factory. Two different R&D CMOS processes are currently pursued based on 180 (mature) and 65 (recent) nm feature sizes respectively.

The 180 nm process is used to develop the MIMOSIS sensor for the MicroVertex Detector (MVD) of the CBM experiment at FAIR/GSI. It features in particular 5 µm and 5 µs spatial and time resolutions, while being adapted to hit densities near 100 MHz/cm² translating into 2 Bpbs output flow.
The first full scale prototype of MIMOSIS, composed of 500,000 pixels, was fabricated with two variants of in-pixel circuitry and
several different doping profile of their epitaxial layer.

In parallel, the 65 nm technology of TPSCo with pixel pitch of 15 and 25 µm respectively is being explored to achieve smaller pixels adapted to in-pixel low power and signal processing functionalities.

Beam test results for both 180 and 65 nm will be presented and complemented by prominent aspects of the next step of the prototyping, in particular multi-reticle sensors exploiting the stitching technique as well as bending technique in partnership with the ALICE-ITS3 groups.

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