MATTER AND TECHNOLOGIES

Contribution ID: **55** Type: **Parallel talk**

Efficiency and spatial resolution of bent Monolithic Active Pixel Sensors measured with a 5.4 GeV electron beam

Monday 26 September 2022 14:00 (20 minutes)

The ALICE ITS3 project will be the first application of bent pixel sensors in high energy physics experiments. Combining truly cylindrical chips of unprecedented low material budget with the migration to a new process technology node that allows stitched sensors will pave the way to a nearly massless detector system. Understanding the effects that could potentially alter its performance is of utmost importance for the current R&D step.
To assess the performance of existing 50 µm-thick chips with respect to bending, several ALPIDE sensors were bent to the ITS3 targeted radii of 18, 24 and 30 mm and consequently tested during test beam campaigns. In this contribution, sensor performance results obtained with 5.4 GeV electron beams are presented.
The sensors are found to have an efficiency larger than 99.9% and a spatial resolution of 5 µm, in accordance with the nominal operation of flat ALPIDE sensors. These values are found to be independent of the bending radius and mark the beginning of an exciting chapter on silicon-detector design, paving the way to a new class of nearly-massless detectors, with ideal geometrical properties.

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Session Classification: Detector Technologies and Systems