



Contribution ID: 396

Type: Oral

ALPIDE, the Monolithic Active Pixel Sensor for the ALICE ITS upgrade

Thursday, 28 May 2015 08:50 (15 minutes)

A new Inner Tracking System based on seven concentric layers of Monolithic Active Pixel Sensors will be installed in the ALICE experiment during the second long shutdown of LHC in 2018-2019. It is based on 10m^2 of pixel sensors that will be fabricated using the 180nm CMOS Imaging process of TowerJazz. The ALPIDE design takes full advantage of a particular process feature, the deep p-well, which allows for CMOS circuitry within the pixel matrix, while retaining the full charge collection efficiency. Together with the small structure size, this allowed placing a continuously active, low-power front-end into each pixel and using an in-matrix sparsification circuit that sends only the addresses of hit pixels to the periphery. This approach led to a design with a power consumption of $<40\text{mW}/\text{cm}^2$, a spatial resolution of $\sim 5\mu\text{m}$, and a peaking time of $\sim 2\mu\text{s}$, while being radiation hard to some 10^3 1MeV n-eq, perfectly matching or superseding the requirements of ALICE.

Over the last years of R&D, several prototype circuits have been used to verify radiation hardness and to optimise pixel geometry and in-pixel front-end circuitry. The positive results led to submissions of full-scale ($3\times 1.5\text{cm}^2$) sensor prototypes in 2014. They are being characterised in a thorough campaign that includes several irradiation and beam tests. This contribution will give a comprehensive summary of the results obtained and prospects towards the final sensor to instrument the ALICE Inner Tracking System.

Collaboration

on behalf of the ALICE collaboration

Primary author: Dr MAGER, Magnus (CERN)

Presenter: Dr MAGER, Magnus (CERN)

Session Classification: Solid State Detectors

Track Classification: S6 - Solid State Detectors