4th DRD3 week on Solid State Detectors R&D

Contribution ID: **66** Type: **WG1 - Monolithic Sensors**

Recent measurements on the CASSIA1 sensors

Monday, 10 November 2025 16:25 (20 minutes)

The CASSIA (CMOS Active SenSor with Internal Amplification) project is focused on developing monolithic active pixel sensors (MAPS) with internal signal gain in the Tower 180nm CMOS process. The advantages of internal amplification include a higher input signal enabling simplification of in-pixel electronics, an improved signal-to-noise ratio for radiation hardness, and superior timing resolution for future 4D tracking applications. The presentation will focus on recent measurements of the first prototype sensors (CASSIA1) which were fabricated to demonstrate the feasibility of implementing a gain layer in the Tower Semiconductor 180 nm CIS process. Current developments towards full efficiency proceed with the design of a new sensor prototype (CASSIA2), which implements the sensor structures with gain alongside in-pixel electronics to operate the sensors either in low-gain (LGAD) or high-gain (SPAD) mode.

The presentation will give an overview of the latest measurement results on CASSIA1, including measurements of sensor response to DC and pulsed laser sources. We have studied four different gain layer implant configuration which vary in n+ electrode and p+ gain layer depth and doping. In our tests we studied the performance of different design in terms of LGAD and SPAD response, break down voltage and dark-count rate. First measurements with ionising sources and a recent beam test at CERN SPS further explore the performance of the sensors.

Type of presentation (in-person/online)

in-person presentation

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

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