Capacitance Studies of a Monolithic Active Pixel Sensor in a 65 nm CMOS Imaging Technology

Monolithic CMOS sensors have found their way into High Energy Physics thanks to multiple advantages in particle detection. Their main characteristic is the integration of the sensor and the readout electronics in a single chip, which provides a reduction in production effort, costs and material. As part of the next generation of silicon pixel sensors, that are usually employed as tracker and vertex detectors, a sensor produced in a 65 nm CMOS imaging process is being investigated at DESY. Device (TCAD) and Monte Carlo (Allpix²) simulations are needed to develop an understanding of this technology and to obtain insight into performance parameters of the sensor, which can be tested in experiments. The capacitance of a sensor has a crucial impact on its signal-to-noise ratio, and this information can be obtained by performing a small-signal AC analysis in TCAD. This project will study the capacitance of a 65 nm CMOS imaging sensor by means of TCAD simulations (90%), as well as comparing the simulation results with laboratory measurements (10%).

Field

B3: Development of experimental particle physics equipment (hardware-oriented)

DESY Place

Hamburg

DESY Division

FH

DESY Group

ATLAS

Special Qualifications:

Basic knowledge on silicon detectors and notions on programming (any language).

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