

Fine-tuning Monolithic Active Pixel Sensors Simulations

Future lepton and electron-ion collider concepts rely heavily on silicon sensors as primary tracking devices. Therefore, investigating silicon sensor ideas that provide cost-effectiveness and good performance is essential. One of the aspects of the DESY Tangerine Project involves assessing monolithic active pixel sensors (MAPS), which are developed using 65 nm CMOS imaging technology.

Precise simulations to improve sensor designs may use a hybrid approach combining Monte Carlo techniques with electrostatic field simulations. The foundation of this methodology is the combination of two tools: Monte Carlo simulations powered by Allpix Squared, which functions as a toolbox for sensor response simulations, and TCAD (Technology Computer-Aided Design) device simulations that supply inputs for electric field profile and doping concentrations. The sensor layouts can then be evaluated based on efficiency, cluster size, and spatial resolution.

The summer student will engage in a hands-on experience in the development of particle sensors through the implementation of TCAD simulations. Tasks will involve optimizing parameters, such as physics models and model meshing, and interpreting results, enabling them to make meaningful contributions to the project.

Group

DESY-ATLAS

Project Category

B2. Development of experimental equipment (hardware-oriented)

Special Qualifications

Particle detectors, ROOT or Python (optional)

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