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Laboratory Characterization Monolithic Active Pixel Sensors Prototypes

Future lepton and electron-ion collider concepts rely heavily on silicon sensors as primary tracking devices. Therefore, it is necessary to explore cost-effective silicon sensor technologies that maintain high performance. The Tangerine Project at DESY actively investigates monolithic active pixel sensors (MAPS), developed using 65 nm CMOS imaging technology.

A key objective of the group is to build expertise in these technologies by participating in all stages of sensor development from simulation and design to prototype characterisation. One of the sensors under study is the H2M (Hybrid-to-Monolithic), a fully integrated chip that ports a hybrid pixel detector architecture into a monolithic sensor. Another test chip, DESY-ER1, shares the same analog pixel front-end as H2M but provides direct access to the analog amplifier output. This feature allows for a more detailed understanding of the sensor's behaviour and underlying technology.

The summer student will gain hands-on experience testing these detectors and conducting characterisation measurements on one or both chips, depending on project needs. Key activities include electrical characterisation, equalisation, energy calibration, and optimisation of operational parameters. These steps are crucial for understanding detector performance and preparing for test beam campaigns.

Project Category

B2. Development of experimental equipment (hardware-oriented)

Special Qualifications

No prior experience with these specific detectors is required, basics in Linux, Python or C++, and Unix shell. Nice to have: lab/silicon experience, ROOT basics.

DESY Site

Hamburg

Group

FH-ATLAS

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