EDT 2020

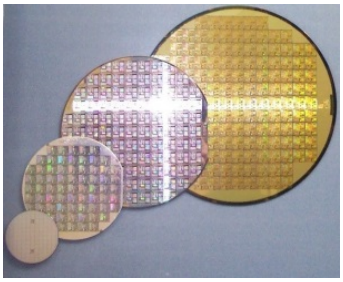
Track 1: Silicon Sensors

Detectors based on silicon sensors are the state-of-the-art technology in high-energy physics experiments. The industrial progress as well as the dedicated research allows to tackle the future challenges of light-weight, radiation hard and fast detectors having a total active area of > 100 m^2 of silicon.

In this track the basics of silicon sensors are studied. The students make use of the laboratory infrastructure to characterise different basic characteristics. These measurements are important to test the overall functionality of a silicon sensor for example in dependence of applied radiation.

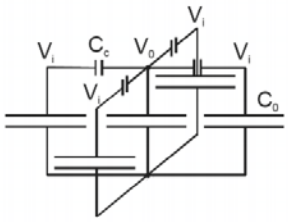
Task 1: IV/CV characteristics

Detecting charged particles with a semiconductor sensor is based on a PN junction which is biased to provide an electric field in which a charged particle creates a signal due to ionisation. The response of a sensor depends highly on the operation settings such as the applied voltage. In this task the students will learn how to measure the IV and CV characteristics of a silicon strip detectors using a probe station in the laboratory.



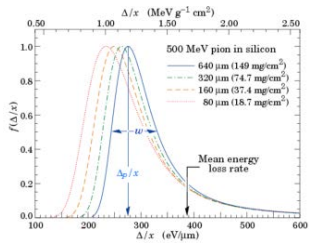
Task 2: Interpixel capacitance

The capacitance between different pixels could cause "cross-talk", if a particle induces a signal.



Task 3: Energy loss (Landau distribution)

The energy loss aka charge deposition depends on the energy of the charged particle. The distribution for a specific Silicon sensor can be measured.



Task 4: Charge mobility

Electron/holes pairs are produced in a Silicon sensor by a traversing charged particle. The mobility of these both charge carriers differs fundamentally, which will be measured.