



# detector seminar

SPEAKER: Simon Spannagel  
TITLE: **Monte Carlo Simulations for Silicon Detectors:  
Bridging the Gap between Detector Design and  
Prototype Testing**  
DATE: 12 Apr 2019, 11:00  
PLACE: 40-S2-B01 - Salle Bohr

## ABSTRACT

Silicon detectors for radiation detection play an important role in High Energy Physics and are nowadays used not only in vertex and tracking detectors but also in timing detectors as well as calorimeters. More and more commercial CMOS imaging technologies are entering the market and the physics community is adopting them to build a new generation of high-resolution, low-material-budget and radiation-hard silicon detectors. However, the increasing complexity of both the sensing element and the front-end circuitry poses a challenge to the detector design process. Detailed device simulations can aid in optimising individual components of the detector. Their execution time, however, is prohibitively large to include statistical fluctuations, which constitute an integral part of the signal formation. This necessitates the development of approximative algorithms, which retain the device characteristics while reducing the simulation time significantly. Combining them with Monte Carlo simulations of the stochastic particle interaction process facilitates the extraction of performance parameters such as spatial or temporal resolution. The precision and explanatory power of such simulations can be enhanced by including aspects of finite-element device simulations, such as electrostatic field calculations. This seminar will provide an overview of different Monte Carlo simulation methods for silicon detectors, using the Allpix Squared Generic Pixel Detector Simulation Framework as an example.

Organised by: Dominik Dannheim