



LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

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Winter Term 2019/2020

# Instrumentation and Analysis Methods

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## Course Description:

The course aims to provide the basics of statistics, data analysis and simulation methods including Monte-Carlo integration, minimization techniques and statistical interpretation of data, which are methods relevant in all fields of experimental physics. In addition, instrumentation techniques are covered, detection methods for charged particles and photons in a broad energy range relevant for particle physics (PP), medicine (M), photon science (X), and homeland security (HL).

Some of the instrumentation topics covered are: the interaction of particles with matter, scintillators and time-of-flight detectors (PP,M,HL), the principle of gas chambers (PP,M,HL), silicon detectors for charged particles and photons (PP,M,X), modern calorimetry and detectors for particle identification (PP, space), large detector systems (LHC/Tevatron/future ILC), photon science detectors (XFEL).

The course is accompanied by computer exercises to gain a deeper understanding in data analysis techniques and simulation as well as in detector physics. A basic introduction to C++ and ROOT will be offered at the beginning of the course covering the aspects needed in the exercise classes. More information is available at:

[wwwiexp.desy.de/groups/pd/?q=education/instrumentation-and-analysis-methods](http://wwwiexp.desy.de/groups/pd/?q=education/instrumentation-and-analysis-methods)

## Prerequisites:

Recommended are basic knowledge from the courses Quantenmechanik, Kern- und Teilchenphysik, Quantum Field Theory I or Advanced Particle Physics.

**Date and Place:** Mon, 8:30–10:00, SR 3, Jungiusstr. 9  
Wed, 14:00–15:30, SR 3, Jungiusstr. 9

**Problem Classes:** Wed, 15:45–17:15, Poolraum 3, Jungiusstr. 9

**Starting on:** 14 October 2019

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