



LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Summer Term 2021

Particle Physics and the Large Hadron Collider (LHC): Accelerator, Detectors and Physics

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Course Description:

The Large Hadron Collider (LHC) and the detectors installed there are the most important experiments for the study of the fundamental questions in particle physics. Processes of the Standard Model (SM) are studied, such as top quarks or Higgs bosons, but new effects are also being sought for, e.g. dark matter, extra dimensions, supersymmetry, or in general new elementary particles.

In the lecture and in the accompanying journal club, the accelerator complex of the LHC, the detectors installed there (with a focus on the large detectors ATLAS and CMS) and especially the physics processes studied as well as the experimental procedures used will be discussed.

Contents: Introduction, accelerators and the LHC, basics of pp-collisions, tracking detectors at the LHC, QCD and electroweak processes at the LHC, calorimeters of the LHC detectors, trigger and data taking systems, physics of the top quark, search for and study of the Higgs boson, search for New Physics, search for supersymmetry, outlook beyond the LHC.

Exercises will be in the form of a journal club.

Learning Goal: To gain a deeper understanding of the current topics and methods in particle physics, especially the research topics being studied at the LHC. The lecture also serves as preparation for possible bachelor, master or PhD theses in the field.

Date and Place: Tue 14:00–15:30, Fri 12:00–13:30, Zoom
details at <https://www.desy.de/~haller/lehre/lhc.html>

Problem Classes: Journal Club, Fri 14:00–15:30, Zoom

Starting on: 6 April 2021
