Universität Hamburg
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CHAMPP
CENTER IN HAMBURG FOR ASTRO-, MATHEMATICAL AND PARTICLE PHYSICS

LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Winter Term 2022/2023

Advanced Particle Physics

Peter Schleper, Matthias Schröder

Course Description:

The course covers experimental and theoretical aspects of elementary particle physics. After an introduction into the relevant concepts of the Dirac theory, symmetries, conservation laws and Feynman diagrams we will discuss more advanced topics like QED, QCD, electroweak unification and the Higgs mechanism. The discussion is accompanied by experimental aspects, explaining the major discoveries in the 20th and 21st century, for example the discovery of the Higgs boson at the Large Hadron Collider at CERN. At the end of the course, students will be familiar with concepts of elementary particle physics. Students will be able to calculate relevant quantities such as interaction cross-sections and they will understand the connection between theory and experiment. Students will understand the Standard Model of particle physics, including its shortcomings leading to hypothetical models of physics beyond the Standard Model.

Prerequisites:

Physik V

Literature:

- M. Thomson, *Modern Particle Physics*, 2013
- D. Griffiths, *Introduction to Elementary Particle Physics*, 2008
- A. Bettini, *Elementary Particle Physics*, 2012
- F. Halzen and A. D. Martin, *Quarks and Leptons: An Introductory Course in Modern Particle Physics*,1984
- B. R. Martin and G. Shaw, *Particle Physics*, 2008

Date and Place:	Tue, 10:30–12:00, SR 1083, Notkestr. 9, Bahrenfeld Fri, 14:15–15:45, SR 1083, Notkestr. 9, Bahrenfeld
Problem Classes:	Fri, 12:15–13:45 / 16:00–17:30, SR 4064, Notkestr. 9
Starting on:	18 October 2022