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 2019/2020

Quantum Chromodynamics

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Course Description:

Quantum chromodynamics (QCD) exemplifies many aspects of the quantum field theories that describe our microcosm, such as local and global symmetries or the scale dependence of the coupling constant. At the same time, it is an indispensable tool for analysing particle physics experiments, for instance at the Large Hadron Collider (LHC). The lecture will cover both aspects.

Topics to be addressed are: gauge symmetry, the spectrum of hadrons, chiral symmetry and its breaking, path integral methods and QCD on a space-time lattice, perturbation theory and the running coupling, concepts and tools for describing QCD in high-energy experiments (factorisation, parton distributions, resummation of large logarithms), and QCD at the LHC.

Homework exercises will complement the lectures and give hands-on experience in doing simple calculations and deriving important results.

Prerequisites:

Basics of elementary particle physics and field theory. Having followed a full quantum field theory course will be useful but not indispensable.

Date and Place: Thu, 11:15–12:45, SR 2, Building 2a, Bahrenfeld

Starting on: 17 October 2019