



LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

Winter Term 2022/2023

Quantum Field Theory I

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Course Description:

This course offers an introduction to the basic concepts of relativistic Quantum Field Theory, the central framework for the formulation of modern theories in both particle physics and cosmology. It understands fundamental particles as quantum excitations of fields in a relativistic spacetime, thus combining the key ideas of Quantum Theory and Special Relativity.

The content of the course is structured as follows:

- (1) Canonical quantisation of the free scalar field
- (2) Perturbation theory and interactions for scalar fields
- (3) Canonical quantisation of the Spin 1/2 field
- (4) Quantum Electrodynamics
- (5) Classical non-abelian gauge theory

Prerequisites:

Theoretical Classical Mechanics, Theoretical Electrodynamics and Special Relativity, Theoretical Quantum Mechanics

Literature:

- Peskin, Schröder: *An introduction to Quantum Field Theory*, ABP 1995
- Itzykson, Zuber: *Quantum Field Theory*, Dover 1980
- Weinberg: *Quantum Field Theory I*, Cambridge 1995
- Banks: *Modern Quantum Field Theory*, Cambridge 2008
- Srednicki: *Quantum Field Theory*, Cambridge 2007

More information will be provided on the course Moodle page.

Date and Place: Wed, 8:30–10:00, Hörsaal, Building 61, Bahrenfeld
Fri, 8:30–10:00, Hörsaal, Building 61, Bahrenfeld

Problem Classes: Tue 14:00–15:30, Hörsaal, Building 61, Bahrenfeld/
Wed 14:15–15:45, Hörsaal, Building 61, Bahrenfeld

Starting on: 19 October 2022
