



## LECTURE COURSE IN THE QUANTUM UNIVERSE RESEARCH SCHOOL

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Winter Term 2021/2022

# 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

**Starting on:** 13 October 2021

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