

Theoretical Elementary Particle Physics (QFT II) SS2024

Lecturer

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Assistant

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Website

*[https://wwwth.kph.uni-mainz.de/theoretische-
elementarteilchen-physik/](https://wwwth.kph.uni-mainz.de/theoretische-elementarteilchen-physik/)*

Lecture hours

Thursday, 10:00 - 12:00 (Newton Room 01-122)
Friday, 12:00 - 14:00 Uhr (Newton Room 01-122)

Topics

Part I: Foundations

- 18.04, 19.04:
Path Integral Quantization: quantum mechanics, field theory: bosons, fermions
- 25.04, 26.04:
Abelian and non-abelian gauge theories, Feynman rules
- 02.05, 03.05:
Quantization of QCD: unitarity argument
- 10.05, 16.05:
Path Integral Quantization of abelian and non-abelian gauge theories
- 17.05, 23.05, 24.05, 31.05:
Loop diagrams and renormalization
- 06.06:
Running coupling constant and asymptotic freedom in QCD

Part II: Applications

- 07.06, 13.06, 14.06:
QCD and the parton model: deep inelastic lepton-nucleon scattering, structure functions, scaling violations, spin of nucleon
- 20.06, 21.06:
Anomalies in QFT
- 27.06, 28.06, 04.07, 05.07:
Standard Model of electroweak interactions: foundations, Higgs mechanism, precision tests
- 11.07, 12.07:
Higgs Physics
- 18.07:
Dark sector searches
- 19.07:
Review

Literature

- M.E. Peskin and D. V. Schroeder,
An Introduction to Quantum Field theory
(Westview Press, Boulder, 1995).
- M. Srednicki,
Quantum Field Theory
(Cambridge University Press, Cambridge, 2007).
- T. Muta,
Foundations of Quantum Chromodynamics
(World Scientific, Singapore, 1998).
- Matthew D. Schwartz,
Quantum Field Theory and the Standard Model
(Cambridge University Press, 2014)