Theoretical Elementary Particle Physics (QFT II) SS2024

Lecturer
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Website
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:
  Standard Model of electroweak interactions
- 05.07, 11.07:
  Higgs mechanism
- 12.07, 18.07:
  Electroweak interactions: examples and phenomenology
- 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)