

08.128.809 Theoretische Elementarteilchenphysik

Quantum Field Theory II

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Course head: Matthias Neubert (matthias.neubert@uni-mainz.de)

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- Lectures: Tu 10:00 am-12:00 pm (c.t.), Th 8:00 am-10:00 am (c.t.)
- Discussion sessions: Approximately every second Thursday, 8:00 am-10:00 am (c.t.)
- Homework: due at the beginning of each discussion session
- Exam: Oral exams on request
- Exam requirement: 50% of homework credits

Lecture schedule (subject to change)

Tues. April 17 Recap of QFT I, Renormalization; Lehmann-Symanzik-Zimmermann reduction formula

Thurs. April 19 Renormalization, continued; ultraviolet divergences

Tues. April 24 Renormalization, continued; Callen-Symanzik

Thurs. April 26 Discussion, problem set 1 due

Tues. May 1 Holiday

Thurs. May 3 Functional integrals

Tues. May 8 Functional integrals, continued; variational method for deriving Feynman rules

Thurs. May 10 Holiday

Tues. May 15 Representation theory/Group theory; Lie algebras

Thurs. May 17 Discussion, problem set 2 due

Tues. May 22 Non-Abelian gauge theory/Yang-Mills theory

Thurs. May 24 Quantization of Yang-Mills; gauge-fixing; Fadeev-Popov ghosts [Time permitting, BRST symmetry]

Tues. May 29 Renormalization of Quantum Chromodynamics (QCD); QCD phenomenology; asymptotic freedom

Thurs. May 31 Holiday

Tues. June 5 QCD phenomenology, continued; hadron phenomenology, jet physics

Thurs. June 7 Discussion, problem set 3 due

Tues. June 12 Chiral gauge theory; electroweak Lagrangian; the Standard Model

Thurs. June 14 Spontaneous symmetry breaking/Higgs mechanism; the Hierarchy problem [Time permitting, Landau-Ginzburg theory]

Tues. June 19 Quantization of massive, non-Abelian gauge bosons; R_ξ gauge; Goldstone boson equivalence

Thurs. June 21 Discussion, problem set 4 due

Tues. June 26 Topics of interest [Time permitting, Chiral anomalies]

Thurs. June 28 Topics of interest [Time permitting, Instantons]

Tues. July 3 Topics of interest [Time permitting, Non-linear Sigma model, Critical exponents]

Thurs. July 5 Discussion, problem set 5 due