

Standard Model of Elementary Particles (PHZ7359): SYLLABUS

0. Introduction: Quarks, Leptons, Vector Bosons and Their Interactions
7. Spontaneous Breaking of Global Symmetry: Chiral Dynamics II
 - Adler-Weisberger and Other Sum Rules
 - Effective Chiral Lagrangians
 - Electroweak Processes involving NGBs
 - Anomalies, Instantons, and the $U(1)$ Problem
 - Theta vacua and the Strong CP problem
8. Gauge Invariance and Anomalies II (Notes Chap 26)
 - Axial current anomalies
 - $\pi_0 \rightarrow 2\gamma$ decay
 - Consequences of Anomalies for the Standard Model
9. The Higgs Mechanism II and Custodial Symmetry
 - Higgs Mechanism Revisited
 - Gauge Symmetries, the Non-abelian case
 - Custodial Symmetry and the ρ parameter.
10. Leptons and their Electro-weak Interactions
 - Vector Boson decay to Leptons and Quarks . .
 - Lepton and Quark beta decay
 - Scattering Processes
11. Electro-weak Interactions of Hadrons
 - Hadronic currents in terms of Quark Fields
 - Semi-leptonic processes
 - Non-leptonic Processes
 - Electro-weak Gauge Bosons

12. Quark Confinement

- Lattice Gauge Theory
- Anomalies, Instantons, and Matching Conditions
- $1/N_c$ Expansion

13. Physics at High Energy and Low Momentum Transfer

- Regge Trajectories
- Small x Structure Functions

14. Beyond the Standard Model

- Supersymmetry
- Minimal supersymmetric standard model
- Grand unification

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