



# Introduction to High Energy Physics



## 01 Interactions and Field

- 1.1 Introduction
- 1.2 The electromagnetic interaction
- 1.3 The strong interaction
- 1.4 The weak and gravitational interaction
- 1.5 Vacuum Polarization
- 1.6 Interactive Exercises
- 1.7 Interactive Quiz

## 02 Elementary Particles

- 2.1 Classification of Particles
- 2.2 Leptons
- 2.3 Quarks
- 2.4 Hadrons
- 2.5 Interactive Exercises
- 2.6 Interactive Quiz

## 03 Relativistic Kinematics

- 3.1 Relativistic Transformation
- 3.2 Relativistic Transformation II
- 3.3 Four vector space time

3.4 Kinematics basic

3.5 Interactive Exercises

3.6 Interactive Quiz

## 04 Symmetry and Conservation Laws

4.1 Why Conservation and Symmetry

4.2 Angular Momentum

4.3 Flavour Symmetry: Isospin

4.4 Parity and Charge Conjugation

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## 05 Quark Model

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5.2 Quark Model

5.3 Meson and Baryon wave function

5.4 Magnetic moment and masses of baryons

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## 06 Experimental Techniques

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6.2 Detection Techniques

6.3 Interaction with Matter

6.4 Decay Rates

6.5 Interactive Exercises

6.6 Interactive Quiz

## 07 Weak Interactions

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7.2 Lepton-quark Symmetry and Quark\_mixing

7.3 Selection Rules in Weak Decays

7.4 Neutral Currents and Unified Theory

7.5 Interactive Exercises

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## 08 The Standard Model & Beyond

8.1 The Standard Model Lagrangians, Currents And Interactions

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8.3 Grand Unification

8.4 Neutrino Oscillations

8.5 Super-Symmetry & String Theory

8.6 Interactive Quiz