PHYS-741

Gauge Theories and the Standard Model

Cohen Timothy

Cursus	Sem.	Type
Physics		Opt.

Language of teaching	English
Credits	4
Session	
Exam	Multiple
Workload	120h
Hours	**56**
Lecture	42
Exercises	14
Number of positions	

Frequency

Every year

Remark

Next time: Fall

Summary

The goal of this course is to explain the conceptual and mathematical bases of the Standard Model of fundamental interactions and to illustrate in detail its phenomenological consequences.

Content

The lectures for this course will be given in person by Tim Cohen. Tim will be available to answer student questions on Mondays at 15:00 in his office, and is also available by email (tim.cohen@epfl.ch) and by appointment on zoom. Exercise sessions will be in person on Tuesdays from 12:00 - 13:00 and led by Majid Ekhterachian (majid.ekhterachian@epfl.ch).

- Non-abelian gauge theories
- Higgs mechanism and massive gauge theories
- Quarks and Leptons
- Basic electroweak phenomenology
- The flavour structure: quark masses and mixing
- Strong interactions
- Basic flavour phenomenology
- The Standard Model as an Effective Field Theory

Note

Keywords

fundamental interactions, particle phenomenology
gauge theories, Higgs mechanism,

Learning Prerequisites

Required courses

Relativistic Quantum Fields I et II, Advanced Quantum Mechanics, Advanced Quantum Field Theory,

Recommended courses

General Relativity, Cosmology

Expected student activities

Appreciate the conceptual foundations of the Standard Model as a theory of fundamental interactions and quantitavely understand its phenomenological success. Be able to concretely apply the Standard Model theory to the prediction of physical processes.

Resources

Bibliography

M. Peskin and Daniel Schroeder, An Introduction to Quantum Field Theory
L.B. Okun, Leptons and Quarks
T-P. Cheng and L-F. Li, Gauge Theory of Elementary Particle Physics

Références suggérées par la bibliothèque

- An introduction to Quantum Field Theory / Peskin, Schroeder

Moodle Link

- https://go.epfl.ch/PHYS-741