

PHYS-416

Particle physics II

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Cursus	Sem.	Type
Ing.-phys	MA2, MA4	Opt.
Physicien	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Oral
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Presentation of the electro-weak and strong interaction theories that constitute the Standard Model of particles. The course also discusses the new theories proposed to solve the problems of the Standard Model.

Content**Partons and quarks:**

Deep inelastic scattering. Annihilation e^+e^- at LEP, jets and strings.

Weak Interaction:

Fermi's V-A theory. Pion and muon decays. Cabibbo's theory. The W and Z bosons and their observation at the CERN collider.

Model of quarks and QCD:

SU(3) flavour, mesonic and baryonic structure. SU(N). Quarkonium. The Colour.

Gauge Theories and the Standard Model:

Global and local gauge invariance. Yang and Mills theories. Spontaneous symmetry breaking. Electro-weak theory SU(2) \times U(1), the Higgs mechanism. GUTs, the Grand Unification.

Learning Prerequisites**Recommended courses**

Nuclear and Particle Physics I and II, Quantum mechanics I and II

Learning Outcomes

By the end of the course, the student must be able to:

- Analyze the sub-microscopical physical phenomena

Teaching methods

Ex cathedra and exercises in class

Assessment methods

oral exam (100%)

Resources**Websites**

- <http://lphe.epfl.ch/~bay>