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**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Presentation of the electroweak and strong interaction theories that constitute the Standard Model of particle physics. 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. Electroweak theory SU(2)xU(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%)

Supervision

Assistants Yes

Resources

Bibliography
Mark Thomson, "Modern Particle Physics" (2013)

Ressources en bibliothèque
- Mark Thomson, "Modern Particle Physics" (2013)

Websites
- http://pdg.lbl.gov/

Moodle Link
- https://go.epfl.ch/PHYS-416