PHYS-761

Attosecond radiation sources

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Cursus	Sem.	Type
Ing.-phys	MA1, MA3	Opt.
Physicien	MA1, MA3	Opt.
Physics		Opt.

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

Remark

Next time: Fall

Summary

This course describes the principles of attosecond photons and electron pulses generation

Content

Introduction to laser physics
Introduction to short pulses generation
High Harmonic generation and attosecond photon sources
Free electron lasers principles and operation
Ultrafast electron sources, principles and implementation
Attosecond electron sources
Exotic radiation sources, gamma ray lasers, atomic laser

Keywords

Femtosecond, Attosecond, Zeptosecond, Ultrafast, lasers, electrons

Learning Prerequisites

Required courses

Basic principles of electromagnetism and quantum mechanics

Recommended courses

Electromagnetism
quantum mechanics

Important concepts to start the course

Maxwell's equations
Basic principles of optics

Learning Outcomes

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

- Describe Ultrafast laser sources

- Design An ultrafast laser
- Describe Free electron lasers
- Describe Pulsed electron sources
- Design Attosecond electron beam
- Operate Ultrafast laser
- Operate Femtosecond electron beam line

Teaching methods

The course will be taught ex cathedra and with several lab-based practical trainings

Expected student activities

participation to lavoratory activity during the excercise sessions

Assessment methods

Oral

Resources

Ressources en bibliothèque

- Find the references at the Library

Moodle Link

- https://go.epfl.ch/PHYS-761