PHYS-744

Advanced Topics in Quantum Sciences and Technologies

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Cursus	Sem.	Type
Physics		Opt.

Language of teaching	English
Credits	4
Session	
Exam	Oral presentation
Workload	120h
Hours	**56**
Courses	32
Exercises	24
Number of positions	

Frequency

Every 2 years

Remark

Next time: Fall 2022

Summary

This course provides an in-depth treatment of the latest experimental and theoretical topics in quantum sciences and technologies, with a focus on quantum sensing, quantum optics, cold atoms, and the theory of quantum measurements and open dissipative quantum systems.

Content

The lectures by different teachers will cover contemporary fundamental and applied research topics in the fields of quantum information processing, quantum simulation and quantum sensing.
Experimental platforms including superconducting circuits, quantum dots, color centers, cold atoms, photonic circuits, 2D materials, etc. will be discussed.
Advances in the theory of quantum information and hybrid classical-quantum algorithms will also be covered.

Keywords

Quantum Science, Quantum Technology, Quantum sensing, Quantum Optics; Quantum simulation; Quantum measurement; Open systems; Cold atoms; Cavity optomechanics; Single photon detection

Learning Prerequisites

Required courses

Required : Quantum Optics I and II
Recommended : Statistical Physics IV

Learning Outcomes

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

- to understand current research in the field of quantum science and technology
- to understand the challenges in experimental implementation of QST and be familiar with the theoretical tools used to describe real quantum systems

Expected student activities

To understand current research in the field of quantum science and technology; to undestand the challenges in experimental implementation of QST and be familiar with the theoretical tools used to describe real quantum systems.

Resources

Notes/Handbook

Advanced Topics in Quantum Sciences and Technologies is a graduate-level lecture series dedicated to PhD and Master students already possessing a background in quantum mechanics and quantum optics.