PHYS-462

Quantum transport in mesoscopic systems

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Cursus	Sem.	Type
Ing.-phys	MA2, MA4	Opt.
Minor in Quantum Science and Engineering	E	Opt.
Physicien	MA2, MA4	Opt.
Quantum Science and Engineering	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

This course will focus on the electron transport in semiconductors, with emphasis on the mesoscopic systems. The aim is to understand the transport of electrons in low dimensional systems, where even particles with statistics different than fermions and bosons will be discussed.

Content

1. Preliminary concepts in Condensed matter physics
2. Landauer-Buttiker formalism in one dimensional channel
3. IQHE, Basics, Classical Hall effect
4. FQHE, Review of IQHE
5. Berry Phase
6. Recent/Relevant experimental works in Graphene
7. Recent/Relevant advancements in the field

Learning Prerequisites

Required courses

Introduction to Solid state physics

Important concepts to start the course

Electronic transport, superconductivity

Learning Outcomes

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

• Develop basic understanding of quantum phenomenon in the mesoscopic devices and current state of the art experimental works in related fields

Assessment methods

oral exam during the exam session

Resources

Bibliography

Electronic transport in mesoscopic system by Supriyo Datta

and current research papers on related topics

Ressources en bibliothèque

- Electronic transport in mesoscopic system / Datta

Notes/Handbook

Lecture notes

Moodle Link

- https://go.epfl.ch/PHYS-462