

PHYS-462

Quantum transport in mesoscopic systems

Banerjee Mitali

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

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. Transmission function, S-matrix and Green's functions
4. IQHE, Basics, Classical Hall effect
5. FQHE, Review of IQHE
6. Berry Phase
7. Recent/Relevant experimental works

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

Ressources en bibliothèque

- [Electronic transport in mesoscopic system](#) by Supriyo Datta

Notes/Handbook

Lecture notes