The Hebrew University of Jerusalem

Syllabus

Quantum Theory II - 77605

Last update 30-10-2024

HU Credits: 7

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Physics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Prof. Nir Barnea

Coordinator Email: nir@phys.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof. Nir Barnea,
Nitzan Goldberg

Course/Module description:
The course will delve deeper into the material taught in Quantum Theory I, with main motivation being to understand symmetries in Quantum Mechanics, solve the problem of the hydrogen atom, explore Landau quantization, get familiar with perturbative techniques, spin of the electron and scattering processes.

Course/Module aims:
See learning outcomes.

Learning outcomes - On successful completion of this module, students should be able to:
1. Solve the problem of the hydrogen atom.
2. Solve problems using the time dependent and independent Perturbation Theory.

Attendance requirements(%):
0

Teaching arrangement and method of instruction: Lecture and recitation

Course/Module Content:
1. Symmetries and Quantum Dynamics
2. The Theory of Angular Momentum
3. The Problem of the Hydrogen Atom
4. Particle in EM field (For instance, Landau quantization)
5. Spin. Addition of Angular Momentum
6. Spinning operators. The Wigner-Eckart theorem
7. The Time-Independent Perturbation Theory
8. The Time-Dependent Perturbation Theory
9. Identical particles
10. The quantum theory of scattering

Required Reading:
None

Additional Reading Material:

Quantum Mechanics/ Landau-Lifshitz

Lectures on Quantum Mechanics/ S. Weinberg

Quantum Mechanics/Cohen-Tannoudji

Modern Quantum Mechanics/Sakurai

Grading Scheme:

Additional information: