

Introduction to atomic physics

Lecturers:

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Organisational meeting: October 4, 2024

First lecture: October 25th, 2024

Place and time: Room D, Fridays, 10:00 - 11:30

Topics covered by the lecture:

1. The concept of atom. Hydrogen atom: Shrodinger theory for one-electron atom.
Symmetries in the hydrogen atom.
2. Energy levels of atoms.
Fine and hyperfine structure.
Atoms with more than one electron: theoretical models for multielectron atoms, the helium atom, alkali atoms, exotic atoms.
3. Interaction with magnetic, electric and electromagnetic fields
Zeeman effect, Stern-Gerlach experiment, Lamb shift, nuclear magnetic resonance.
4. Emission and absorption of electromagnetic radiation by atoms:
Transition probabilities, selection rules, lifetimes, spectral lines.
The periodic system.
5. Modern developments in atomic physics:
Optical cooling and trapping of atoms.
Atomic clocks. New trends in quantum optics
6. Interaction between atoms
Scatterings, bound states and molecules.

If you are interested - send us an email!

Bibliography:

[1] "Quantum Mechanics" Jean-Louis Basdevant, Jean Dalibard, Springer, 2nd edition (2005)

[2] H. Haken, H. Ch. Wolf, The physics of atoms and quanta, 7th ed. Springer-Verlag, 2005

[3] C. J. Foot, Atomic Physics, Oxford University Press, 2005