Introduction to atomic physics

Lecturers:
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Organisational meeting: October 4, 2024
First lecture: October 18th, 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