

Selected topic of theoretical physics: Introduction to physics of quantum gases

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*Fridays 13:30-15:30, room D of IFPAN, 1st lecture: 23 February
30 hrs, 3 ECTS*

Prerequisites: solid knowledge of quantum mechanics at the undergraduate level.

1. Cooling and trapping neutral atoms
2. Magneto-optical trap
3. Evaporative cooling
4. Statistical ensembles
5. BEC according to grand canonical ensemble
6. Fluctuations of the condensate- more restricted ensembles
7. Cold collisions - scattering length
8. Gross-Pitaevskii equation
9. Thomas-Fermi approximation
10. Bogolyubov approximation
11. Quantum droplets
12. Classical fields approximation
13. Solitons and vortices
14. Cold bosons in optical lattice
15. Quantum degenerate fermions
16. Density functional methods