

Topological phases of matter

Administrative stuff:

- * "Special lecture" \Rightarrow No ECTS points ∇
- * We offer a oral exam \Rightarrow You can add the grade to your grade report (\Rightarrow examination office)
- * One lecture per week (13 lectures), uploaded on Wednesday on Ilias
- * Tutorials every second week (I will discuss the solutions, no submissions by students)
- * No signup for tutorials required
- * Since I will do the tutorials, you can ask questions on the lecture there, or you comment on the video in Ilias
- * I develop the lecture as we go along, the script is expanded accordingly (for literature, see script)

Requirements:

I will assume that students are familiar with....

- * Non-relativistic QM and second quantization (fermions, bosons,...)
- * Basics of condensed matter theory (Band theory, quasi-particles)
- * Basics of quantum information (qubits, gates,...)
- * Basics of complex analysis (holomorphic functions...)
- * Basics of group theory (groups, linear reps....)
- * For the tutorials, programming skills are useful (Python, Mathematica,...)

Roadmap:

What I
would like
to do

(I) Topological phases of non-interacting fermions
(~9 lectures)

(II) Symmetry-protected topological phases of
interacting bosons in one dimension
(2-3 lectures)

(III) Intrinsic topological order and topological
quantum computation

What I can do
in 13 lectures

Maybe in a follow-up
course....