

Final remarks

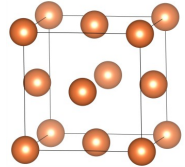
EXAM



February 1, 2024

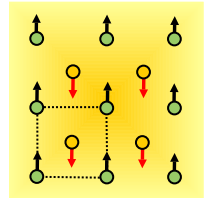
1. Structure of crystals

- direct lattice / reciprocal lattice
- symmetry
- crystal structure / structure factor



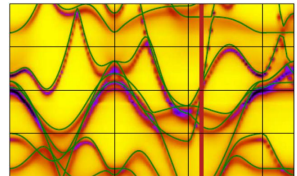
2. Atoms in crystals

- types of bonding
- elasticity and thermodynamics
- phonons (lattice vibrations)



3. Electrons in crystals

- free electron gas / Drude metal
- electronic band structure
- Fermi surface



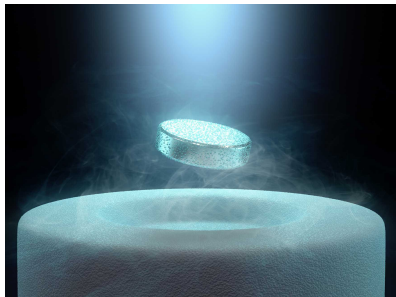
Superconductivity I (SS 23)

Superconductivity Lab (SS 23)

basic lecture,

no hard-core quantum

and many-body physics



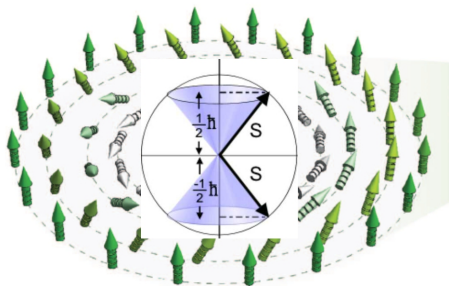
- how do magnetic levitation trains work?
- what is common between MRI and LHC?
- do we have a chance for a room-temperature superconductor?

Lab: practical low-temperature measurements and NMR
(separate module)

Fundamentals of Magnetism (provisionally, WS 24/25)

another fairly basic lecture

- What is the origin of magnetism?
- Magnetic memory: past and future
- Which one is more cool, spin ice or spin liquid?

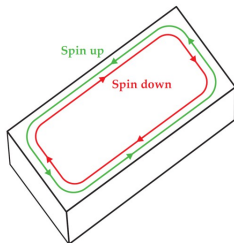
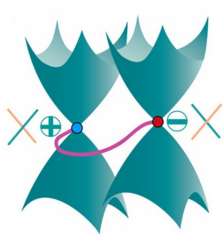


Advanced Solid-State Physics (WS 24/25)

(together with Inti Sodemann)

Lecture from the master program, can be part of your bachelor too

- Surprises from 2D: the best standard for electronics (graphene, quantum Hall effect)
- Topology: bands, donuts, and dissipationless transport
- Correlated electrons: colors of solids



Schedule will be published
on the web page tonight (1.02)

*send me an e-mail if you do not
find your name in the list*



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on the web page tonight (1.02)

*send me an e-mail if you do not
find your name in the list*



You get an individual 30-min slot

Please, arrive at least 10 min before your assigned time

Delays by more than 5 min **will not be tolerated**

Missing your time slot means that you get 5.0 (*nicht bestanden*)
you can make a **second attempt** on 25.03 or 26.03 (25 slots only)
your next chance will be in SS 2025 (written exam)
third attempt requires a permission by Prüfungsausschuss

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If you were absent on a **good reason**, you will still have two attempts, but the second one will be realistically next year

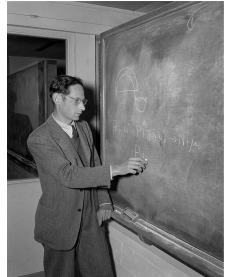
“Good reason” (typically, doctor's certificate)
should be communicated to the study office (not to me)

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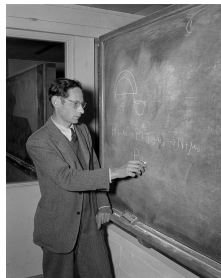
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should be communicated to the study office (not to me)

If you are **not planning to come** (for a “good reason” or not),
please let me know as well. It will be appreciated

1. Show your ID
2. 105 questions distributed into 21 “cards”
You will get one (random) card with 5 questions
3. **Five min per question**, use the blackboard
make sketches and write short formulas



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60. Define thermal expansion. Why do crystals expand upon heating?
- What are the units of thermal expansion?
 - What are the typical values of thermal expansion coefficient?
 - How does thermal expansion coefficient change with temperature?
 - How to measure thermal expansion?

You may get the best grade even if you failed to answer one or another question

Using hints is fine if you eventually come to the right answer

But: you have to show that you are **familiar with the topic**

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After 25 min you should leave the room for a few moments

We discuss the grade, invite you back, and let you know the result

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In any case, stay calm and take things easy
From the last year's experience, your chance to pass is 90%

Lecture notes: currently, 12 lectures
perhaps a few more by 20.02

Ask questions via e-mail:
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