Tasks

(1) Read chapter 9:

(2) Solve exercise sheets

(3) Who is summarizing next week?

16th Lecture	13h00 – 15h00 Chapter 9: tight-binding
18th Lecture	10h00 – 12h00 Chapter 9: Quantum Oscillation
23th Lecture	13h00 – 15h00 Chapter 9: Quantum Oscillation
25th Lecture	10h00 – 12h00 Wrap-up
30th Exercise	13h00 – 15h00
01st Lecture	10h00 -- 12h00 Exam focus

Exam – time line

16th Lecture	13h00 – 15h00 Chapter 9: tight-binding
18th Lecture	10h00 – 12h00 Chapter 9: Quantum Oscillation
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01st Lecture	10h00 -- 12h00 Exam focus

4-6th of June– Questions and Answers session with Stefan, Daniel or Denys?

7-8th of June (9h00 – 17h30) in Y-36-H-48 – Oral exam

9th of June (18h00): Beer in StudiBar or somewhere else

EXAM PLAN

Stefanie	Jucker	07.06.2018	09.00h
Rafael	Spörri	07.06.2018	09:45h
Pascal	Rothenbühler	07.06.2018	10:30h
Yoel	Pérez Haas	07.06.2018	11:15h
Jens	Oppliger	07.06.2018	12:00h
Lorena	Niggli	07.06.2018	13:30h
Yannick	Zwirner	07.06.2018	14:15h
Abraham	Karen	07.06.2018	15.00h
Wiemeyer	Andreas	07.06.2018	15.45h
Ma	Keyuan	07.06.2018	16.30h
David Michael	Urwyler	08.06.2018	09.00h
Claudio	Henry	08.06.2018	09:45h
Simon	Giesch	08.06.2018	10:30h
Benjamin	Frölich	08.06.2018	11:15h
Witteveen	Catherine	08.06.2018	12.00h
Irene	Dei Tos	08.06.2018	13:30h
Marcelo	Looser	08.06.2018	14:15h
Andrej	Maraffio	08.06.2018	15:00h
Thomas	Meier	08.06.2018	15:45h
Jasmin	Müller	08.06.2018	16:30h
Luca	Naterop	08.06.2018	17:15h

Exam Structure

~10 min – Presentation:

Topics: (1) Crystal structures,
(2) Crystal Bindings,
(3) Reciprocal lattice+ scattering theory,
(4) Crystal vibrations (Phonons),
(5) Heat capacity
(6) Band structure
(7) Semiconductors
(8) Resistivity & Hall effect

~10 min – Discussion 1:

Questions to the lecture material (Example next slide)

~10 min – Discussion 2:

Questions to the exercises (Example next slide)

End Exam

5 min - evaluation

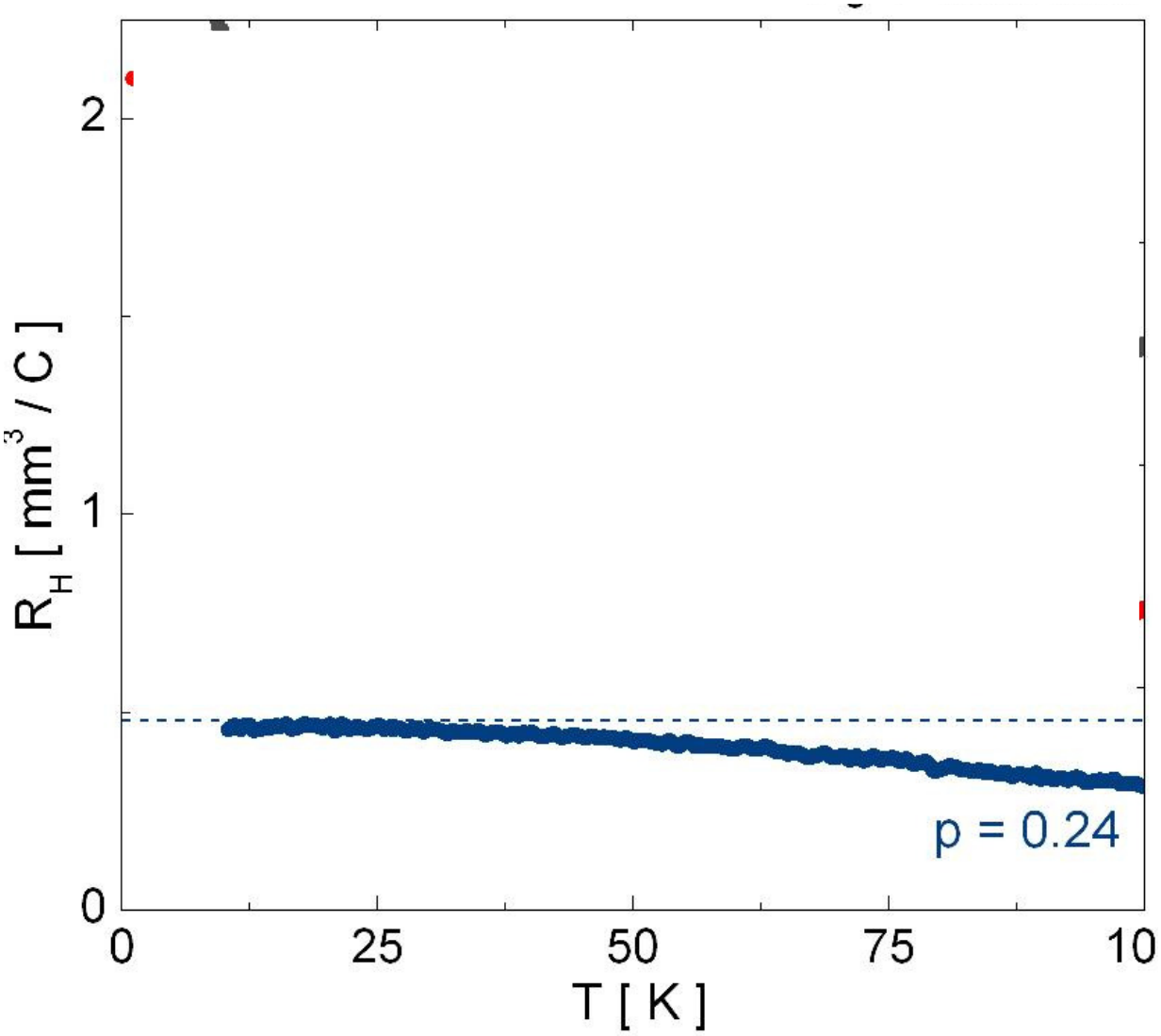
5 min – Results: Passed / failed, grade will be known at a later point.

Luttinger’s Theorem

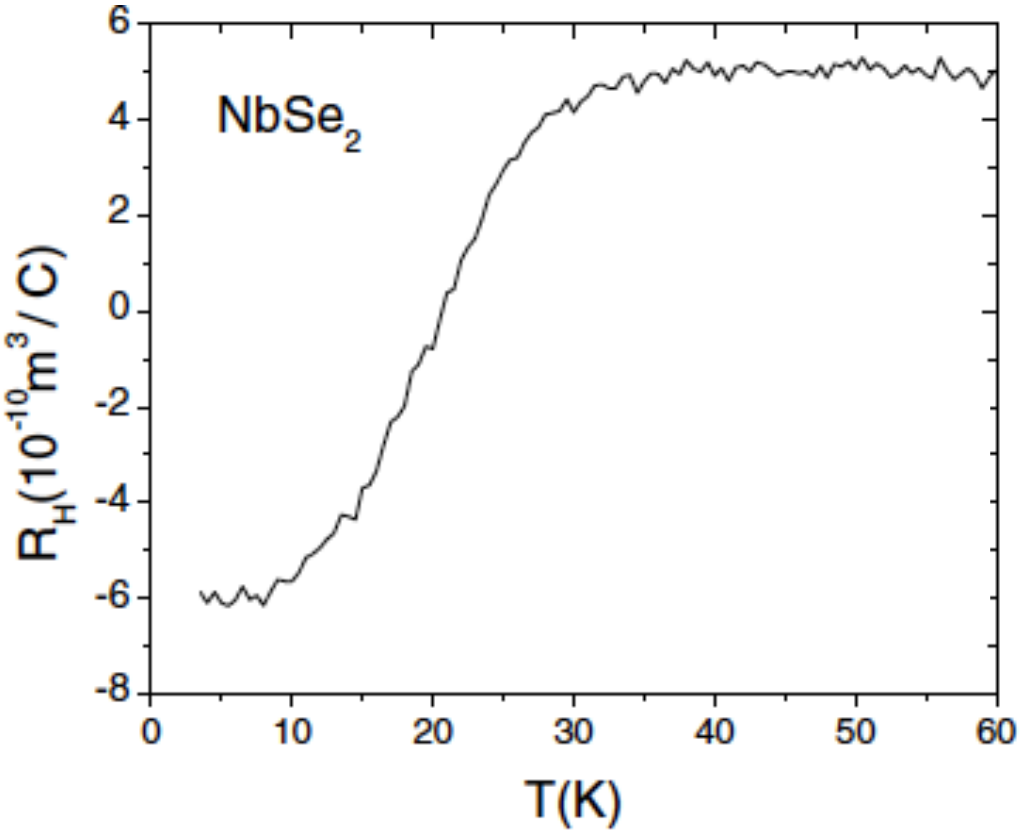
Luttinger's theorem states that **the volume enclosed by a material's Fermi surface is directly proportional to the particle density**.

$$n = \frac{N}{V} = (3\pi^2)^{-1} {k_F}^3$$

Hall effect: Carrier density

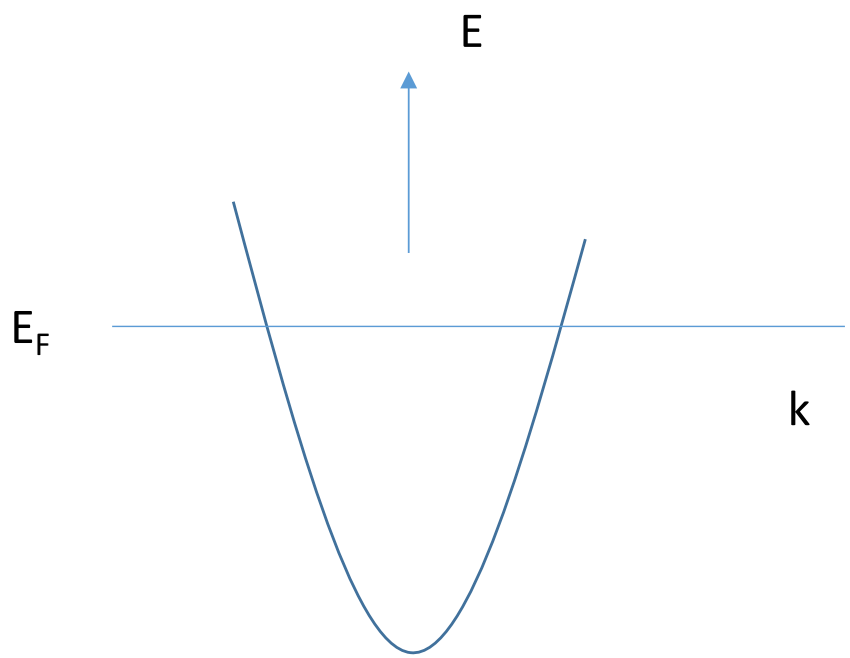


Fermi surface reconstruction

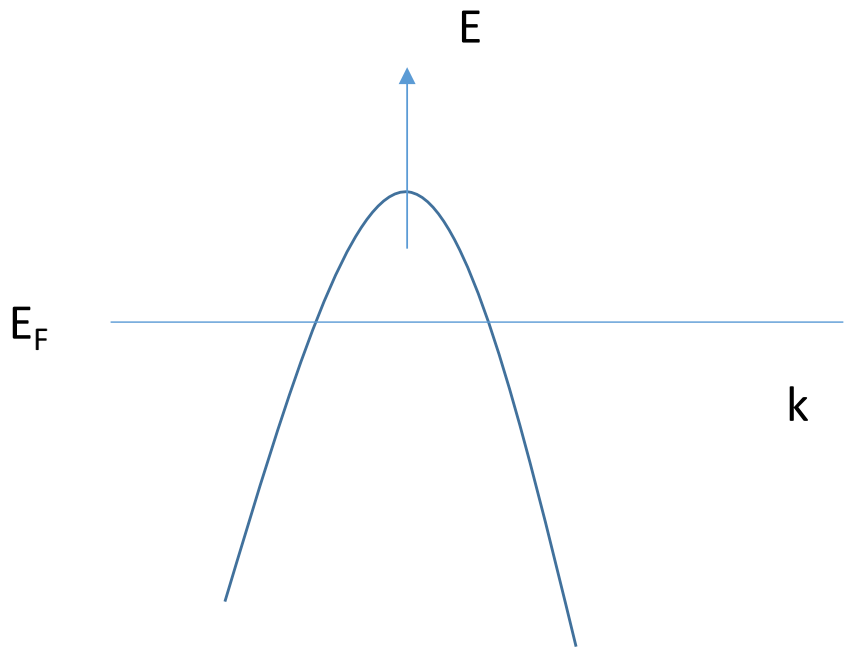


PRL 91, 066602 (2003)

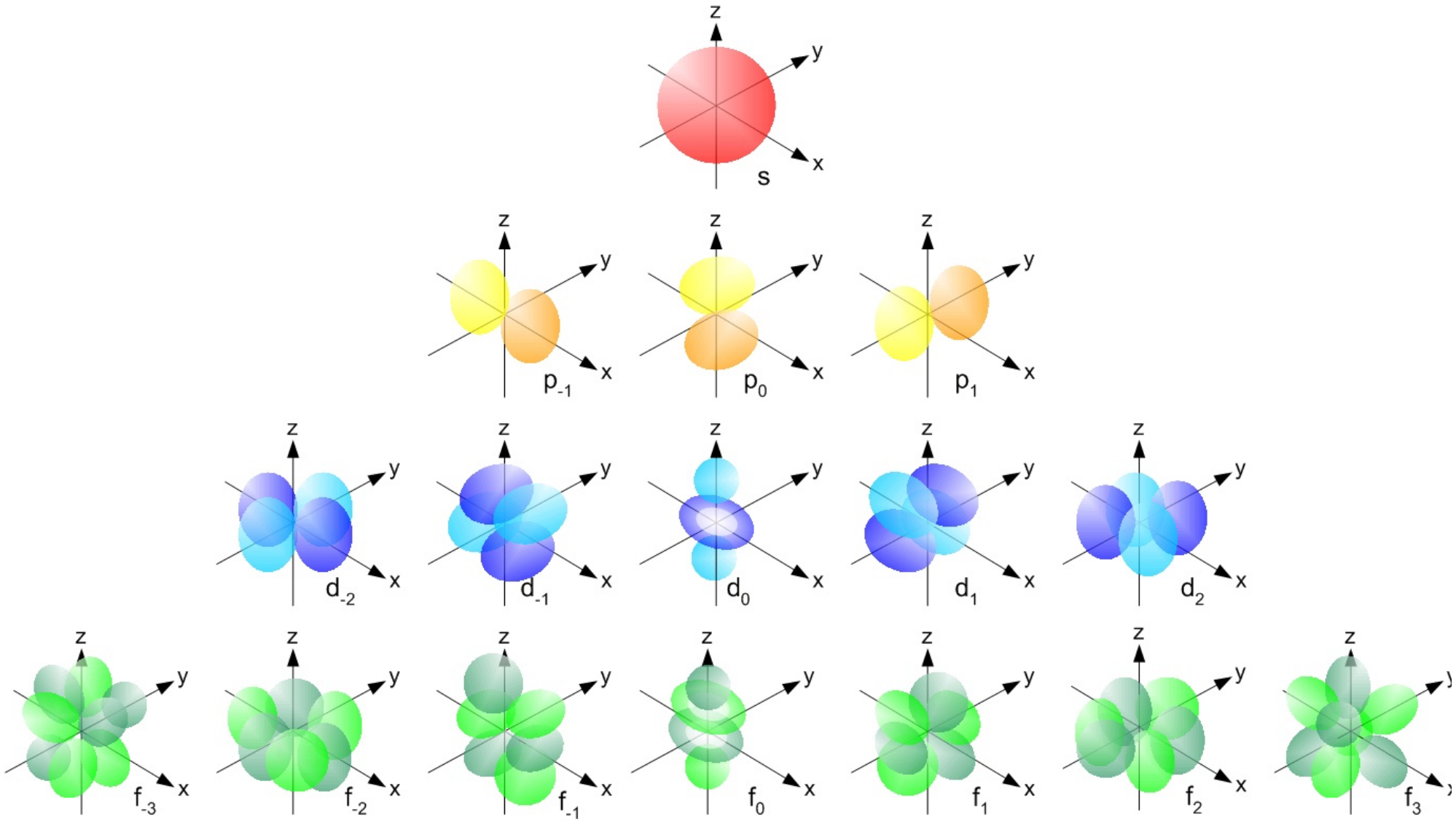
Electron versus Hole like bands



Electron-Like Band



Hole-Like Band


z
y
x
s
p-1
p0
p1
d-2
d-1
d0
d1
d2
f-3
f-2
f-1
f0
f1
f2
f3