

SYLLABUS

“Einführung in die Festkörperphysik II”

Summer Semester, 2017

Instructor: Prof. Dr. Beatriz Roldán Cuenya

Time: Tuesdays – Class: 2:15 pm – 4:00 pm

Seminar: 4:15 pm – 6:00 pm

Location: NB 4/158

Office hours: NB 4/125

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Reference Textbooks:

Course material will consist of class notes which will be available online in my website. Additional information on the topics covered in class can be found in the following reference books.

- Rudolph Gross & Achim Marx, *Festkörperphysik*, Oldenbourg Verlag

- Charles Kittel, *Introduction to Solid State Physics*, Wiley

- Philip Hofmann, *Einführung in die Festkörperphysik*, Wiley-VCH

Login information for “Courses” section of my website:

Login: physics

Password: Rolsol2

Course

| Topic | Date |
|-------------------|----------------------------|
| Magnetism | 18.4, 25.4, 2.5, 9.5, 16.5 |
| Dielectrics | 23.5, 30.5, 13.6 |
| Superconductivity | 20.6, 27.6 |
| Surface Science | 4.7, 11.7 |
| Nanophysics | 18.7, 25.7 |

Some suggested presentation topics for the seminars (other suggestions are welcome suggested to approval to avoid duplication).

Magnetism

- 1) Spintronics
- 2) Magnetic properties of thin films
- 3) Magnetic properties of size- and shape-selected 0D and 1D nanostructures
- 3) Kondo-effect

- 4) Magnetoresistance
- 5) Ferromagnetic resonance
- 6) SQUID-Magnetometry
- 7) Mössbauer spectroscopy
- 8) X-ray magnetic circular dichroism

Dielectrics

- 9) Mott-Metal-Insulator transition
- 10) Measurements of excitations in an electron gas

Superconductors

- 11) High temperature superconductivity
- 12) Andreev-Reflection

Semiconductors

- 13) Solar cells
- 14) Semiconductor laser
- 15) Transistor
- 16) LEDs
- 17) Semiconducting quantum dots

General topics

- 18) Liquid crystals
- 19) Quasi crystals
- 20) Amorphous solids
- 21) Neutron scattering methods
- 22) X-ray scattering methods
- 23) Multiferroic materials
- 24) Nanophotonics
- 25) Plasmonics
- 26) Functional nanostructures for chemical sensing applications.
- 27) Synthesis, characterization, structural/electronic properties and applications of C-nanotubes.
- 28) Vibrational properties of low dimensional systems
- 29) Nanostructures for solar energy applications