Lectures

Lectures will take place every Monday, Wednesday, and Friday from January 6 through April 22 except January 20 (Holiday), February 7 (travel), February 21 (Sanibel Symposium), March 2-6 (spring break). Classes will be held 7th period (1:55–2:45 p.m.) in NPB 1011.

Instructor

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Office Hours: Mon 2:45 p.m.–4 p.m.

Course Overview

PHZ 7427 is a continuation of PHZ 6426 (Solid State I).
Main Text: None
Supplementary Texts:
Prerequisites

Graduate-level quantum mechanics and statistical mechanics (and to a lesser extent electromagnetism), and Solid State I.

Homework

There will be a homework set approximately every two weeks. The homework is your best opportunity to learn the material in depth. If at all possible, do the homework entirely on your own. Only if you are hopelessly stuck is it alright to seek help from the instructor or other students. Any help must be explicitly acknowledged at the end of the corresponding problem. In that case you will not be penalized for having received help.

Topics to cover (subject to change)

- Electron-phonon interaction. Phonons in metals. AM Ch. 26
- Electron-electron interaction and magnetic structure. AM Ch. 32.
- Magnetic ordering. AM Ch. 33.
- Superfluidity. Notes.
- Superconductivity: conventional superconductors. Phonon mechanism of Cooper pairing. Landau-Ginzburg equations. Electrodynamics of superconductors. Elements of the BCS theory. AM Ch. 34+Notes.
- Semiconductors: k dot p theory, statistics of carriers, excitons. AM Ch. 28+notes.
- Semiconductor devices. AM Ch. 29.
- Topological phases

Grades and grade points

The final grade will be based on:

Homework 80%
Research paper 20%

Research paper is due on April 19.