

Student Lectures

Below are the tentative assigned teams, topics and dates. Each teach (2 people) should give a 40 minute lecture (20 minutes each) and hold a 5 minute question session. Two teams will make presentations per 90 minute lecture period over 3 periods. You should thoroughly discuss the material with the other member of your team beforehand, practicing your presentation with that person and practicing answering questions. The suggested material could be expanded or shrunk a bit if the length doesn't seem appropriate. Please discuss this point with me if necessary. The dates are tentative because they assume I will finish lecturing on other material I want to cover on March 27. (It may be necessary to schedule a session or two during the exam period if we are running later.) If you can't make it during the proposed date, or a possible later one, or have any other problem with this assignment, please let me know immediately.

Schedule

April 3:

- 1) Charles and Matt: Shankar IX [first briefly review Shankar VI. Discuss $D=3$ case as well as $D=2$.]
- 2) Hamid and Liam: Shankar X

April 5:

- 1) Tim and Amanda: Fermi liquid theory at finite temperature. In particular, discuss the linear heat capacity. A good reference is M.P. Marder, *Condensed Matter Physics*. See also Abrikosov, Gorkov and Dzyaloshinski, *Methods of quantum field theory in statistical physics*, D. Pines and Nozieres, *The theory of quantum liquids*.
- 2) Zheng and Ashley: Zero versus 1st sound, He-3 experiments. References: I. Khalatnikov and A. Abrikosov, Sov. Phys. JETP, 6, 84, 1958. W. Abel et al. Phys. Rev. Lett. 17, 74 (1966); AGD, Marder

April 10, 1:00-2:30 PM, Hennings 302:

- 1) Mohammad and Namshik: including spin in $D=1$, interacting fermions. Reference: T. Giamarchi
- 2) Clemens and Huai-Chieh (Ken): including electron spin in Fermi liquids ($D=2$ or 3). Fermi liquid parameters, spin magnetic susceptibility, spin fluctuation contribution to heat capacity. References: Marder, AGD, D. Greywall, Phys. Rev. B27, 2747 (1983), Pines and Nozieres.

Grading Criteria

- Your understanding of the material
- Effective writing and sketching on blackboard
- Effective speaking
- Improving students (and instructor and TA) understanding of the material
- Answering questions

Try to explain material using notation and RG approach of Shankar, as much as possible.