Brief description of the course on
"Advanced Condensed Matter Physics I"
at the School of Nano Science, IPM
2020-2021

Lecturer: Reza Asgari

Condensed matter physics deals with the physical properties of materials in which many particles interact appropriately with each other. The low-energy properties of condensed matter systems emergent; collective properties make the whole greater than the sum of the parts. Therefore, understanding correlations between the parts and how the physical properties of condensed matter systems depend on them is the business of condensed matter physics.

The study of condensed matter physics involves measuring various material properties via experimental probes along with demonstrating techniques of theoretical physics to develop mathematical models that help in perceiving physical behavior. Essentially, in the condensed matter physics, we deal with almost all materials around us by asking many questions about materials; for instance, you can feel them, manipulate them, change, perturb, and built them for a specific purpose.

This specific course is intended to be accessible and useful to experimentalists and theorists alike, properly providing an introduction both to the phenomenology and to the underlying theoretical description. In this course, we will be following the book:

 Modern Condensed Matter Physics, by Steven M. Girvin and Kun Yang, *Cambridge University Press* **2019**

Prerequisite:

It is assumed that the students are familiar with the basics of *Solid State Physics (as contained,* for instance in the book by Kittle).

NOTICE:

i) For non-IPM students there is the possibility of formally registering for the course as a "*guest student*". Please arrange the formal details with the Nano department office of IPM.

ii) I anticipate that all the students, people who have formally registered or otherwise alike, to attend the lectures regularly and more importantly take the problem sets seriously.

iii) The classes will be on Sunday and Tuesday afternoon 1-3 pm in virtual form.