

Assiut University
Faculty of Science
Physics Department



Laboratory Manual

Physics 312

Solid State Physics

Academic Year 2009-2010

Dear Student

Welcome to the Solid State Physics Lab. hoping for you valuable and interesting work and by the end of the semester success in the course. Enjoy learning Physics just as you enjoy your life. The following are our regulations you have to follow during the semester.

Before attending your laboratory section, you should always read the experiment you are going to do. Be aware that the pre-Lab. reading enables you to understand well basics of the experiment and while attending the class you can do the experiment correctly. Information given in the first few Labs. will be much more detailed than that of the next subsequent Labs; many of the laboratory techniques you learn will be used repeatedly in other Lab. sessions. The only acceptable way to demonstrate your experimental results in graphical form is that by “Excel” computer program. In the first Lab. session a discussion about the Excel and how to use the most common tools of your experiments, namely the Multimeters, voltage amplifier and DC power supplies, will be given. As you perform the Labs, your laboratory skills will improve and you should be less dependent on exact instruction from the Lab. Manual.

Student attending the Lab. late by more than 15 minutes will **Loose** the corresponding two marks. Student late by more than 30 minutes can not attend the Lab. and he/she will be considered **Absent**. Absence of 25 % of the Lab. sessions during semester may prevent you from attending the final exam. In such a case your final grade of the Lab. work can be zero.

Be aware that **Cheating** during Exams. and submitting experimental results which is not yours will be strongly punished according to the university regulations.

Be sure that organizing your work will save you a great deal of time and frustration. The 3 hours Lab. time can be subdivided according to the next proposal:

25-30 min	General discussion
80-90 min	Practical work
15-20 min	Drawing graph by Excel
15-20 min	Answer questions
15-20 min	Experiment Correction and evaluation

Before leaving the Lab. you have to correct and evaluate your work by the assistant. Be sure that your grade, in addition to the assistant name signature and date of attending the Lab., have been recorded in your manual and in the files of the Lab. Six marks out of 10 marks for each experiment (A sum of 100 marks for the 10 experiments of the Lab.) are given for the experimental work including **Performance, Lab. attitude** and **Accuracy**. Two marks are given for the **attendance** and other two marks are given for **solving correctly questions** that can be found at the end of each experiment sheet. The total grad will be considered during the final course evaluation. You have to ask about the experiment you have to do in the next Lab. session in order to follow the exact way to do the experiment correctly.

A Mid-Term Exam., covering materials of experiments the student did during the first five weeks will be organized. In the proper time date and time of exam will be announced. In addition, student should be ready for Quick Quizzes during all the Lab. sections.

Using Lab. equipment in a correct way is your responsibility. You have to think twice before connecting power to the experiment. Damage of any of the experiment components should be substituted without delay by the student. Attending the Lab. with food or drinks is not allowed. Please keep the Lab. table clean and in order.

By performing this Lab., you will learn:

How to measure basic quantities in Solid State Physics like e/m of an electron,

How to confirm the duality nature of waves and particles using electron diffraction,

How to measure thermal and electrical conductivity of metallic rods,

How to measure Peltier coefficient and related coefficients,

Some Dielectric and magnetic properties of solids

Finally: We are constantly trying to improve the quality and instructional utility of your Labs. If you can think of any modification to the equipment or clarification to the Lab. manual please let us know. Your feedback is extremely important to us so, please do not hesitate to submit your suggestions to your instructor or assistant.

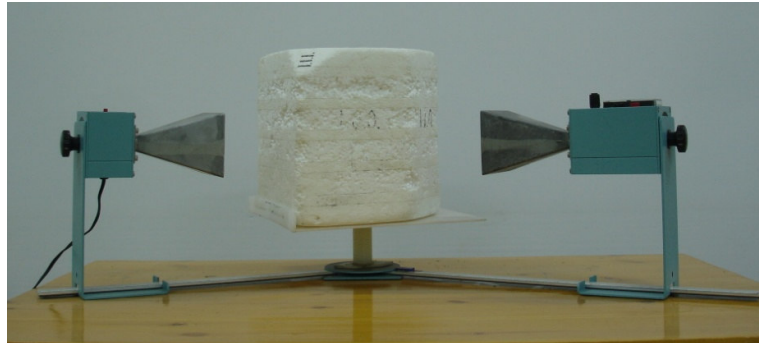
*Study of Solid State Physics in this Lab. will be much enjoyed,
Good Luck*

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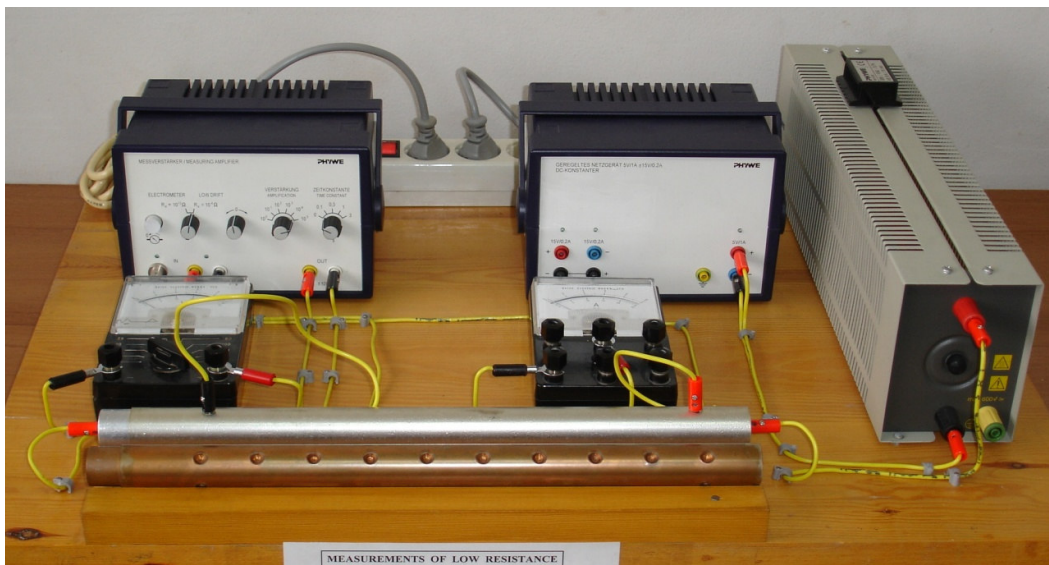
Solid State Physics

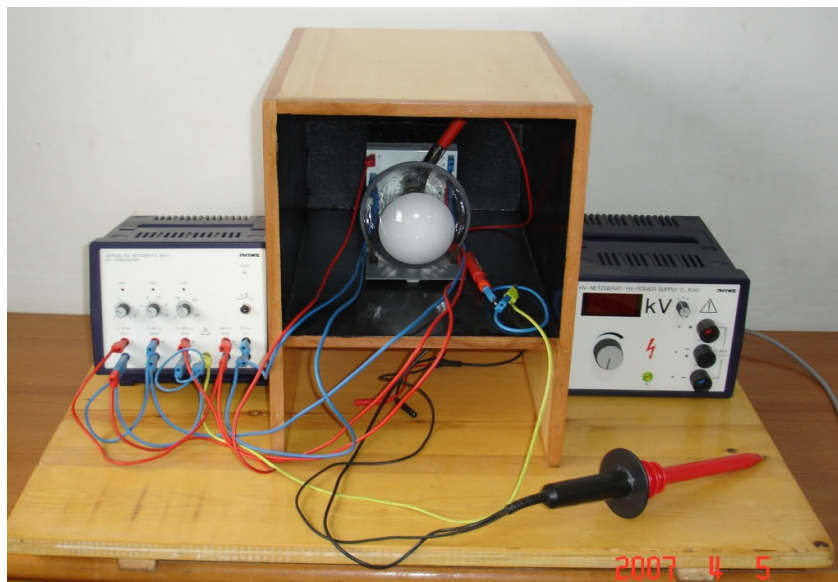


Brag's Law



Thermal and Electrical Conductivity of Metals



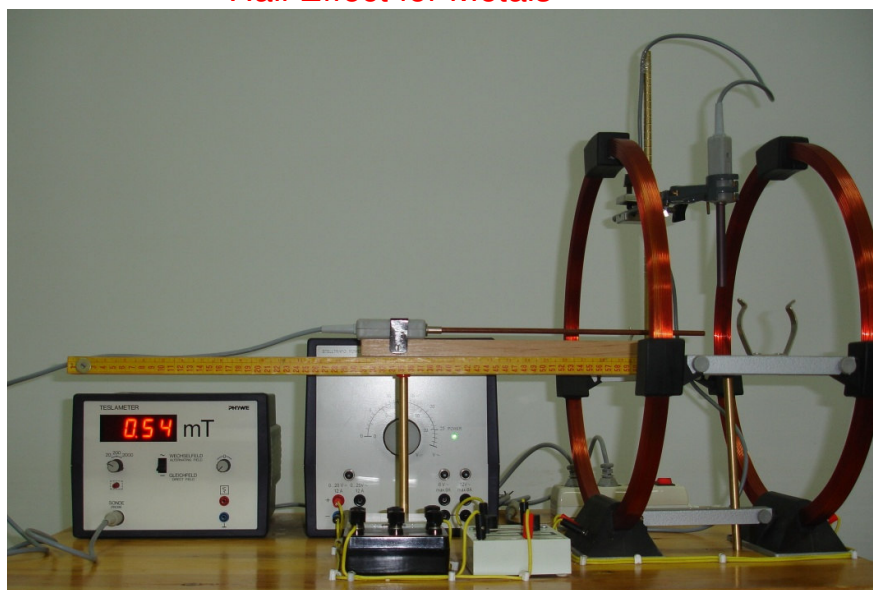


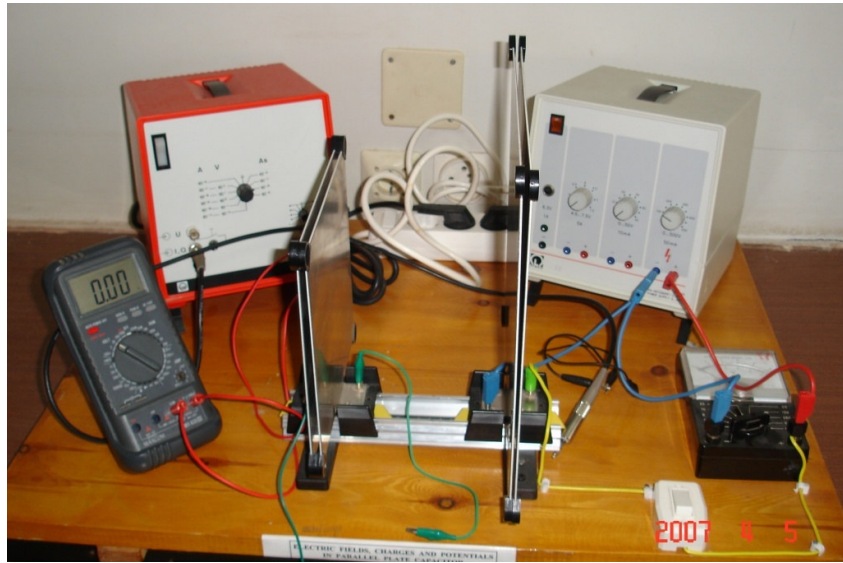
Electron Diffraction



Hall Effect for Metals

**Helmholtz
Coils**





Parallel Plate Capacitor, Properties of Dielectrics



Electron Diffraction