Physics 6
Experimental Physics Laboratory

Prelab Preparation and Recitation

Plan to spend at least 1–2 hours preparing for recitation. The actual amount of time necessary will depend on the experiment. Up to 40% of your weekly lab grade is based on your demonstrated preparation at recitation to understand the experiment's purpose, equipment, procedures, and analysis. You must successfully complete recitation before attempting the experiment.

Recitation is a 20−30 minute long, individual meeting with your TAs, and it is usually scheduled for the day before your lab session (lecture/demo if the lab session is remote). The recitation may be held in the lab or remotely; your TA will let you know. Don't be late or you will lose points. You must thoroughly review the experiment notes (*including the in-lab procedure and analysis sections*!) and **submit answers to the experiment's prelab problems before beginning the recitation.**

Many experiments involve physics which you have not yet covered in lecture courses, and you will be somewhat uncomfortable with the theory and the details of the phenomenon. *This is quite representative of the situation you will find yourself in during your early career as a graduate student!* Thus, you will have the opportunity to learn some new physics. If you are unsure about aspects of the theory, procedure, or analysis, then ask your TA!

Your TA will also ask you questions regarding some of the following topics, so be prepared!

1. What is the experiment all about? Provide an overview of the **primary theory** which the experiment examines and the data that it will gather.
2. What is a specific mathematical statement of the aspect of the theory which you will evaluate? What is the significance of this expression to the overall validity of the theory? Are there any **free parameters representing fundamental constants of nature** which you can measure using your experiment's data?
3. Provide **a general description of the experiment's apparatus**. What are the major components used to establish and control test conditions and collect the numerical data?
4. Provide a thorough description of **the physical nature of the data** to be gathered. What parameters are controlled? What are the units of the data recorded? Within what numerical range do you expect the data and control parameters from the experiment to fall (the experiment's range of "parameter space")? **How does one take a data point?** Which data points should be the most difficult to obtain or accurately measure?
5. What do you expect to be **the major sources of systematic error** in the apparatus? How might the experimenter mitigate the impacts of these errors? How will you incorporate estimates of their magnitudes into the uncertainties in your results?
6. How does your data then relate to the mathematical statement of the theory you are examining? **How will you analyze the data** to evaluate the accuracy of the theory's predictions?
7. What should be the target value or range for **the first data point attempted**? What are the point estimates you can obtain during lab to check that the experiment is working and your data are useable? **Can you make in-lab estimates of the free parameters to be measured?** How much data do you need to evaluate the accuracy of the theory?