EXPERIMENTS

For

PHYSICS 2

by

Richard Masada and Nuria Rodriguez

THE PHYSICS LABORATORY

The laboratory period is designed to accomplish three main objectives: (1) to supplement and reinforce concepts and ideas presented during the lecture portion of the course, (2) to familiarize the students with various types of equipment, and (3) to acquaint the student with different methods of data analysis.

A complete laboratory report should include the following in the order indicated:

1. **Title,** student's name and Partners' names, course and section number, and date of the experiment

2. A clear brief statement of the **purpose** of the experiment.

3. A **procedure** section, which summarizes as briefly as possible the steps to take during the experiment and the theory behind it. Include here a listing of the materials and apparatus in the experiment. Also include here a diagram of the equipment and any illustrations needed to clarify the procedure, remember that a picture can be worth 'thousands of words' of procedure.

4. Original **data** in an easy to read format, such as a table. Include units with all data and always read to the limit of your instrument but remembering ignificant digits. The data must be approved by the instructor before leaving the lab.

5. Show a sample of your **calculations.** No need to show repetitive calculations, but it should be clear that you know what you are doing. Provide units with your final results.

6. Summarize your **results** in an easy to read table with units, error estimate, and the appropriate number of significant digits. Include any accepted value for your result, if available, and compare to your calculated result. Also draw a one-dimensional graph of results.

7. Discuss only the main sources of **error in** your experiment, starting with the one you think- is the most important. Be specific ('human error" is too general a term and is not a meaningful description). Compare your estimated, expected error with the actual deviation of your results from an accepted value and discuss unexpected discrepancies. Always keep this question in mind: Do you think the error analysis can account for the difference between your result and the accepted value? Suggest improvements if appropriate.

8. The last statement should be a **conclusion.** Your conclusion is your conclusion and it should address the purpose of the experiment is some way. The conclusion should reflect "the big picture' (how does this lab relate to what we are learning in class?), make a connection to the "real" world, and it should

strive to be meaningful. A mere recapitulation of the results or the procedure, or the statement "I learned a lot" does not make for a good conclusion.

9. Answer any questions posed in the lab instructions in the proper place in the write-up: procedural questions in the procedure section, theoretical questions in the calculation section, error questions in the error discussion, etc. Any questions left over should be answered in the conclusion, and make sure to clearly identify those questions in your write-up so that I won't miss them.

Before the lab: Steps 1, 2, 3, and 4 should be done ahead of time. Of course you can't have the data before the class but you should prepare a logical data table ready for data.

During the lab: Do-the experiment, record information, do as much of the write-up as you can.

Short Write-ups: These will be due at the end of the lab period or the next class meeting. Short write-ups will include the preparation plus steps 5 and 6 above. Most of your lab reports short write-ups.

Long Write-ups: Some of your lab reports (selected by the teacher) will require a full write-up with all the steps. These will be due the following the lab period. Late reports will be severely penalized.