Keep your report brief. The total amount of “text area” should be able to fill 3 to 4 pages, not including the cover sheet. Tables and graphs will take additional space.

1. **Cover sheet (5)**
   - a. Title
   - b. Name of author
   - c. Name of partner
   - d. Name of TA
   - e. Course number
   - f. Section number
   - g. Date data were taken
   - h. Due date/time for report submission
   - i. The date and actual time the report was inserted into the bin in A-129

2. **Introduction (5)**
   - a. Importance of topic being studied
   - b. Goals of the experiment

3. **Experimental Setup (5)**
   - a. Briefly explain the setup.
   - b. Emphasize only DIFFERENCES from what’s in the lab manual.

4. **Data Taking (20)**
   - a. Procedures (emphasizing only differences from what’s in the lab manual)
   - b. Tables of data and uncertainty estimates, etc.

5. **Data Analysis (20)**
   - a. Derivations that need explanation (show all steps)
   - b. Sample calculations as examples, but they must use your actual data from the experiment

6. **Result(s) and Discussion (20)**
   - a. Tabular, graphical, and textual statements of results and their significance
   - b. Comparisons with other results (must include statement of whether different results are consistent or not, with quantitative justification that includes uncertainties)

7. **Boldface Questions (25)**
   - a. Answer all “boldface questions” and “requests for comments to be made” in the lab manual.
   - b. Must be distributed throughout the ‘narrative’ of the report (a serial list of answers is NOT allowed)
   - c. Indicate the location of each answer by referencing the question number in bold parentheses at the beginning of your response to the question. Ex: (1) or [1] or {1}
   - d. The value of each bold face question will depend upon the number of questions and importance of each question. Their total combined value will be no more than 25 points.

**More Formatting Details**

- Make sure all tables and graphs presenting your data and results obtained using them, as warranted, are labeled properly.
• Graphs made manually are perfectly acceptable, but some students may want to use a spreadsheet program. This allows for sophisticated plots and even for linear or polynomial fits to data sets.
• The website http://zunzun.com provides free use via a graphical-user-interface (pulldown menus) of a wide variety of pre-loaded fitting functions that can be applied on the remote server to user-supplied data. It even allows the user to enter new fitting functions. Output is via screens-ful of results or a downloadable pdf file that runs to 30 pages (this number may change from time to time). A new user must become familiar with navigating and using the web site, but it’s logically and professionally organized and free! However, anyone using it must be aware of the common-sense advice, “Do NOT use a program that you do not understand fully. Be prepared to spend a significant amount of time learning to use such a program and testing it if you haven’t before!”
• Do NOT regurgitate what’s in the lab manual, but you may refer to what’s there. Include, in your own words, the principle of operation of the setup and/or problems you experienced.
• Show UNDERSTANDING: Why does the experiment work (or, maybe in your case, not work), what is its underlying physics principle, its function, its goal? Derive the key physics formulae used, and/or explain where they come from.
• Discuss both STATISTICAL and SYSTEMATIC errors. Estimate the dominant source(s) of uncertainty and try to minimize your experimental uncertainties, or at least indicate how you would if you were to re-do your experiment. State every formula you use in your analysis and calculations and then list the values you insert along with their uncertainties. (You may refer to a table in your report where they may be found.) Otherwise the one grading your work will probably be unable to discern what you have done. If you repeat the same calculation over and over again on your data, present one of them as an example that shows the reader you know what you’re doing.
• Use units throughout your calculations, and not only for results! This helps to trace mistakes made in the calculations: If there are different units on the two sides of an equality, something is clearly wrong.
• Check spelling and syntax. Using a word processor is helpful here.

If you have problems or questions, by all means see the TA during his/her help-room or office hours! Don’t wait until it is too late.

Common Mistakes and How To Avoid Them

• Do NOT give a long, historical introduction. State clearly and succinctly what the idea of the measurement is. What is the physical principle behind it? How did you apply it to measure the quantity(ies) of interest?
• Do NOT copy sentences/paragraphs from the manual (but you may refer to it).
• Do NOT enumerate the equipment, but describe its functionality and use. Discuss why this is the only/best/simplest (or not these if you think so) way to measure the quantity of interest.
• Do NOT come up with nonsensical speculations of why your result doesn’t agree with the “accepted value”. Do not artificially increase your estimate of the uncertainty in your measured value(s) to make it(them) agree!
• Do NOT apply error propagation formulas blindly, and make sure the uncertainties in your measurements are sensible. Refer, as warranted, to relevant sections or formulae in the Guide to Estimating Uncertainty. Record the uncertainties in your data together with the data themselves in a table. Discuss how the uncertainties in the measurement influence the result. Make sure it’s clear whether you’re discussing random (statistical) vs. systematic uncertainties (errors).
• The deviation of your results from the theoretical or the accepted value is NOT the error in your measurement!
• Do NOT plagiarize!

Updated on 23 Feb. 2014 by the lab TAs and Prof. Koch from a previous version, which was based on materials that appeared in hard-copy compendia of lab manuals for PHY 133 and PHY 134 at Stony Brook in years gone by. We expect that this document will continue to develop. Though there is no such thing as a perfect lab report, we do want you, the students, to continue to work toward that goal!