Data Analysis guidelines

In this document you will report your collected data and how you used data to determine results. It will have two sections: (i) background and (ii) analysis. Please label both sections as indicated it below. Be Complete, Concise, Clear and Correct. One of the main goals of this course is about learning how to communicate your work.

When writing a "Data Analysis" document consider that you are omitting much of the material that will be in the final lab report.

You must include

1. **Your name, title of the lab, date you took the data and your lab partner's name.**

2. **Background.** Include any items that any reader needs to know in order to understand the remainder of the analysis section. For example, in the Schawlow's ruler experiment, you may use the equation $n\lambda=\ldots$ You must report any needed equations so a reader can understand what you are doing. You don't need a derivation or a reference at this time. You should expect that most of the information used in this section will wind up in your final draft anyway. For the data analysis I am looking for very brief contextual information.

3. **Analysis.** Here you must include your **data** and **plots/graphs**. This must include uncertainties in measured quantities. You can explain how you determine error bars later in the final draft (that is a discussion). Likewise you will be clear in your final draft how you get from data to the end results, but you don't need to write this out yet (it needs to be done correctly). Most of your procedure will be included in a different section in your final report. But, for example, you don't need to tell me how you measured position using a meter stick in the speed of light lab (you will include that in procedure later in the full report). I already understand how you did that common task. Likewise you don't need to tell me about modes and beats in the analysis draft, but very simply---I track these peaks (whatever makes those happen---to be discussed in final report).

   You do need to **tell me uncommon tasks** that come into the analysis. If in your analysis, you came up with a unique way to measure fringe positions down to a hundredth of a fringe in one of those labs, then you need to include that. I need to know if you do something unique that impacts your analysis.

   Your **plots** must be complete at this time (titles, appropriate axes, labels, units, title, caption). Likewise, **tables**. You must be clear about what you are plotting. There should be very little change between this entire analysis section and what is included in analysis in the final report.

   The purpose for this analysis is not for me to give you feedback relevant to your final report, you have instructions to follow for that. Rather, I am prompting you into good time management. You should be clear that your end results are valid and properly analyzed before you move on and focus attention to writing the report.

You must, of course, have things like neatness, correctness, appropriate uncertainty analysis and correct use of significant figures.

General Comments:

This document should be typed using LaTex. (other equivalent---see me)

Where appropriate your writing style and format should adhere to AJP sample paper style and format I have indicated. Writing should be clear.

The analysis is always due one week after you start taking data (as the schedule allows). The final lab report is due two weeks after you start taking data.

YOU INCLUDE THE FOLLOWING PAGE ON TOP OF YOUR HANDED IN "ANALYSIS DRAFT".

MAKE SURE YOUR ANALYSIS INCLUDES ALL RESULTS I HAVE ASKED FOR.

- For speed of light you need c= and + -
- You need pulse width = + -
- You need peak spacing= ….
- You need to compare your c to known (how many standard deviations away)
- You need to compare the manufacturer longitudinal mode spacing to what you measured (how many standard deviations=# uncertainty widths=# of error bars)

You may have more than I have requested, but missing a measurement is NOT OK. "Do or do not. There is no try."

Data Analysis Grading: **Total points out of 100=_____**

Author name: _____ Lab partner name: _____

0. Lab title/name/Date of lab/Lab Partner (on the analysis document). 10 points

1. Background section. 10 points (label this section, include the bare facts)
    a. Equations (end result equations used in analysis)
    b. General information needed for context

    Other comments

2. Analysis. 60 points
    a. Data table
        i. Title, caption, format (find follow AJP if possible)
        ii. Header info: symbol, units, uncertainty
    b. Plot/Graph
        i. Title, Caption, general format
        ii. Axes, axes labels
        iii. Lines, connect or not, symbols for data, error bars if needed
        iv. Fitted line and equation for the fitted line
        v. Consistent use of symbols
    c. End result analysis: explanation of how equation is used if needed
    d. Discussion of analytical method: how to yield the result
    e. End result propagation of error

    Other Comments

3. Sufficiently neat appearance. 10 points

    Other comments

4. Other analysis and format issues. 10 points
    a. Significant figures
    b. Discussion of end result: how far off from known standards and uncertainty
    c. Other as needed.
    d. Grammar/Spelling/Other distracting issues