Guidelines for Lab Reports

Pedro Henrique Bernardinelli
`pedrobe@sas.upenn.edu`

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Abstract

This section should contain a very brief explanation of your experiment, what you expected to achieve by doing it and a summary of your results. 2-3 lines long at most.

1   Introduction

This section should contain the motivation and a little bit of background for the experiment, a very brief description of the methods used and a comment about what you expect to achieve with your experiment. The size of this section varies based on the experiment, of course, but 4-5 lines should be ok.

2   Discussion

Here you should present your data and include any graphics made in the experiment. All the questions are to be answered here, preferably in the text (opposed to bullet points with each answer). Any mathematical framework is to be presented here as well, including any derivations to be made. A general idea is to work on math first, then proceed to the experimental results.

If you report any value that presents an uncertainty, you should have up to 2 decimal places in both values, matching both. It doesn't make sense to report $a = 8.5454 \pm 0.43 \, \text{m/s}^2$ or $a = 8.54 \pm 0.4343 \, \text{m/s}^2$, for example. The correct way would be $a = 8.54 \pm 0.43 \, \text{m/s}^2$. Also be careful if your parameter is not being fit directly! If you fit A and want $2A$, your uncertainty should be multiplied by 2 as well.

Also pay attention to what is the meaning of uncertainty. It doesn't mean how off you are from your expected value, but it shows how good your measurement was. The uncertainty depends on the apparatus used for the experiment, on your mathematical framework and on the computational process used for obtaining parameters. A quick way to compare your obtained value to the real one is by computing

$$Z = \frac{|\text{measured} - \text{real}|}{\sqrt{\text{uncertainty}^2 + \text{error for real value}^2}}.$$

You should expect $Z < 5$ for a decent measurement and $Z < 3$ for a good one.

3   Conclusions

Here, you should present a brief recap of everything you did, your final results (all of them), the values you obtained, discuss what were your uncertainties and errors and what could be the case for each one. You should also suggest ways to improve the experiment and reduce possible sources of error. Any feedback on the experiment should also be here.