How to write a Research Paper (Title, less than 10 Words)

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Abstract

Contains a brief summary of less than 100 words. For people who don't know if they want to read the paper or those who don't have the time to do so. Should contain the final result with error and the principal conclusion. No derivation. No references. Write the abstract after you have finished with the rest of the paper.

(...the rest of the paper is organized into 4 parts and a reference section...)

1. Introduction (part 1)

"What is the goal of this experiment?": briefly explain. Discuss the physics involved (just state which law(s) is (are) being tested or what constants are measured, no copying of text books, rather give a good reference [ref] that contains relevant background information). Briefly say what method is used here, how it relates to other methods [give refs], which were used to gain the same or similar information.

2. Experimental Method

Description of the apparatus. Usually contains a sketch of the setup and (if applicable) a block diagram of the electronics. Give all dimensions, mechanical and electrical properties that are of importance in carrying out or analyzing this experiment. How is the measurement done? What instruments are read? How many times and in what intervals? Are several measurements combined or is the result deduced from several measurements? How?

3. Results

Show the measurements in a figure (fig.1). Only in rare cases is a table of numbers better than a figure. Give the important results. Discuss the uncertainties of the measurement. Distinguish between random and systematic errors and describe where the latter might arise and how you assign a value to them. Clearly outline the final result and its uncertainty, and say how it was deduced.

4. Discussion

Comparison of your result with other similar measurements in the literature [ref] or with some "accepted" value [ref]. Comparison of your result with a theoretical expectation, e.g., fit of the measured data with a theoretical relation. Show the theory (as a curve) on the same figure as the data (represented by points with error bars). Discuss the quality of the measurement and list the most
important improvements that would make this a better experiment in the future (in your opinion).

5. References

For data, ideas, or arguments that are not your own you must mention the source by giving a reference. References are identified in the text by a number in [..] brackets (numbers are consecutive, in the order of their occurrence in the text).

this is how one references a monograph:

this is how one references an article from a journal (the numbers are: volume (year) page):

This concludes the paper. In the following, there are some additional comments:

a) Figures

Figures are important and convey information usually much better than text. Axes should be clearly labeled and the units should be given.

Every figure has a number. The numbers are consecutive in the order in which the figures are mentioned in the text (e.g., "see fig.1").

Every figure has a caption, describing briefly what is contained in them. The caption may be on the same sheet as the figure or all the captions may be collected on a separate sheet. Here, an example of a caption:

*Fig. 3: Displacement of the pendulum as a function of time. The data are from run #. The solid curve is a fit using the equation for a damped harmonic oscillator, as discussed in the text.*

b) Equations

Equations are separated from the text (as is done in the lab instructions). They should be numbered consecutively on the right margin, so one can refer to a given equation in the text ("see eq.1")

c) General comment

It is good practice to start with an outline to make sure that the arguments logically follow each other and that the organization of the paper is clear to the reader.

2 (page number!!)