Writing a laboratory report

When taking elective courses at atomic physics you will perform laboratory exercises after which you must write a report. This will both be an additional learning opportunity for you, as well as a proof to the supervisor that you have understood the different parts of the exercise. The report can have different appearances. To be sure about what is expected of you, you should ask your laboratory supervisor. She/he might want you to put emphasis on different things. Here follows some parts a laboratory report usually consists of. **To fulfill the purpose of the report it is mandatory that you write the report yourself. It is considered cheating to copy text from other sources (citations are obviously acceptable).**

Introduction

This is a short, summering description of the exercise. The background to the laboratory exercise should be written here. Why it is interesting and what the results can be used for?

Theory

All theory should be written here. Make sure to write references in your text so that the supervisor clearly can see where your information comes from. From this chapter the reader should be able to understand the theory behind the method, results and discussion. It is often a good idea to mix text and figures.

Method

In this part you explain how the laboratory exercise was executed. The text and figures should be detailed enough for a reader to repeat the exercise. If you used programming code (from e.g. MatLab) that you've written yourself you should at least describe the program. Example:

To characterize the laser, its spectrum was analyzed using a Czerny-Turner spectrometer with a CCD-camera. A MatLab script integrated the image from the CCD along the y-axis (see figure X) to obtain the total intensity at each wavelength. The number of lasing modes across the screen could now be calculated.

Results

The results should be presented here. If additional calculations were necessary to obtain the results these should be included. When you write your results there are two things you should keep in mind:

1. Are your results reasonable? If you e.g. calculated a laser cavity length to be $1.5 \cdot 10^{-15}$ m = 1.5 fm (about the size of an atom nucleus) something is very wrong!

2. Number of digits of accuracy! If you e.g. measure the length of an etalon with a ruler to 102 mm your results based on this length should not have more than three digits of accuracy. Values should be presented together with the correct unit, e.g., "4 cm", not just "4".

Discussion

The discussion should focus on the results. It should answer a couple of questions:

- Are your results reliable?
- What sources of error are there?
- Which one is most significant?
- Do the results confirm or differ from your theory part?

Citing a source

If it is **clear to the reader** that it is not your text, you may cite another source. You may only do this if you **include a reference** to the source. If you copy text without fulfilling these two criteria you are considered to be **cheating**.

Figures

Including figures in your report is often both pedagogic and makes it easier to read. You should only include figures that will contribute to the report. Each figure must have a figure number, text and reference (if you haven't produced the figure yourself) as can be seen in figure 1. Figure axes must have a notation and a unit, e.g. "Propagation length [mm]".You must also refer to your figures in your text at least once to make it easy for the reader to follow.

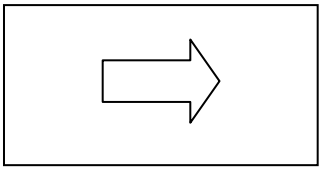

Figure 1. Example figure showing a square with an arrow inside [X].

References

It is important that you write you references correctly so that it will be easy for a reader to check the source for additional information. If you refer to a book it is good if you also write which chapter. If you refer to a homepage it is good if you are specific. You should not write www.wikipedia.org when you can write http://en.wikipedia.org/wiki/Refractive_index. Here follows two examples:

[1] Fundamental of Photonics, B. E. A. Saleh and M. C. Teich Wiley Series in Pure and Applied Optics, John Wiley & son, 2nd edition, 2007, chapter 1.2

[2] http://en.wikipedia.org/wiki/Refractive_index, visited 2011-03-25

Correcting the report

When a laboratory supervisor gets your report she/he will ask her-/himself a couple of questions:

- Has the student understood the laboratory exercise and the important physics behind it?
- Are the results and calculations reasonable?
- Has the student discussed whether her/his results are reasonable (sources of error…)?
- Has the student included all necessary parts of in the report (method, theory…)?
- Are all formal requirements fulfilled (correct references, figure texts…)?

Before you hand in your report it can be worthwhile to check that you have answered all these questions. Also go through the text to find mistakes such as spelling errors or poor sentence structure.

Help!

If you need help or have questions concerning the laboratory exercise or report: ask your laboratory supervisor.

I cannot finish the report in time!

If you cannot hand in the report in time (usually one week after the laboratory exercise) please contact the laboratory supervisor as soon as possible.