How to write a lab course report

Here we give a few advises regarding the writing of a report within the scope of the astrophysical lab course. We aim to give an overview over what should be included in those reports and which guidelines need to be followed. Those largely are similar to the requirements of future scientific writings like thesises and journal papers.

General Notes

A scientific text has two important purposes:

1. *Presentation of your results, findings, and conclusions.* This is the fundamental message that you want to convey, you describe and show all of your findings. This is the part that contains what others should learn from your work.
2. *Transparency and reproducability of the results.* This includes a clear and precise description of the process you obtained your results with. Write under the assumption that a potential reader schould be able to reproduce your results from your data while following your steps. This gives credibility to your results. For a lab report, it allows us to identify potential problems that occured throughout the process and see how well you understood the work you did.

Report structure and content

A typical report should consist of the following sections:

1. A short **introduction**, setting the general stage of the report.
2. A **theoretical part** that explains the knowledge needed to understand the topic of the report, the processing of the data, and the conclusions drawn in the end.
3. A general description of the **observations**, the **data reduction** that lay out the path from the original raw data to the results presented in the next section.
4. The presentation and description of the **results**. This includes the processed data and measured values.
5. An **analysis** of the results which include calculations, deductions, interpretations, or fitting results based on the data.
6. A **discussion** of the results of the analysis with respect to literature values, plausibility, uncertainties, and possible error sources
7. A list of **references** used throughout the report. This includes values for literature comparisons but also adopted literature values for the results and analysis part. The same goes for figures that you use from books or webpages.
8. An ***appendix** that contains all suplementary informations, additional figures, etc.

More remarks

- It can be exhausting writing on a lengthy text over time. One gets blind for their own mistakes over time, things that made sense in your head may when they are on paper. Leverage that you write this as a group, proof read each others contributions. Also, put the text to rest for one or two days and reread it to identify problems with the structure or wording, and find repitions or gaps to be filled in the text.
- When thinking about what to include in your report as information, act according to this princinple: what does someone need to know to understand your findings and the way you reach there, and information do they need to be able to retrace your steps with your data to reproduce your results?

- Use your own words to describe things. Please be aware that the supervisors (which will evaluate your report) already read dozens of other reports. Hence, they will immediately recognize whether you have copied text from e.g. the Internet, which is considered to be a plagiarism and which will result in an immediate disqualification.
- An example for a good, although not perfect, N2 report can be found here (many thanks to Tomer Shenar and Christoph Guber for providing this file).

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A typical report should consist of the following sections:

1. a theoretical part that explains the background need to understand the topic of the report
2. a general description of the observation, the data reduction, and the data analysis
3. the presentation of the results
4. a discussion of the results with respect to literature values, plausibility, uncertainties, and possible error sources
5. a reference list

Some general remarks:

- **first of all:** use your **own** words
  - Please be aware that the supervisors (which will evaluate your report) already read dozens of other reports. Hence, they will immediately recognize whether you have copied text from e.g. the Internet, which is considered to be a plagiarism and which will result in an immediate disqualification.
- state the origin of each figure that is not made by yourself
- the report should include the figures from the data reduction, however only one example of each type is needed in the main part of the report, additional figures should be attached as an appendix

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