

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 theses 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 reproducibility 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 should 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 occurred 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 supplementary information, additional figures, etc.

This is just a general structure, valid for most writings. Given the content of the report, individual points can be merged or even omitted. Also the order may change in specific cases when the content demands/merits it.

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 not 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 repetitions or gaps to be filled in the text.

- When thinking about what to include in your report as information, act according to this principle: what does someone need to know to understand your findings and the way you reach there? Which 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).

Report template

We have created a report template for you to use. It is written in Latex and you should be able to compile it with a typical Latex installation. A [zipped source files directory](#) contains all necessary files, including the template for you to edit, and all auxiliary files needed for the successful compilation. The files are as follows:

| File name | Purpose | edit by you? |
|----------------------|---|--------------|
| lab_report_empty.tex | The empty lab report template for you to fill | yes |
| bibliography.bib | Contains bibtex entries for everything you reference | yes |
| aa.bst | Bibtex style file that determines how references look like | no |
| lab_report.tex | Source file for guide (see below) | no |
| bibdefinitions.tex | Predefined definitions for typical Astronomy journal references (needed for bibtex) | no |

All other files are created by the compilation. lab_report.pdf is the compiled report.

Based on this template, we wrote a [little guide](#) on how to write lab reports and on the required contents for the individual experiments that extends the information given here. It also describes some general typesetting and writing conventions for scientific documents as well as helpful Latex commands.

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