Physics 307L

Spring 2020

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Lecture 2: Lab Notebooks

Course webpage

Course webpage: lecture slides, syllabus

https://ghz.unm.edu/education/juniorlab.html

Course Wiki: editable pages on experiments and schedule
https://ghz.unm.edu/juniorlab/

Please check your email regularly for course announcements and updates.

Initial Class Survey

Still useful to fill out!

Email me if you have any questions or problems.

https://forms.gle/emUxCRcLoyJPiV228

Keeping A Lab Notebook

- Keeping a detailed lab notebook will count for 25% of your grade in this course
- What to include?
  - What you did
  - How you did it
  - Why you did it
  - Why it was different than what was expected/calculated
- Order should be chronological, can leave some space to add in info later (add in a later printout, finish a calculation later)

Purpose of lab notebook for this class

- To communicate to the instructors how you performed an experiment and what result you got (and why)
  - Should be able to hand us your notebook and we can re-create exactly what you did
  - Should be able to answer questions about what you did that day at the end of semester, based on lab notebook
  - **Should stand independent of provided experiment info**
- To document for yourself what you did, especially between lab sessions
  - Especially important to make sure you finish in 2 weeks
  - Order of notebook should be mostly chronological, and need to have clearly separated sections for each experiment
- To practice scientific documentation
  - If you run out of space, you can start a second notebook

Other purposes of lab notebooks

- Used for strict record-keeping for certain kinds of scientists, especially for patent verification
- Shared documentation in a collaboration
  - Shared lab notebook for an experimental setup
- Long-term record keeping
  - In graduate school and beyond, experiments last for months and years, and need to have a system to record all relevant information (not just important information)
- Reproducibility
  - For others, or for yourself (how did I do that?)
- Historical records

Why a handwritten notebook?

- An extremely “portable” format
- Encourages you to be selective and thoughtful about what is recorded
- Can include a wide variety of information (drawings, tables, printed photos, hand-drawn plots, printed plots, calculations, etc)
- Be sure to include references to any relevant data files, programs, etc!

Resources

- http://www.unm.edu/~mph/307/notebook.pdf
- http://web.mit.edu/me-ugoffice/communication/labnotebooks.pdf
- https://phys.libretexts.org/Bookshelves/Ancillary_Materials/Demos%2C_Techniques%2C_and_Experiments/The_Laboratory_Notebook
- http://pmaweb.caltech.edu/~phy003/notebooks/notebooks.html

Lab reports

- Just like how your lab notebook is practice for real-world scientific documentation, the lab reports should be used as practice for writing scientific papers
- Should also be used as practice in writing in LaTeX

Elements of a scientific paper

ABSTRACT: A series of measurements were performed to measure the charge of the electron. An experimental value of $1.6 \pm 0.2 \times 10^{-19}$ C was obtained, in good agreement with the established value.

INTRODUCTION: The charge of the electron is a fundamental constant of physics. It was first measured by R. Millikan and co-workers in 1913 [1]. As experimental techniques improved, the accuracy...

EXPERIMENT: A sketch of the experimental setup is shown in Figure 1. A mist of drops is injected...

RESULTS AND DISCUSSION: Results are summarized in Table I. Experimental errors are attributed to...

CONCLUSIONS: The experiment gives the fundamental electron charge with an accuracy of approximately
12%. This is limited by...

REFERENCES:

[1] R.A. Millikan, “On the Elementary Charge and the Avogadro Constant”, Phys. Rev., **2**, 109 (1913).

Resources

- https://physics.unm.edu/Courses/Becerra/Phys307LSp18/DescriptiveDocuments/GuideforWritingLabReports.pdf