Physics 307L

Spring 2021

Prof. Darcy Barron

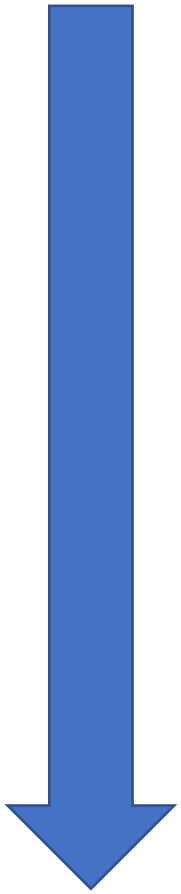
Lecture 5: Lab Reports and Presentations

Reminders

- Reminder: you will complete 6 experiments this semester, give 3 presentations, and write 3 full lab reports in the style of a scientific paper
- First student presentations will be during lecture on March 1 and March 8
  - Ok to present on 'Lab 0' (Oscilloscope OR Chua Circuit)
- First written lab report is due Wed. March 24
  - Lab report cannot be on Lab 0
- **Please submit lab notebooks as a single pdf file with naming "PHYS307L_Lab#_Name.pdf" in the future**
  - **Let us know if you need help figuring out a way to compile the pdf**
  - **Also, ok to mix handwritten and digital content, don't need everything handwritten**

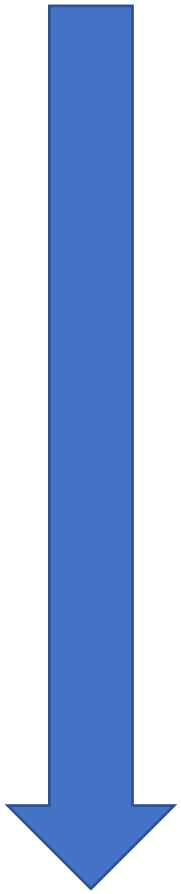
Three ways of reporting results

- **Lab notebook -** *Documenting in detail*
- **Lab reports -** *Organizing and editing*
- **Short conference-style talks –** *Summarizing, advertising*



Three ways of reporting results

- Your **lab notebook** is practice for real-world scientific documentation
  - *Documenting in detail* for yourself and close collaborators what you did and how you did it
  - Should be a complete write-up, including completed analysis, where content is ~ in order of time of completion
- **Lab reports** are practice for writing scientific papers, which communicate results to broader audience
  - *Organizing and editing* your work for a broader audience
  - Also should include more background/introduction for context, and typically a section on "what's next"
  - Should also be used as practice in writing in LaTeX
- **Short conference-style talks** are used to briefly summarize and advertise results to a broader audience
  - *Summarizing* the important context and results
  - Also want to reach a broader audience than a paper (interested/experts will go follow up and read paper)



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

DATA: Data is shown in Table I

RESULTS AND DISCUSSION: Results are shown in Figure 2. 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).

Example papers

- https://journals.aps.org/pr/pdf/10.1103/PhysRev.2.109
- http://articles.adsabs.harvard.edu//full/1887SidM....6..306M/000
- https://royalsocietypublishing.org/doi/pdf/10.1098/rspa.1920.00350306.000.html
- https://arxiv.org/pdf/2010.09761.pdf
- https://arxiv.org/pdf/2009.04496.pdf
- https://journals.aps.org/prl/highlights
  - https://journals-aps-org.libproxy.unm.edu/prl/issues/126/7

Formatting articles

- https://www.latextemplates.com/cat/academic-journals
- https://www.overleaf.com/latex/templates/aastex-template-for-submissions-to-the-astrophysical-journal/bpkjwktvsqwp
- https://medium.com/@marko_kovic/why-i-write-with-latex-and-why-you-should-too-ba6a764fadf9

Lab Report Guidelines

- https://ghz.unm.edu/education/juniorlab_pdfs/labreportguidelines.pdf

Three ways of reporting results

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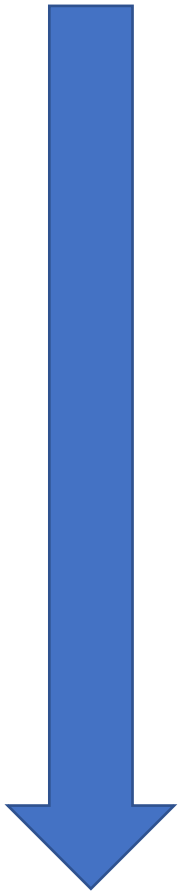

Elements of a short scientific talk

- **Short** scientific talk – conference style
- Different in style and content from a lecture, seminar, or colloquium
- Typically have 5 – 15 minutes to present, plus short time for questions
- Short enough that you can only communicate ~ 1-2 main points well

Elements of a short scientific talk

- Whom are you speaking to?
- What do you want your audience to learn?
- What is your story?
- How long do you have to speak?
- What visuals will serve to amplify your story?

Elements of a short scientific talk

- Whom are you speaking to?
  - Assume a general undergraduate physics audience
  - Not all students will be familiar with your experiment
- What do you want your audience to learn?
- What is your story?
  - How do you frame it as an engaging story?
- How long do you have to speak?
  - Your first talk will be 5-10 minutes plus a few minutes for questions
- What visuals will serve to amplify your story?
  - Graphs, photos of setup, historical photos

Examples

- Friday afternoon department colloquium
  - Good colloquium-level talks will stay at a level understandable to undergraduate students for at least first ~ 15 minutes
  - Doing this is not always easy, so not all talks are good!
- American Astronomical Society conference session
  - https://www.youtube.com/watch?v=SQwROzDcFkc

Sections of a short talk

- Short enough that an outline isn't always necessary, but can be good to include a ~ 3-4 point outline
  - Intro/Overview of X
  - Experimental Procedure
  - Results
- Variation is expected in focus and content based on which experiment and what outcome was
- Talk should communicate enough information for audience to generate questions

Expectations for first talk

- We will have two sessions of talks, next Monday and the following Monday
- You need to talk for at least 5 minutes, and have at least 5 content slides
- Everyone is expected to ask at least one question per session
- Please email me with your topic and preference on which day to present (Mar 1 or Mar 8)

Resources

- https://physics.unm.edu/Courses/Becerra/Phys307LSp18/DescriptiveDocuments/GuideforWritingLabReports.pdf
- https://www.overleaf.com/learn/latex/Tutorials

Resources

- https://www.americanscientist.org/blog/the-long-view/the-science-of-scientific-writing
- https://www.planetary.org/blogs/emily-lakdawalla/2013/04040850-better-conference-talks.html
- https://colinpurrington.com/tips/lab-notebooks/