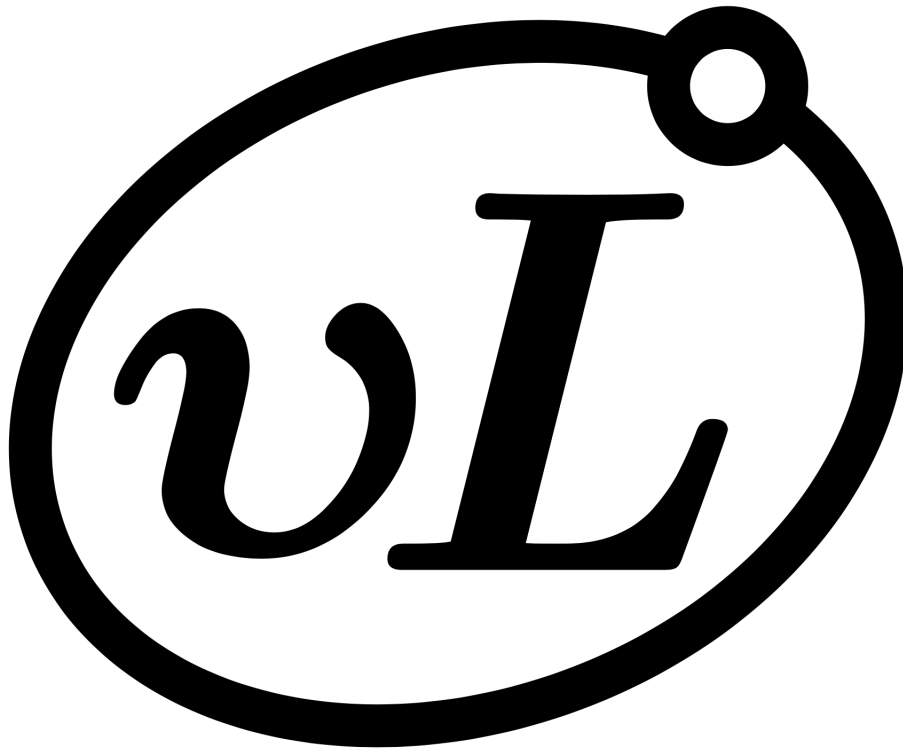


Upsilon Lab *Reading a Research Paper*
an Official UCLA Physics & Astronomy Department Sponsored Organization

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“A lab for undergraduates, by undergraduates.”

1 Summary

The goal of this guide is to give a basic outline of how a physics major should take an active approach to read a research paper for best understanding and reference.

I will outline the key information to look for in a paper, and how to find more resources through the paper.

2 Begin Reading

To begin, start with the introduction, **then** the abstract. Since you are reading for understanding, the introduction will give you a sense of the means, and you can follow the author's logic in a big-picture way, to the end laid out in the abstract.

2A Introduction

When you read the introduction, I recommend making a “map” of the ideas, so you can follow the author's thought process. Don't worry about the individual steps, just get a sense of:

- what established work the author is using, in the form of citations,
- the relevant information the author is lifting from these citations- in a well written paper, this will be clear without needing to read the cited paper (yet),
- how the author is connecting these “known” things to form their own intermediate conclusions, and
- how their intermediate conclusions bring them to the goal they stated in the abstract.

How you want to format this information in your notes is up to you, but I prefer a numbered map with a list of ideas.

3 Cursory Read

The next step is to make a cursory read of the entire paper, excluding the introduction and abstract, **and conclusion/discussion** which we will reach in Section 4.

3A Following the Author's Logic

As you go through, make notes to go alongside your map of how the author moves from point to point. Don't assume they are correct! Think both critically and creatively- look for places where you can see a new conclusion as well as where the author may have made a mistake- these often, but not always, go hand-in-hand. Some key places to look:

- Graphs: what are they trying to point out in a graph? Usually, authors point to obvious trends or peaks, and discrepancies from past data. Think about what the figure communicates to you.
- Data tables: in the absence of a graph, you can do the same for a table that you would do with that graph. Look for trends, peaks and discrepancies that the author is either highlighting or ignoring.
- Equations: look for physical relations in equations, if you can. What is the equation relating? How does that help (or hurt) the author's points?

While you read, look at the ideas in your map. How do each of the author's intermediate conclusions you've examined bring them toward their goal, in your mind?

4 Examining the Paper’s Concluding Idea

Now that you have a solid sense of the author’s basis for their final conclusion, read it. Carefully examine all of the logic they use to trace from the intermediate to the final conclusion. This will help cement your understanding of the reasoning both in the specific and in the general senses.

5 Return to Your Notes

Next, go back to your map and notes and look again at the points you were skeptical about. Are you still skeptical? Go back to that point in the paper and read it again. It’s fine if you disagree with the author’s logic; that is a great place to ask a friend, colleague or advisor about their thoughts. Such points of skepticism are great places to see if more research is an order to prove or disprove something.

6 Write a Summary

Finally, try to write a short (a few sentences) paragraph or briefly explain the paper to a friend or colleague. Don’t focus on justifying where the author gets their information, but rather how they connect all of it. If you can easily write this paragraph, you’ve probably done a good job of understanding the concepts and logic of the paper!

7 Further Study: Author’s Citations

If you are trying to further your understanding of the paper’s field in general, or are pursuing your own research in the subject, the author’s citations are an excellent starting point. Go back to your notes, and identify the citations you made notes of as key pillars which you took as “known” for the purpose of following the logic of the author. Use this method to read those papers, and see if there are any other outstanding research questions you can ask to make more connections within the field, or a new direction that may have come to mind while you were reading the papers.