

## Physics 2710 Student Projects

During the last few weeks of the course, each of you will study a modern physics topic of your choice, make a 10-minute presentation to the class on this topic, and write a formal paper summarizing what you have learned. The idea is to give you a chance to explore a subject that interests you in some depth, while exposing the whole class to the breadth of modern physics. You'll also gain some practice in communicating science, in an environment where there is much less pressure than in a senior seminar or job interview.

Please start thinking now about possible topics. Your topic should be an application or extension of something that you've already learned in this class, that is, of relativity or quantum mechanics. The topic must also lend itself to a presentation and paper at the level of this class, neither too elementary nor too advanced. Your presentation and paper must include some honest calculations—not just descriptions—yet must be fully understandable to your classmates.

Many of the best project topics are discussed in your textbook, in sections that we will otherwise not cover in class. Your textbook covers a wealth of applications to atomic physics, molecules, solids, nuclei, and elementary particles. (Please avoid topics such as statistical mechanics that are more appropriate for a different WSU course.) Many other suitable topics are not in your textbook but are reasonably easy to research in the library or on the Internet. Here are a few off the top of my head: relativistic electrodynamics; The Schwarzschild metric; GPS satellites (relativistic effects); Bell's theorem; quantum cryptography; nuclear magnetic resonance; radiation safety; nuclear medicine; particle accelerators; structure of the proton; Feynman diagrams; quantum electrodynamics; neutrinos; dark energy. Please consult with me as you choose a topic, look for sources of information, and pin down the scope of your project.

To deliver your presentation you should use Powerpoint or some similar presentation software. Plan on preparing between 6 and 10 slides, depending on how much is on each of them. Prepare your slides to be clear and legible, but don't spend a lot of time making them pretty or distract your audience with visual frills. Be sure that your slides include all of the visual information you need; writing on the blackboard is not an option when you have only 10 minutes.

Here some important dates and deadlines for preparing and delivering your project:

- Wednesday, March 9: Starting today, I'll take written requests for presentation topics on a first-come, first-served basis. If you don't want someone else to choose your favorite topic, get your request in soon! Your written request should include a title and at least one good reference (book or article) to the information you will be presenting.
- Wednesday, March 23: Deadline for submitting your project topic (in writing). Again, your written request should include a title and at least one good reference.
- Monday, March 28: I'll distribute a schedule showing the exact date of each presentation.
- Friday, April 1: Turn in a one-page typed summary of what you plan to cover (including a detailed outline). Schedule an appointment for practicing your talk.
- At least three school days before your presentation: Practice giving your talk (to me).
- April 8 – 18: The presentations themselves.
- Wednesday, April 20: Turn in your typed paper by 5:00 pm.

I will grade your project based on all of the elements just described: how much you have learned, how effectively the presentation was delivered, whether the topic and presentation are at the right level, and whether you meet all the deadlines. For students who make a conscientious effort and do not procrastinate, I expect the presentation grades to be quite high. I will give you a separate grade on your final paper, which must be technically correct, self-contained, and clearly presented at a level that your classmates can read and understand. You will also receive credit for attending your classmates' presentations and the guest lectures that precede them.