

Physics 129AL Project

November 2023

Objective

The objective of this physics computational project is to provide students with an opportunity to gain hands-on experience in solving complex physical problems using computational methods. Through this project, you will:

- **Develop Computational Skills:** Acquire proficiency in using computational tools and techniques for modeling and solving physics problems.
- **Explore Diverse Topics:** Choose a specific physics topic of interest and explore it computationally. Topics can include but are not limited to classical mechanics, electromagnetism, quantum mechanics, thermodynamics, or astrophysics. I will also provide few ideas.
- **Data Analysis:** Learn to select, process, and interpret data generated by simulations to draw meaningful conclusions.
- **Visualize Results:** Create visual representations of physical phenomena and results, enhancing the ability to communicate findings effectively.
- **Report and Presentation:** Deliver a presentation to share project findings, methodology, and insights with peers and instructors.

Timeline/Grading

- **Due: [11/09/2023]** **Project Initiation**
- **Due: [11/16/2023]** **Milestone Report (1), Weight: 10%**
- **Due: [11/23/2023]** **Milestone Report (2), Weight: 10%**
- **Due: [11/30/2023]** **Milestone Report (3), Weight: 10%**
- **Due: [12/07/2023]** **Class Presentation, Weight: 20%**

****It is required to complete all milestones in order to receive a grade for the project.****

Content Requirements

Project Initiation

Please **submit a short (≤ 500 words) proposal for your project**, which should include the following:

1. the physics subfield.
2. the problem and your goal.
3. the computational techniques you will be using.
4. why you find this problem interesting.

Milestone report

The weekly project milestone report serves as a critical documentation of your progress and is essential for monitoring the successful completion of your project. Each week, you are asked to **submit your Jupyter notebook on Github, along with a short report on the current progress**, which should include the following key elements:

1. **Methodology:** Describe the methods, tools, and approaches used to address the project's goals. Explain your computational techniques, numerical simulations, and any specific algorithms used.
2. **Progress Summary:** Present a clear and detailed account of the work completed up to the milestone. Include any significant achievements, results, or findings.
3. **Challenges and Solutions:** Identify and discuss any challenges or obstacles encountered during the project, along with the strategies employed to overcome them.
4. **Future Work:** Outline the remaining tasks and objectives for the project, emphasizing the next steps to be taken.
5. **References:** Cite all relevant sources, references, and literature used in your project so far.

Although you do not need to follow a specific submission format, **please make sure you include the above key elements**. You will also receive feedback and suggestions from the TA and me along the way.

Presentation

In the last week of the class, students will have the opportunity to showcase their knowledge and achievements through a comprehensive presentation. This culminating presentation will provide a platform for students to share their insights, project outcomes, and key learnings with their peers and instructors.