PHY 604: Final project rubric

This document will give additional information about the final projects for PHY 604. Note the deadlines highlighted with bold red text below. (Note that the source code and write up will be turned in via github classroom)

1. ***Topic***: The topic of the final project is up to you. In general, the idea behind the final project is to go beyond what we discussed in class and either solve a different physics problem with one (or multiple) of the numerical methods discussed in class, or implement a method/algorithm beyond what was discussed in class. See the document `final_project_ideas.pdf` for some possible ideas for topics. You should send me (by email) a short (couple of sentence) summary of your planned topic by **Nov. 11, 2021**.

2. ***Source code*** (50 pts): You should turn in all of the code you write for the project. As usual, you can use whatever language you wish. You should include some brief documentation about how to run the code, and what each part does (can be in the form of comments in the code, Markdown in a Jupyter notebook, a separate README file, etc.). The final source code will be due **Dec. 14, 2021**, but you will need to have at least preliminary results for your presentation (see point 3 below). The code will be graded with the following criteria:

   - *Generation of novel/original code*: 25 pts
   - *Code runs without errors and solves the problem:* 20 pts
   - *Documentation sufficient for users to run and understand the code*: 5 pts

3. ***Write up*** (25 pts): The source code should be accompanied by a write up. The format should roughly be that of a letter-length academic paper. It should be written in LaTeX, and include any necessary figures, references, etc. The due date for the full write up is the same as the source code, **Dec. 14, 2021**. However, a rough draft of the first two sections (Introduction, computational approach) is due on **Nov. 18, 2021**. The write up should include the following sections (graded as specified):

   - *Introduction/motivation*: 3 pts; Motivate the physics problem or what the algorithm is used for, introduce the problem/algorithm, and give some background as to how the problem is usually solved, what are the competing algorithms, what is the context in which the algorithm you chose is used, etc. This section should not include any figures or equations, but should include relevant references.
   - *Computational approach*: 3 pts; Describe the algorithm used to solve the problem. Use equations and schematics where necessary. Introduce the calculations you did and the parameters you used.
   - *Results*: 8 pts; Describe the results of your calculations. This section should most likely include figures/plots of the results of the calculations.
   - *Discussion*: 8 pts; Analyze the data that you calculated. How did you ensure the calculation was converged? What tests did you do to ensure the code ran correctly? Did the results you got match what you expected?
   - *Conclusion*: 3 pts; Briefly summarize what you did and what you found. Should just be a few sentences, no figures, equations, references, etc.

4. ***Presentation*** (25 pts): Presentations will be given the last week of class, **Nov. 30, 2021** and **Dec. 2, 2021**. The order of the presentations will be chosen at random, so be prepared to present on either day. The presentations should be 15 minutes plus 5 minutes for questions. They can be given with slides and/or on the blackboard. They can also include a short demo of your code. They should

include the same sections as the write up. Note that even though the final code and write up are due Dec. 14, you will need to have some results for your presentation.

Summary of due dates:

- **Nov. 11, 2021**: Send me a short summary of your planned topic by email.
- **Nov. 18, 2021**: Turn in via github classroom a rough draft of the first two sections (introduction, computational approach) of the write up.
- **Nov. 30, 2021** and **Dec. 2, 2021**: Presentations during class. Order will be chosen at random.
- **Dec. 14, 2021**: Write up and source code turned in via github classroom.