Experiment Progress Report

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Experiment: Lab 01 - Graviational Wave of Binary Object Mergers

Write at least 3 bullets under each point below.

1. What have you done over the past week?

   - Organization of Raw data, and Jupyter Notebooks, to ensure that we are analysing the correct information and can produce the correct deductions from it.
   - Strengthening out background knowledge of gravitational waves through papers, jupyter notebook tutorial and reviewing resources on canvas.
   - Creating appropriate fit functions to fit the GW strain. Calculated the chirp mass of the fit model.
   - Generate a distribution of chirp mass and fit it with a Gaussian.

2. What are your achievements so far?

   - Find the parameters to yield the highest signal-to-noise ratio for binary blackhole and binary neutron mergers.
   - Fitting models from a binary neutron star merger and binary blackhole merger from Livingston and Harford.
   - Calculating the correct chirp mass values for the binary neutron star merger and binrary blackhole merger.
   - Compare the fit results to the template and compare the residual. They are almost the same around the merger event.

3. What problems did you run into over the past week?

   - Properly setting up and running the tutorial python notebooks, including organizing the dependency modules.
   - Ensuring that our predicted functions could produce reasonable fits on the GW time-series waveform, and ensuring that the results could provide pertinent information to us as well.
   - Find the right fit model and the right parameters to make the fit look good.
   - Find a method to get the most accurate chirp mass from the fit result.

4. What questions do you have about your experiment/analysis/interpretation/...?

   - What is the *single end goal that we are working towards?*. We are accomplishing a lot of very important tasks, but what is all of this in service to?
   - How do we compute the uncertainty in the chirp mass? Is this from the raw data or does it come from the limitations of numerical accuracy?

- There are several methods to filter the noise, (tutorial 1.1 and 2.2), should we choose the best method and go with it?

5. What is your plan for next week? Provide a detailed timeline with goals and dates.

- Cleaning up and redundant or messy code. Ensure that out repository is documented so that we have easily reference needed material when producing the final report. (Wednesday)
- Calculate the velocity, luminosity distance, and total masses. (Wednesday)
- Formalizing our understanding of how to control the error in this lab. What is its source? Finalize uncertainty calculations. (Thursday)
- Make the figures look nice and professional (Friday)
- Write a draft for the report (Sunday)