Faint Emission Lines in eLIER Galaxies

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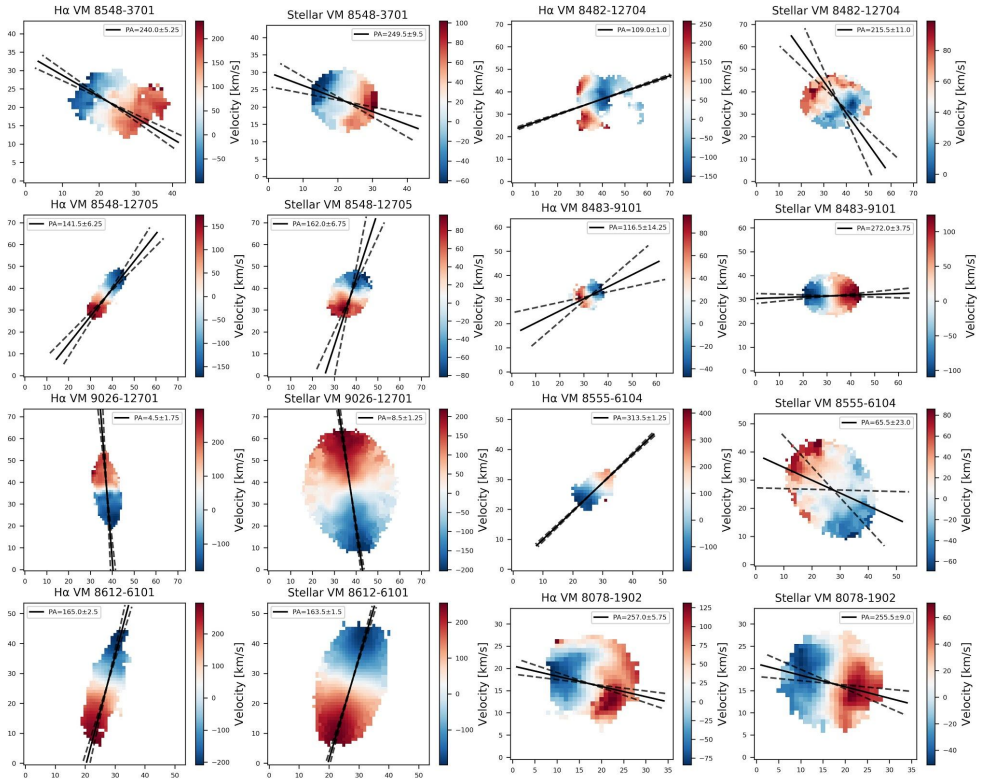
Summer Research Goal

- We are looking for faint emission lines in eLIER galaxies
- Steps to reach goal
  - Get a catalogue of eLIER galaxies.
  - Find the position angle of each galaxy twice. Once using the Hα emission line velocity map and again using a stellar velocity map.
  - Sort galaxies with aligned position angles and misaligned position angles. Aligned if within 30°.
  - Sort galaxies by mass by finding the median mass and separating high mass galaxies from low mass galaxies.
  - Create four groups of galaxies and stack their spectra
    - Low mass aligned, low mass misaligned, high mass aligned, and high mass misaligned.
  - Fit the stellar continuum and subtract it away to look at the emission lines and see if we can find the faint emission lines in any of the stacks
  - [O III] λ4363, [N II] λ5755,[S II] λλ4068,4076, and [O II] λλ7320,7330 are the specific lines we are looking for

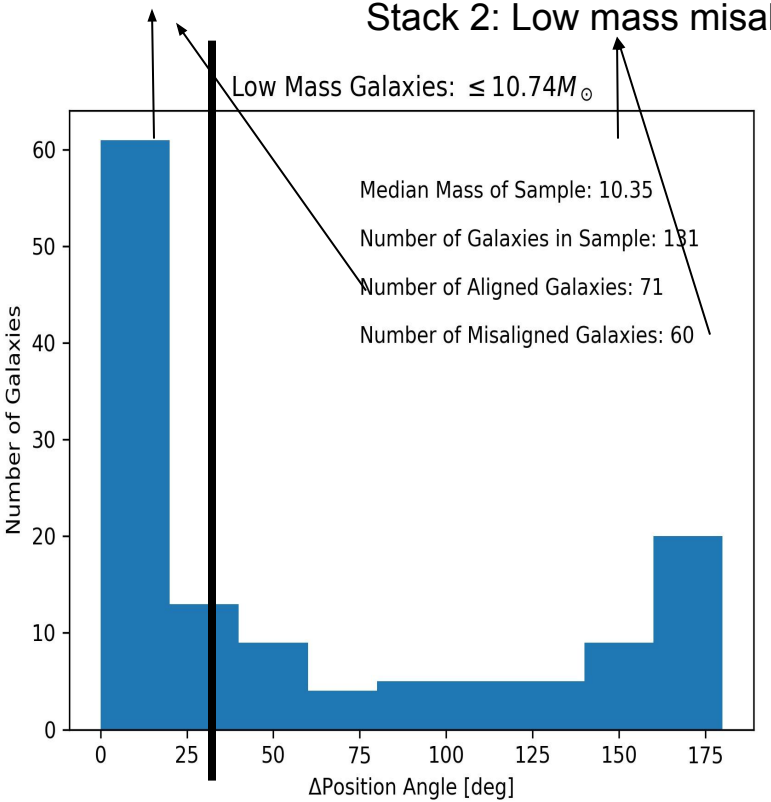
Example of finding position angles for 8 galaxies



Histogram of difference in position angle

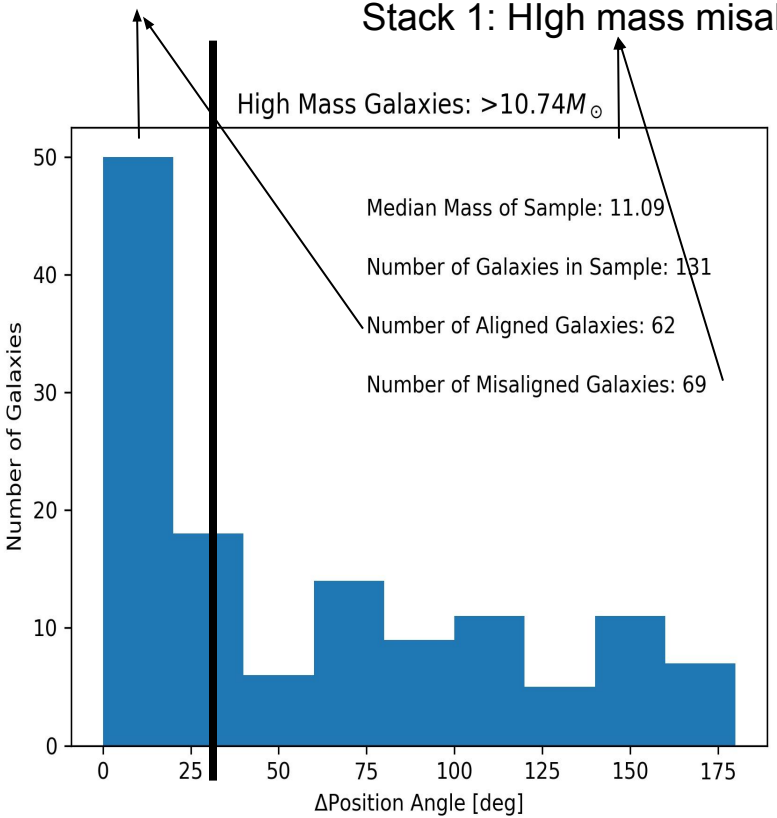
Stack 1: Low mass aligned

Stack 2: Low mass misaligned



Stack 3: High mass aligned

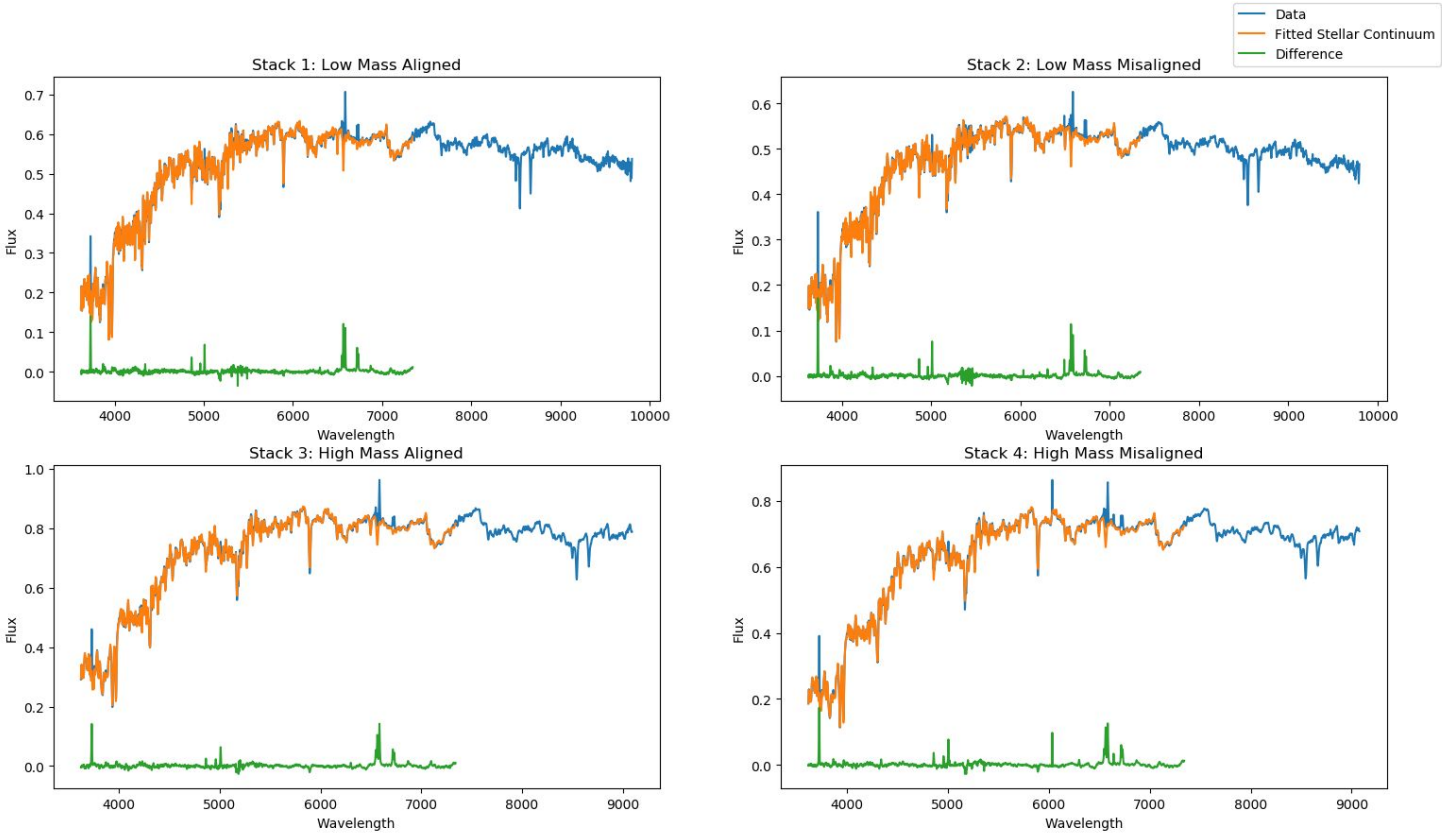
Stack 1: HIgh mass misaligned



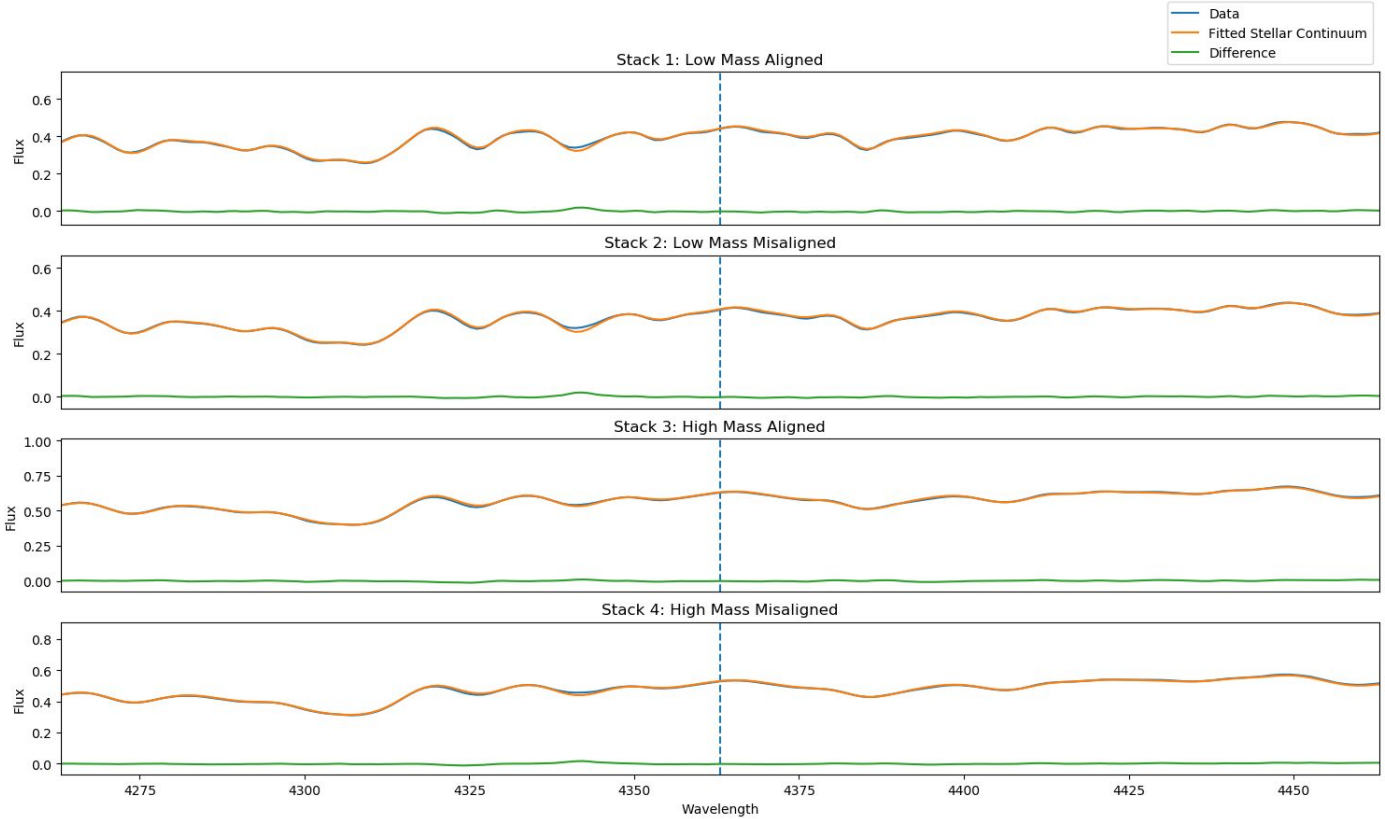
About Stacking

- When stacking, we considered three weighting techniques.
  - Weighting each pixel in the logcube file based on the average Hα flux.
  - Weighting each pixel in the logcube file based on mean g-band signal-to-noise ratio per pixel.
  - No weighting, all pixels treated equally.
- In the next slides, the graphs are shown with no weighting scheme.

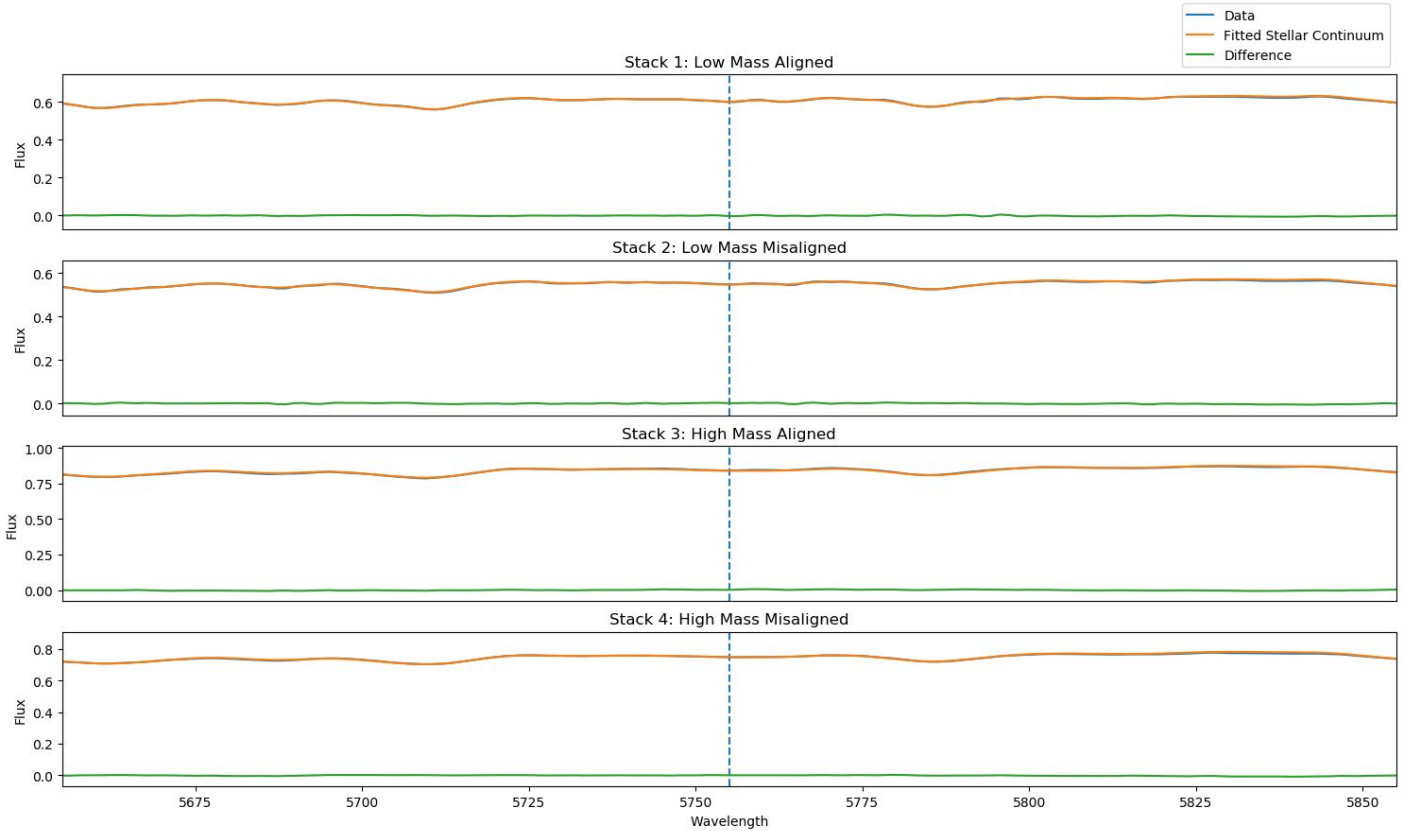
Subtracting fitted stellar continuum from stacks



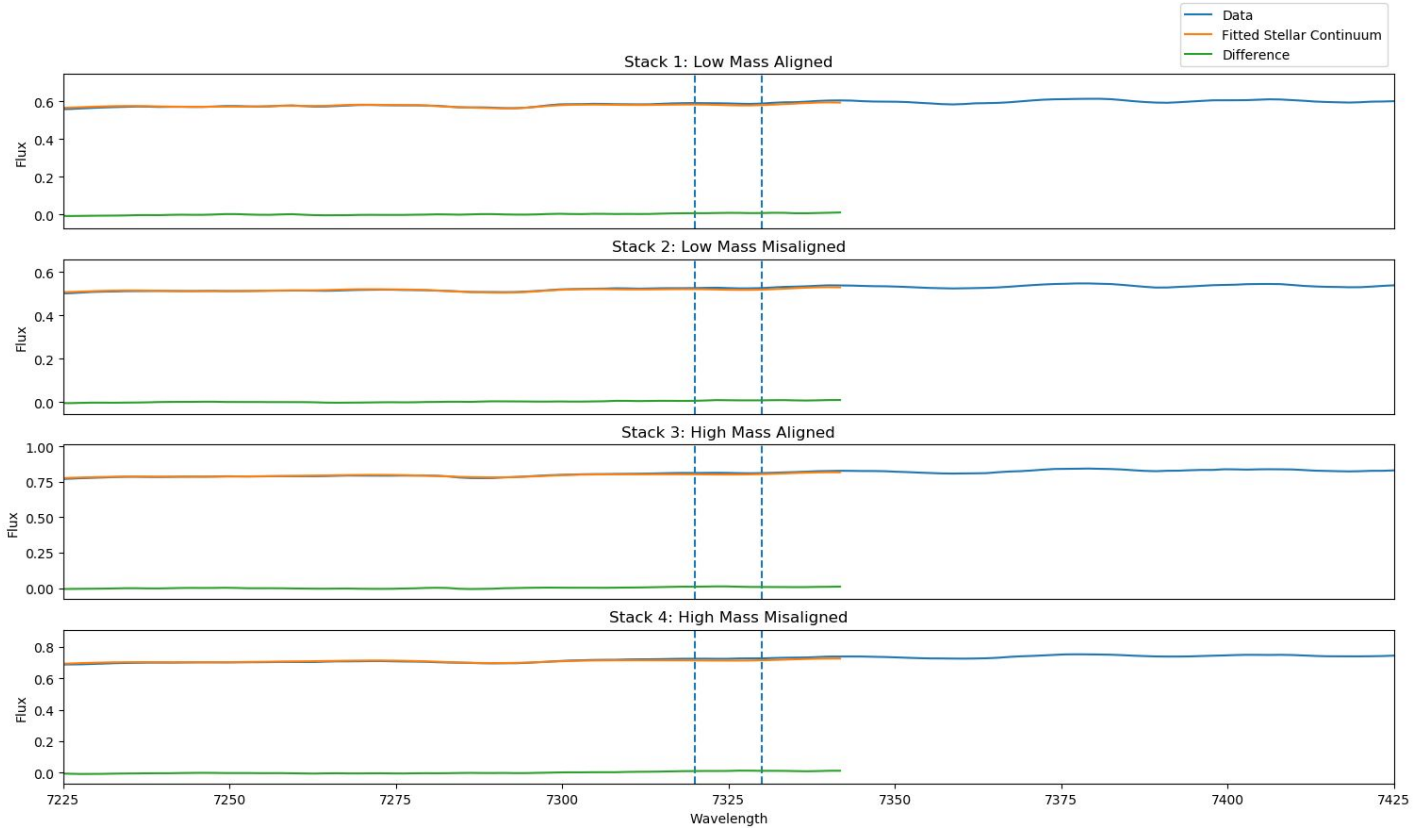
Looking for emission lines: [O III] λ4363



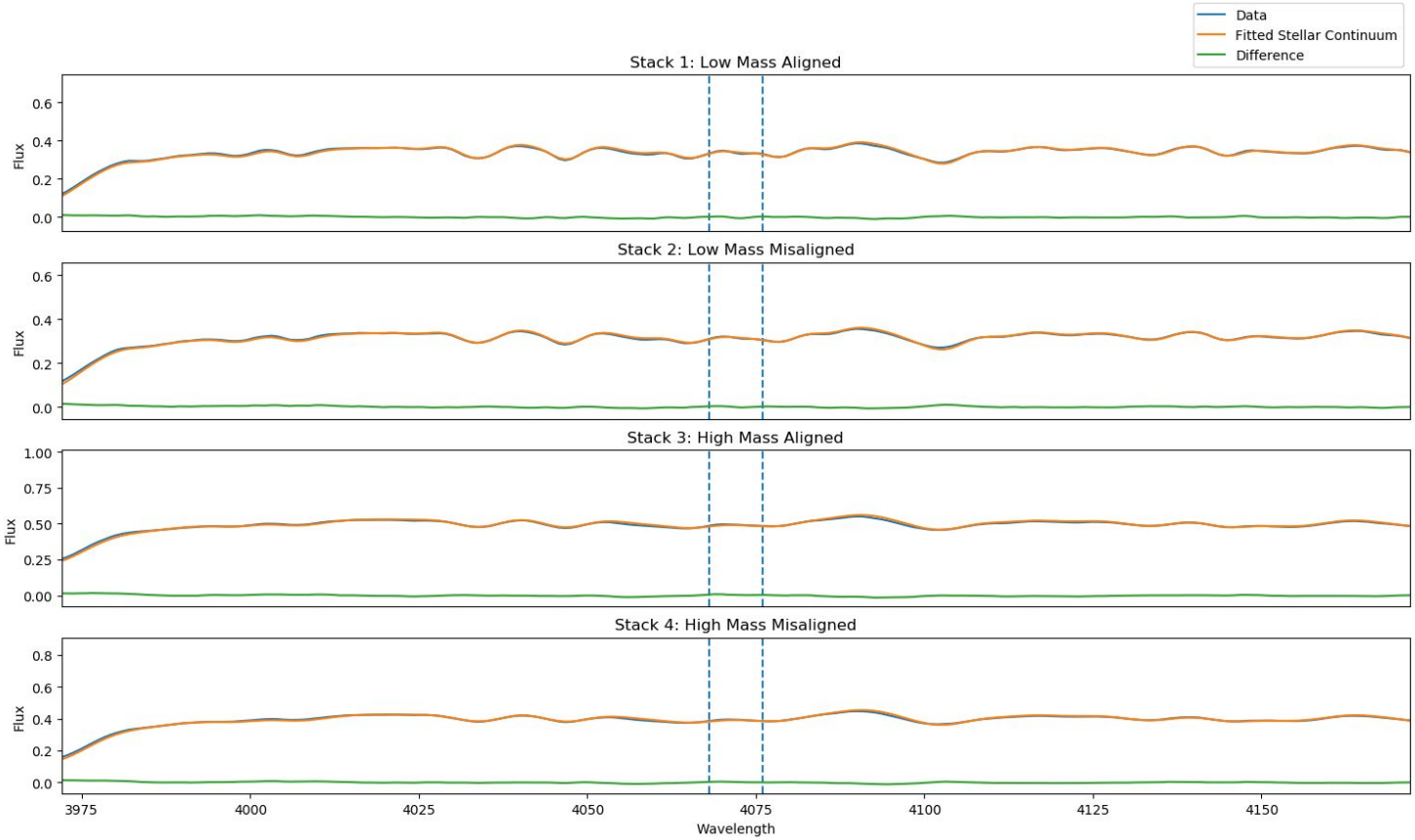
Looking for emission lines: [N II] λ5755



Looking for emission lines: [O II] λλ7320,7330



Looking for emission lines: [S II] λλ4068,4076



Future Steps

As shown in the previous slides, we found no signs of the emission lines we were looking for. However this may be due to a bad fit for the stellar continuum.

So far we have fit using the MILESHC and BC03 stellar libraries.Using a catalogue of MaNGA galaxies with no emission lines, we could create a different stellar template to fit our stacks to. This will increase the quality of our fit and thus giving us higher quality emission line readings.

Once the above is finished, we can take a second look at the three weighting schemes to see if there is an optimal one.