The spectrum of a galaxy at $z = 4.991$

In this exercise we will plot the absorption spectrum of the galaxy associated with the γ-ray bursts, GRB 111008A. The spectrum has been taken with the VLT X-shooter spectrograph. The following data and model files are available for you:

VIS.txt The observed spectrum for the visual wavelengths. Column 1 is wavelength in Å and column 2 is flux in erg cm^{-2} s^{-1} Å^{-1} (in all the below data files wavelength and flux is column 1 and 2, respectively).

NIR.txt The observed spectrum for the Near-infrared wavelengths.

Continuum.txt A file containing a fit to the continuum of the spectrum.

VIS130512Model.txt A model of the absorption line spectrum for the visual wavelengths

NIR130512Model.txt A model of the absorption line spectrum for the Near-infrared wavelengths

- Read in the above data in Python (with numpy.loadtxt) and create a plot (with matplotlib). Make the VIS and NIR spectrum blue and red, respectively, make the continuum black, and the models grey.

The spectrum reveals absorption lines for the following ions (the rest wavelengths of the absoption lines are written).

S II at $\lambda = 1253.8110$ Å
Ni II at $\lambda = 1370.1320$ Å
SiII II at $\lambda = 1526.7066$ Å
FeII II at $\lambda = 1608.4511$ Å and $\lambda = 1611.2005$ Å
Si II at $\lambda = 1808.0126$ Å
CrII II at $\lambda = 2056.2540$ Å
ZnII II at $\lambda = 2062.6640$ Å

The observed wavelength of each ion is $(z + 1)$ times the rest wavelength.

- Create a figure with 7 panels showing (λ,flux) for the above ions. The figure should look like Fig. 2 from `https://arxiv.org/abs/1309.2940`.

Hint: Use plt.subplot to create a multi-panel figure.