20250507 ppxf stellar

1. Data

I am still using IC3392

```
Cube dimensions  →  nz = 3761,  ny = 438,  nx = 437
```

2. Wavelength cutoff and velocity scale

"Sky subtraction is clearly not perfect, but the best that we can do for the moment. Below 7000 Å it is generally acceptable, at longer wavelengths the situation is worse."

So I make a cutoff at $7000Å$. Actually, now it remains $4750 - 7000Å$.

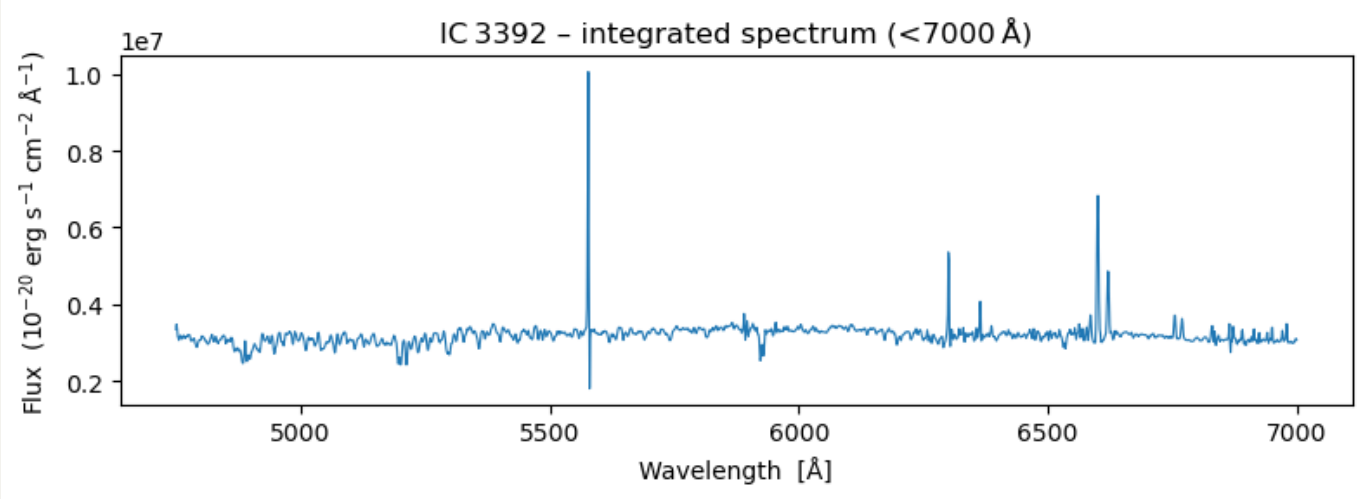
```
After λ-cut (<=7000 Å)  →  nz = 1800
```

Then I compute the velocity scale:

```
c_kms    = c.c.to(u.km/u.s).value        # 299 792.458
dlnλ     = np.diff(np.log(lam_ang))  # dlnλ in Å
velscale = np.min(c_kms * dlnλ) # km/s per pixel
```

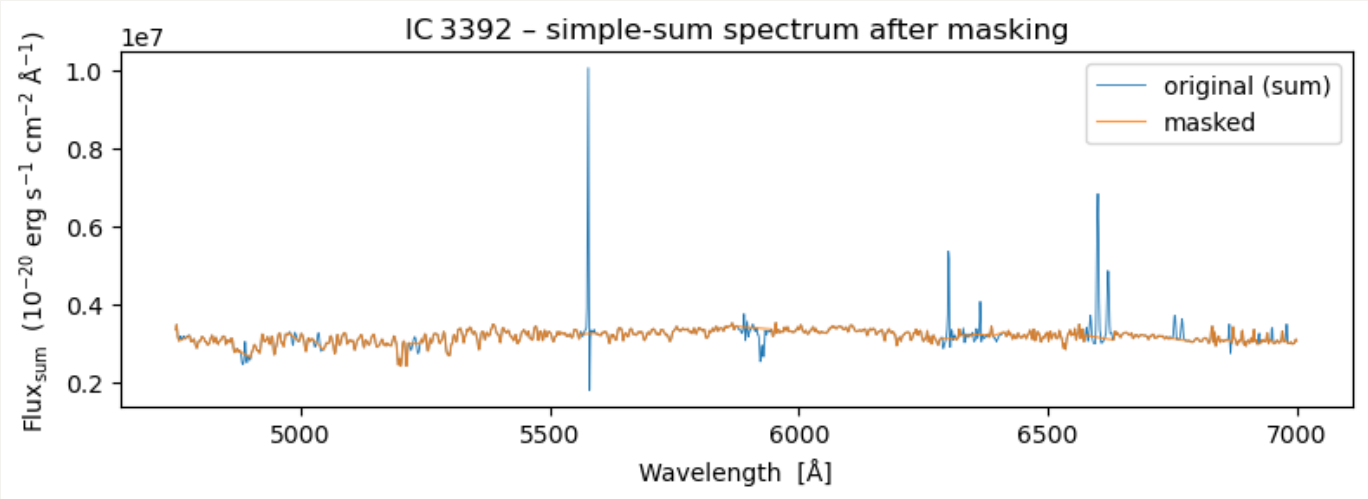
This gives $53.55 km/s$. Ok, but I still have questions, why choose the minmum one, why not using the one return by `log_rebin` below, and what exactly is the meaning of velocity scale?

Here is the native spectrum:



3. Mask emission lines

Since we are only interested in the continuum, I remove the emission lines from galaxy and air:

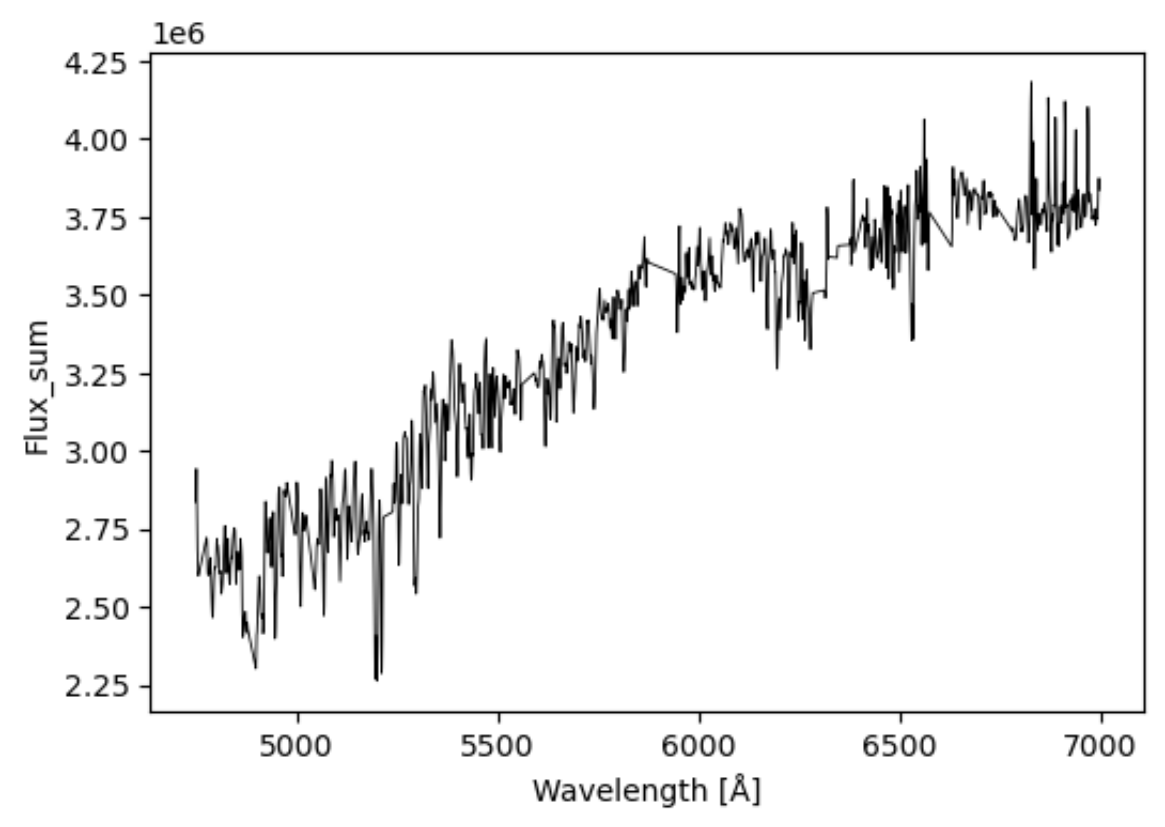


4. `log_rebin`

Now I need to do `log_rebin`. It seems that this is one of the requirements in `pPXF`. But the question is that, why in natual log rather than $\log_{10}$ (same question for `velscale`)? No need to multiply an extra constant when taking derivative?

I still do `log_rebin` anyway for both flux and noise, and I force `velscale=velscale`, so I got:

```
Log-grid length : 2171 pixels
velscale        : 53.549 km/s
```



5. SPS templates: E-MILES

Then I load the SPS templates. Here I choose `spectra_emiles_9.0.npz` because it seems to be more suitable for IFS data.

E-MILES SPS model templates: Vazdekis et al. (2016).

6. FWHM and MUSE LSF

I am still confused starting from here.

`pPXF` requires thestellar templates and the galaxy spectrum to have the same instrumental resolution before it adds any extra broadening for the LOSVD. And I think this resolution is related to FWHM of the instrument LSF?

Emsellem+2022 use this equation for MUSE LSF:

$$FWHM\left(\lambda\left[\mathring{A}\right]\right) = 5.866 \times 10^{-8}\lambda^2 - 9.187 \times 10^{-4}\lambda + 6.040.$$

But then?

Convolve the SPS templates to MUSE resolution? To boarden them to avoid sharpening the spectrum in fitting?

Technically, I am not sure what to do with this.

After that I can `log_rebin` the template and ready for `pPXF` fitting.