example_run_starlight_and_ifscube

October 30, 2025

1 Running Starlight and IFSCube

This notebook was created as a **step-by-step example** of how to run a full workflow using STARLIGHT and IFSCube.
The goal is to demonstrate, in a reproducible way, how to load input data, perform spectral fitting, and visualize the results.

The workflow covered here includes: 1. Preparing the input spectra. 2. Running STARLIGHT for stellar population synthesis and spectral fitting. 3. Processing the results with IFSCube. 4. Visualizing the results.

This notebook is intended both as a **hands-on tutorial** and as a **quick reference** for future projects.

[1]:
```
import os
import subprocess
import numpy as np
import pandas as pd
from pathlib import Path
from spectools import specutils,spectrum_io
import matplotlib.pyplot as plt


# Define your own figure configuration here
font = 12
plt.rcParams.update({
    'font.family': 'DejaVu Sans',  # ou Helvetica se estiver instalada
    'text.usetex': True,
    'font.size': font,
    'axes.titlesize': font,
    'axes.labelsize': font,
    'xtick.labelsize': font,
    'ytick.labelsize': font,
    'legend.fontsize': font,
    'figure.titlesize': font,
    'font.sans-serif': ['Helvetica']
})
```

Defining all the workflow directories:

[2]:
```
base_dir = Path.cwd().parent   # pega o diretório onde o notebook está rodando
data_dir = base_dir / "data/A194/"

library_dir = base_dir / "data/STARLIGHTv04/CB19CSFBasesDir/"
mask_dir = base_dir / "data/STARLIGHTv04/"
starlight_dir = base_dir / "data/STARLIGHTv04/"
```

Generating a list of all spectra in '.txt' format in **data_dir** that will be processed with Starlight.

[3]:
```
galaxies  = [f for f in os.listdir(data_dir) if '.txt' in f]
```

1.1 Creating the input file for Starlight fitting

Starlight only runs inside the STARLIGHTv04 directory, where the executable is located.

That's why the **data_directory** needs to be defined in that way. Inside the next step, where you actually run Starlight, the running occours inside the **starlight_dir** defined above.

[4]:
```
conf_file = specutils.create_starlight_input_file(
    data_directory = './../A194/',
    list_galaxies = galaxies,
    n_files = 3,
    library = 'CB19_16x5')

conf_path = mask_dir / "config.in"

with open(conf_path, "w") as f:
    f.write(conf_file)
```

1.2 Running Starlight...

[5]:
```
specutils.run_starlight(starlight_dir)
```

```
**> Welcome to STARLIGHT (v04) & good luck with this run!

**> Read config file: StCv04.C11.config
**> Read data file: spec-1079-52621-0424.txt
    from dir = ./CB19CSFB
    Data goes from:   3734.0  -->   9049.0 Angs with N =  5316 pixels
**> ATT: Defined error & flag spectra the old way! S/N =   11.145
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
????????????????????????????????????????????????????????????????????????????????
OOPS! You have specified i_FastBC03_FLAG = 1 (in arq_config) but the file:
./CB19CSFBasesDir/cb19_xmilesi_z004_chab_CSF01.16.man.spec
does NOT match the lambdas of BC03/STELIB!! Reverting to i_FastBC03_FLAG = 0!
????????????????????????????????????????????????????????????????????????????????
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
```

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[ReadSpecWithHeader] BUG! N > Nl_max!!  14000
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  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
**> Read base files: CBASE.PARSEC.chab.16x5.all                    N_base  =  80
    from dir = ./CB19CSFBasesDir/
**> Read masks file: mask_sdss.gm                                  N_masks =  24
    from dir = ./
**> Modeling spec-1079-52621-0424.txt       ==> spec-1079-52621-0424_CB19_16x5
    Sampling: 3569.0 ==> 9650.0  with dl =   1.0 Angs  & fscale_chi2 = 1.000E+00
    dl_cushion (A) =   50.0
    Extinction Law = CCM
    Initial kinematical parameters: v0 =    0.0 & vd =  150.0 km/s
    We are going to FIT the spectrum of this galaxy
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@> BASE LIMITS WARNING <@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@ Your base goes from lambda =       5.6 to    8750.6 Angs
@ but the fit will run from       3519.0 to    9700.0 Angs
@ (including a +/- 50.0 Angs cushion for the kinematical filter)
@ STARLIGHT will flag-out lambdas outside the      55.6 to    8700.6 Angs range!
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
    Number of components with different extinction =   0  ( 0.00 < YAV <  0.00)
    S/N     =   11.145    10.443     in S/N & norm. windows
```

```
    S/N_err =   11.145    10.443     in S/N & norm. windows
********************************************************************************
* STARTING FIRST FITS …
* N_loops  =   3
* N_chains =   7
* Temp     = 1.00E+02 ==> 1.00E+00
* GR-R     = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING RE-FIT AFTER CLIPING …
* Cliped    96 points with > 4.0 sigma residuals with method = NSIGMA
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING FINAL BURN-IN LOOP…
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.20E+00 ==> 1.20E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING EX0s FITS …
* EX0_method     =   CUMUL
* EX0s_Threshold =   0.020
* EX0s_PopVector =     MIN
* N_loops =   5
* Temp    = 1.00E+00 ==> 1.00E-03
* GR-R    = 1.20E+00 ==> 1.00E+00  Method =  1  (0/1=Soft/Hard)
********************************************************************************

**> RESULTS for spec-1079-52621-0424_CB19_16x5
   N_tot chi2/Nl_eff    adev |     v0    vd | sum       A_V  Y_AV |     x_j…
[%], j = 1 … 80
 1049440 1.3307E+00   9.4883 |   91.9  75.0 | 101.376  0.28  0.00 |    0.00
32.09   0.00   2.21   0.00   0.00   0.00   6.47   0.00   0.00
                                                                      4.96
18.57  12.90   2.56   1.65   0.00   0.00   0.00   0.00   0.00
                                                                      0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                      0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                      0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                      0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                      0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
```

```
                                                                                    0.00
0.00  14.88   5.06   0.00   0.00   0.00   0.00   0.00   0.00

                                                                                  Total chi2
=   5.9946E+03  for Nl_eff =  4505 lambdas!

*CidTIME>  FF=        9   RF=        2   BI=        4   EX0=        1   ALL=
34   sec - fit = spec-1079-52621-0424_CB19_16x5
*TotTIME>  FF=    8.571   RF=    2.248   BI=    3.666   EX0=    1.186   ALL=
34.340   sec - fit = spec-1079-52621-0424_CB19_16x5
*UsrTIME>  FF=    8.568   RF=    2.248   BI=    3.666   EX0=    1.185   ALL=
34.316   sec - fit = spec-1079-52621-0424_CB19_16x5
*SysTIME>  FF=    0.003   RF=    0.000   BI=    0.000   EX0=    0.001   ALL=
0.024   sec - fit = spec-1079-52621-0424_CB19_16x5


**> Welcome to STARLIGHT (v04) & good luck with this run!

**> Read config file: StCv04.C11.config
**> Read data file: spec-f2ace614-8708-11ef-b7bb-5
    from dir = ./CB19CSFB
    Data goes from:   3534.0  -->   9641.0 Angs with N =  6108 pixels
**> ATT: Defined error & flag spectra the old way! S/N =    6.397
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
????????????????????????????????????????????????????????????????????????????????
OOPS! You have specified i_FastBC03_FLAG = 1 (in arq_config) but the file:
./CB19CSFBasesDir/cb19_xmilesi_z004_chab_CSF01.16.man.spec
does NOT match the lambdas of BC03/STELIB!! Reverting to i_FastBC03_FLAG = 0!
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  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
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  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
**> Read base files: CBASE.PARSEC.chab.16x5.all                    N_base  =  80
    from dir = ./CB19CSFBasesDir/
**> Read masks file: mask_sdss.gm                                  N_masks =  24
    from dir = ./
**> Modeling spec-f2ace614-8708-11ef-b7bb-5 ==>
spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5
    Sampling: 3569.0 ==> 9650.0  with dl =   1.0 Angs  & fscale_chi2 = 1.000E+00
    dl_cushion (A) =   50.0
    Extinction Law = CCM
    Initial kinematical parameters: v0 =    0.0 & vd =  150.0 km/s
    We are going to FIT the spectrum of this galaxy
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@> BASE LIMITS WARNING <@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@ Your base goes from lambda =       5.6 to    8750.6 Angs
@ but the fit will run from       3519.0 to    9700.0 Angs
@ (including a +/- 50.0 Angs cushion for the kinematical filter)
@ STARLIGHT will flag-out lambdas outside the      55.6 to    8700.6 Angs range!
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
    Number of components with different extinction =   0  ( 0.00 < YAV <  0.00)
    S/N     =    6.397     6.380     in S/N & norm. windows
    S/N_err =    6.397     6.380     in S/N & norm. windows
********************************************************************************
* STARTING FIRST FITS …
* N_loops  =   3
* N_chains =   7
* Temp     = 1.00E+02 ==> 1.00E+00
* GR-R     = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING RE-FIT AFTER CLIPING …
* Cliped    71 points with > 4.0 sigma residuals with method = NSIGMA
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING FINAL BURN-IN LOOP…
```

```
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.20E+00 ==> 1.20E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING EX0s FITS …
* EX0_method     =   CUMUL
* EX0s_Threshold =   0.020
* EX0s_PopVector =     MIN
* N_loops =   5
* Temp    = 1.00E+00 ==> 1.00E-03
* GR-R    = 1.20E+00 ==> 1.00E+00  Method =  1  (0/1=Soft/Hard)
********************************************************************************

**> RESULTS for spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5
   N_tot chi2/Nl_eff    adev |     v0    vd | sum       A_V  Y_AV |     x_j…
[%], j = 1 … 80
 1257340 9.6491E-01  11.9768 |   99.3  23.5 |  98.121  0.41  0.00 |    0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                    0.00
1.49   0.00   0.00   4.81   9.37   0.00   0.00   7.52   0.00
                                                                    0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                    0.00
0.00   0.00  26.69   0.00   0.00   0.00   0.00   0.00  36.00
                                                                    0.00
0.00   0.00   0.00   0.00   0.11   0.00   0.00   0.00   0.00
                                                                    0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   5.62
                                                                    0.00
0.06   0.01   0.00   1.34   0.00   0.00   0.00   0.00   0.00
                                                                    0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   5.08   0.00

                                                                 Total chi2
=   4.5013E+03  for Nl_eff =  4665 lambdas!

*CidTIME>  FF=        8   RF=        3   BI=        3   EX0=        2   ALL=
35   sec - fit = spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5
*TotTIME>  FF=    7.743   RF=    3.425   BI=    3.239   EX0=    2.008   ALL=
35.024   sec - fit = spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5
*UsrTIME>  FF=    7.743   RF=    3.425   BI=    3.238   EX0=    2.008   ALL=
35.011   sec - fit = spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5
*SysTIME>  FF=    0.000   RF=    0.000   BI=    0.001   EX0=    0.000   ALL=
0.013   sec - fit = spec-f2ace614-8708-11ef-b7bb-525400f334e1_CB19_16x5


**> Welcome to STARLIGHT (v04) & good luck with this run!
```

```
**> Read config file: StCv04.C11.config
**> Read data file: spec-1497-52886-0498.txt
    from dir = ./CB19CSFB
    Data goes from:   3736.0  -->   9041.0 Angs with N =  5306 pixels
**> ATT: Defined error & flag spectra the old way! S/N =    8.809
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
????????????????????????????????????????????????????????????????????????????????
OOPS! You have specified i_FastBC03_FLAG = 1 (in arq_config) but the file:
./CB19CSFBasesDir/cb19_xmilesi_z004_chab_CSF01.16.man.spec
does NOT match the lambdas of BC03/STELIB!! Reverting to i_FastBC03_FLAG = 0!
????????????????????????????????????????????????????????????????????????????????
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
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  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
  [ReadSpecWithHeader] BUG! N > Nl_max!!  14000
**> Read base files: CBASE.PARSEC.chab.16x5.all                   N_base  =  80
    from dir = ./CB19CSFBasesDir/
**> Read masks file: mask_sdss.gm                                 N_masks =  24
    from dir = ./
**> Modeling spec-1497-52886-0498.txt       ==> spec-1497-52886-0498_CB19_16x5
```

```
    Sampling: 3569.0 ==> 9650.0  with dl =   1.0 Angs  & fscale_chi2 = 1.000E+00
    dl_cushion (A) =   50.0
    Extinction Law = CCM
    Initial kinematical parameters: v0 =    0.0 & vd =  150.0 km/s
    We are going to FIT the spectrum of this galaxy
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@> BASE LIMITS WARNING <@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@ Your base goes from lambda =       5.6 to    8750.6 Angs
@ but the fit will run from       3519.0 to    9700.0 Angs
@ (including a +/- 50.0 Angs cushion for the kinematical filter)
@ STARLIGHT will flag-out lambdas outside the      55.6 to    8700.6 Angs range!
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
    Number of components with different extinction =   0  ( 0.00 < YAV <  0.00)
    S/N     =    8.809     7.979     in S/N & norm. windows
    S/N_err =    8.809     7.979     in S/N & norm. windows
********************************************************************************
* STARTING FIRST FITS …
* N_loops  =   3
* N_chains =   7
* Temp     = 1.00E+02 ==> 1.00E+00
* GR-R     = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING RE-FIT AFTER CLIPING …
* Cliped    25 points with > 4.0 sigma residuals with method = NSIGMA
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.30E+00 ==> 1.30E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING FINAL BURN-IN LOOP…
* N_loops =   1
* Temp    = 1.00E+00 ==> 1.00E+00
* GR-R    = 1.20E+00 ==> 1.20E+00  Method =  0  (0/1=Soft/Hard)
********************************************************************************
********************************************************************************
* STARTING EX0s FITS …
* EX0_method     =   CUMUL
* EX0s_Threshold =   0.020
* EX0s_PopVector =     MIN
* N_loops =   5
* Temp    = 1.00E+00 ==> 1.00E-03
* GR-R    = 1.20E+00 ==> 1.00E+00  Method =  1  (0/1=Soft/Hard)
********************************************************************************

**> RESULTS for spec-1497-52886-0498_CB19_16x5
   N_tot chi2/Nl_eff    adev |     v0    vd | sum       A_V  Y_AV |     x_j…
[%], j = 1 … 80
 1532650 6.7415E-01   8.6266 |   58.6  69.0 |  96.078 -0.06  0.00 |    5.78
```

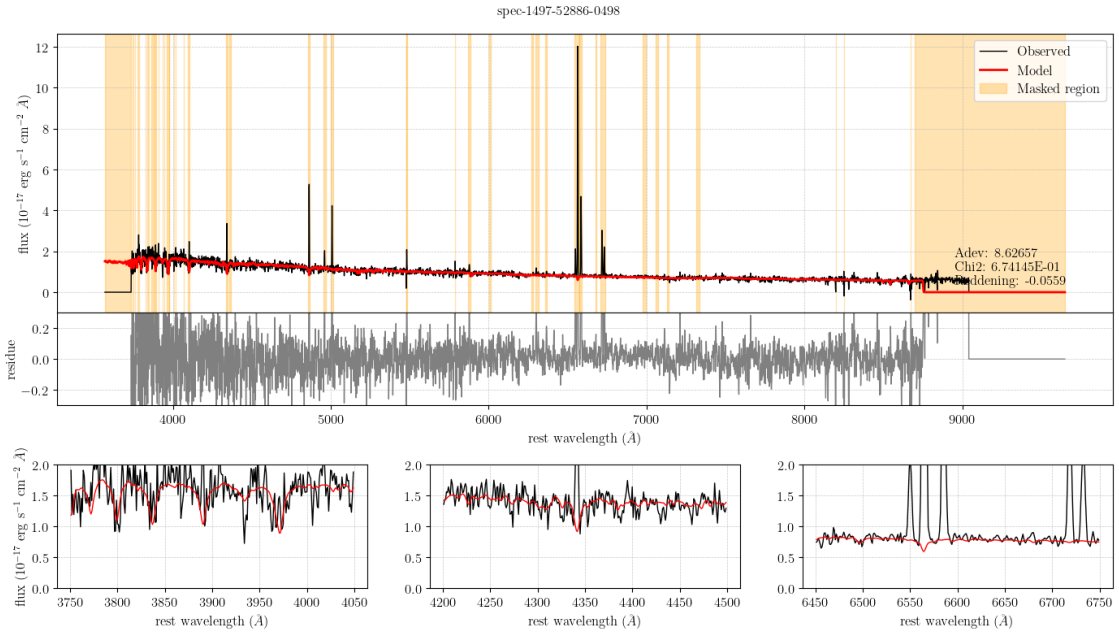
```
0.00   2.93   1.59   0.00   0.00   0.00   0.00   0.00   0.00
                                                                0.02
4.70   5.86   6.28   8.66   0.00   3.30   0.00  15.55   1.77
                                                                0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                0.00
0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                0.00
1.97   8.35   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                                                                0.00
0.00   0.00   0.00   8.71   0.00   0.00   0.00   0.01   0.00
                                                                0.00
0.00   0.00   0.00   0.00   0.00   0.00   6.76   0.00  13.86

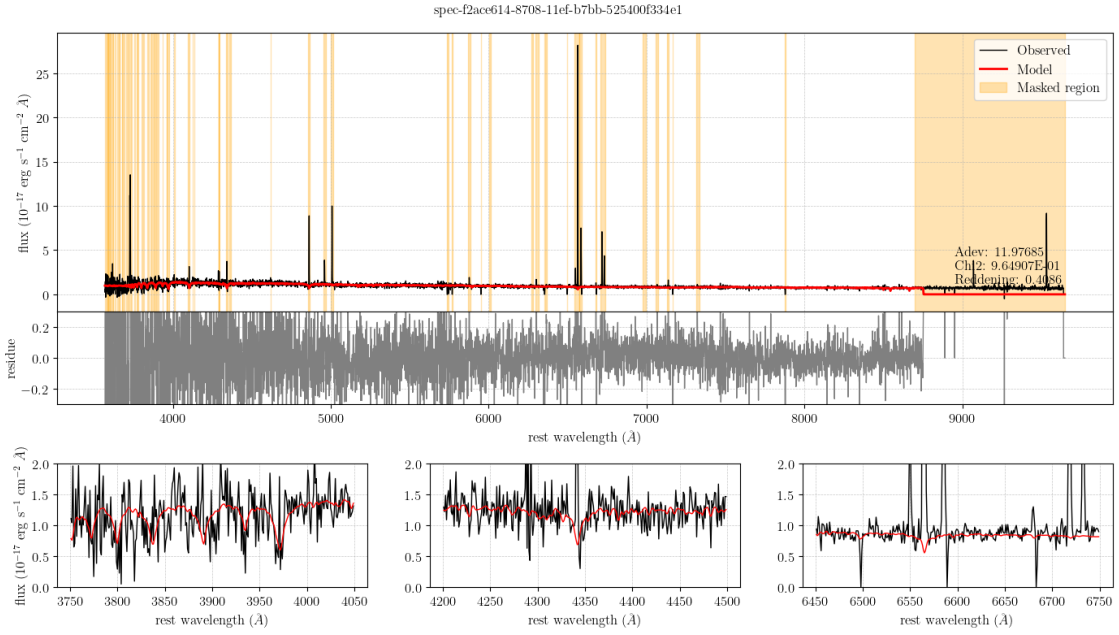
                                                              Total chi2
=   3.0876E+03  for Nl_eff =  4580 lambdas!

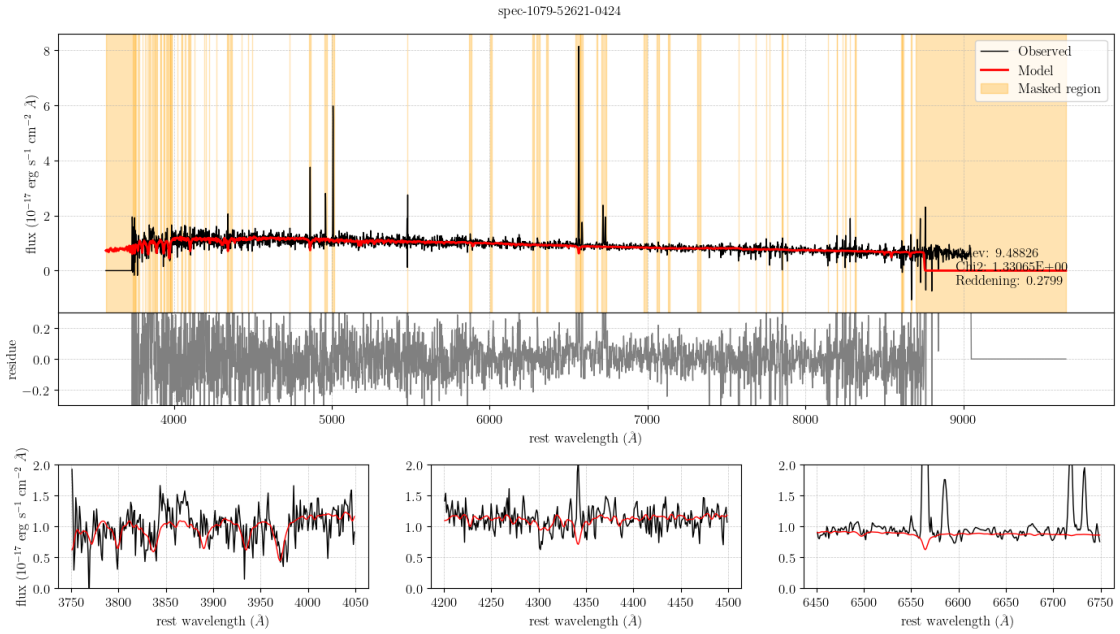
*CidTIME>  FF=        7   RF=        3   BI=        3   EXO=        2   ALL=
34   sec - fit = spec-1497-52886-0498_CB19_16x5
*TotTIME>  FF=    7.471   RF=    2.442   BI=    2.886   EXO=    2.416   ALL=
33.593   sec - fit = spec-1497-52886-0498_CB19_16x5
*UsrTIME>  FF=    7.471   RF=    2.442   BI=    2.886   EXO=    2.414   ALL=
33.583   sec - fit = spec-1497-52886-0498_CB19_16x5
*SysTIME>  FF=    0.000   RF=    0.000   BI=    0.000   EXO=    0.002   ALL=
0.010   sec - fit = spec-1497-52886-0498_CB19_16x5
```

Once Starlight has run, we need to create the ".fits" file for IFSCube fitting and generate output spectra images to inspect the quality of the fit.

[6]:
```python
# After running Starlight, read the output files and saving into a list
files = [f for f in os.listdir(data_dir) if os.path.isfile(os.path.
 ↪join(data_dir, f)) and  '.' not in f]
starlight_output = specutils.read_starlight_output(files,␣
 ↪filepath=str(data_dir) + '/')

for galaxy, data in starlight_output.items():
    fig = specutils.plot_starlight_spectrum(data)
    fig.suptitle(f'{galaxy}')
    fig.tight_layout()
    fig.savefig(data_dir / f"{galaxy}_starlight.png")
    plt.show(fig)
    plt.close(fig)

    new_fits = specutils.create_new_fits_from_starlight(data)
    new_fits.writeto(data_dir / f'{galaxy}_starlight.fits', overwrite=True)
```


spec-1497-52886-0498
Observed
Model
Masked region
Adev: 8.62657
Chi2: 6.74145E-01
Reddening: -0.0559
flux (10^{-17} erg s^{-1} cm^{-2} Å)
residue
rest wavelength (Å)


spec-f2ace614-8708-11ef-b7bb-525400f334e1
Observed
Model
Masked region
Adev: 11.97685
Chi2: 9.64907E-01
Reddening: 0.4086
flux (10^{-17} erg s^{-1} cm^{-2} Å)
residue
rest wavelength (Å)



1.3 Defining IFSCube inputs

If you want to add more emission lines in the fit, you need to add them at the "lines_config" dictionary.

[7]:
```
ifscube_config_file = base_dir / 'data/ifscube_config.cfg'
stdout_ifscube = {} # to save the output log of ifscube runs
velocity = '0, +- 300'
velocity_broad = '0, +- 300'
sigma = '100, 40:400'
sigma_broad = '120, 50:200'
lines_config = {
    "OII_3726": spectrum_io.make_line(3726.032, velocity, sigma),
    "OII_3729": spectrum_io.make_line(3728.815, velocity, sigma),
    "OIII_4363": spectrum_io.make_line(4363.210, velocity, sigma),
    "Hb_4861": spectrum_io.make_line(4861.325, velocity, sigma),
    "OIII_5007": spectrum_io.make_line(5006.84, velocity, sigma, k_group=0),
    "OIII_4959": spectrum_io.make_line(4958.91, velocity, sigma,
                          amplitude="peak, 0:, OIII_5007.amplitude / 2.98",␣
 ↪k_group=0),
    "OI_6300": spectrum_io.make_line(6300.304, velocity, sigma),
    "Ha_6563": spectrum_io.make_line(6562.80, velocity, sigma),
    "NII_6583": spectrum_io.make_line(6583.46, velocity, sigma, k_group=12),
    "NII_6548": spectrum_io.make_line(6548.04,
                         amplitude="peak, 0:, NII_6583.amplitude / 3.06",␣
 ↪k_group=12),
```

```
    "SII_6716": spectrum_io.make_line(6716.44, velocity, sigma, k_group=13),
    "SII_6731": spectrum_io.make_line(6730.82, amplitude="peak, 0:",␣
 ↪k_group=13),
}
```

1.4 Running IFSCube

Before running IFSCube, we check if the galaxy has emission lines detected.

-> How we do that?

We define as detected the emission line that has the amplitude greater than 3 times the standard desviation of the continuum next to the line.

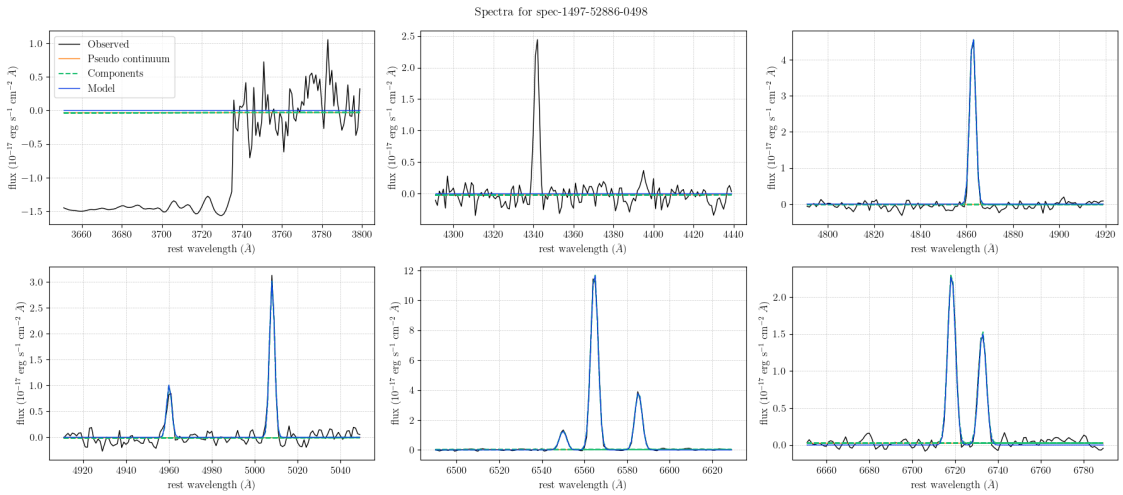
[8]:
```
ifscube_output_files = [f for f in os.listdir(data_dir) if f.
 ↪endswith('_starlight.fits')]

for file in ifscube_output_files:
    galaxy = os.path.splitext(file)[0]
    print(f' -> Checking if galaxy {galaxy} has detected emission lines... \n')
    do_fit = spectrum_io.select_do_fit(data_dir/file, value=3)
    if do_fit == True:
        out_image = data_dir / f'{galaxy}_g.fits'
        config = spectrum_io.
 ↪generate_ifscube_configuration_file(continuum_degree=1, lines=lines_config,␣
 ↪out_image=out_image)
        # print(config)

        with open(ifscube_config_file, "w") as f:
            f.write(config)

        output = subprocess.run(["specfit", "-oc", ifscube_config_file,␣
 ↪data_dir/file], check=True, text=True)
        stdout_ifscube[galaxy] = output.stdout
    else:
        print(f'Skipping galaxy {galaxy}. No emission lines detected.')

    # break
```

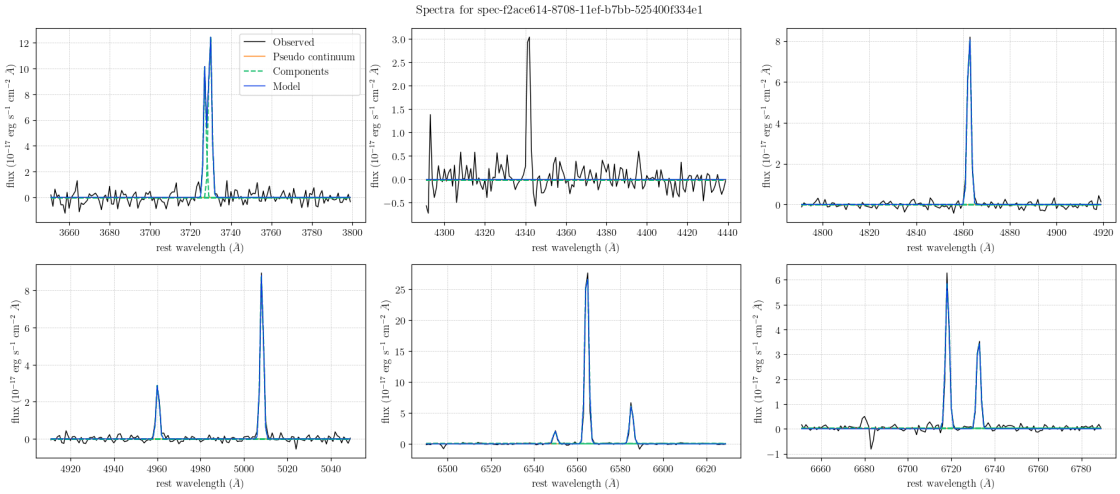
```
 -> Checking if galaxy spec-1497-52886-0498_starlight has detected emission
lines…


/home/kelly/Dropbox/bolsa-FAPESP/github/spectools/.venv/lib/python3.12/site-
packages/ifscube/onedspec.py:109: RuntimeWarning: Wavelength read in meters.
Changing it to Angstroms.
  warnings.warn(message="Wavelength read in meters. Changing it to Angstroms.",
category=RuntimeWarning)
```

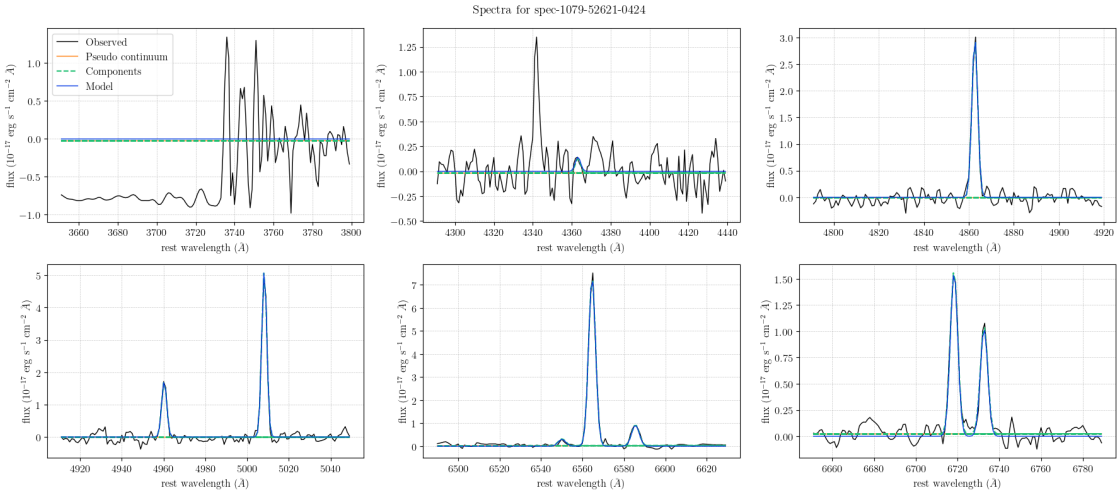
```
 -> Checking if galaxy spec-1079-52621-0424_starlight has detected emission
lines…


/home/kelly/Dropbox/bolsa-FAPESP/github/spectools/.venv/lib/python3.12/site-
packages/ifscube/onedspec.py:109: RuntimeWarning: Wavelength read in meters.
Changing it to Angstroms.
  warnings.warn(message="Wavelength read in meters. Changing it to Angstroms.",
category=RuntimeWarning)

 -> Checking if galaxy spec-f2ace614-8708-11ef-b7bb-525400f334e1_starlight has
detected emission lines…


/home/kelly/Dropbox/bolsa-FAPESP/github/spectools/.venv/lib/python3.12/site-
packages/ifscube/onedspec.py:109: RuntimeWarning: Wavelength read in meters.
Changing it to Angstroms.
  warnings.warn(message="Wavelength read in meters. Changing it to Angstroms.",
category=RuntimeWarning)
```

Plotting the fit…

[ ]:
```
ifscube_fitted_galaxies = [f for f in os.listdir(data_dir) if f.endswith('_g.
  ↪fits')]
for galaxy in ifscube_fitted_galaxies:
    fig = specutils.plot_ifscube_spectra(data_dir, galaxy)
    # plt.close(fig)
```




Spectra for spec-f2ace614-8708-11ef-b7bb-525400f334e1
Observed
Pseudo continuum
Components
Model
flux (10^{-17} erg s^{-1} cm^{-2} $\AA$)
rest wavelength ($\AA$)


Spectra for spec-1079-52621-0424
Observed
Pseudo continuum
Components
Model
flux (10^{-17} erg s^{-1} cm^{-2} $\AA$)
rest wavelength ($\AA$)