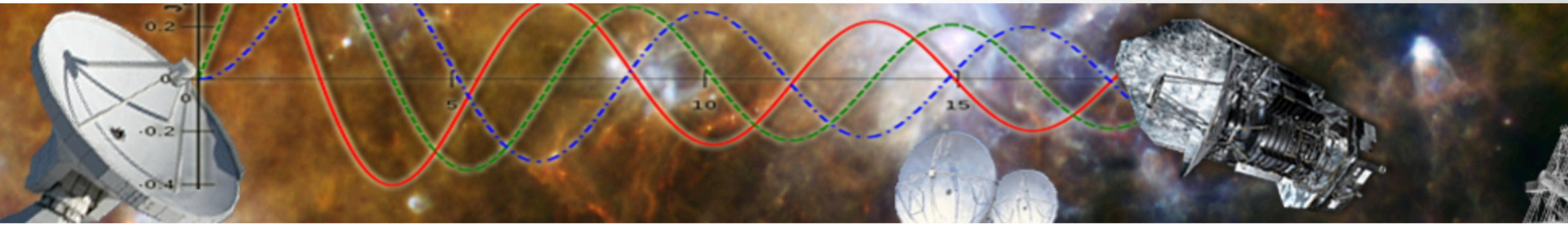
CASSIS
A free interactive spectrum analyser



Introduction to CASSIS

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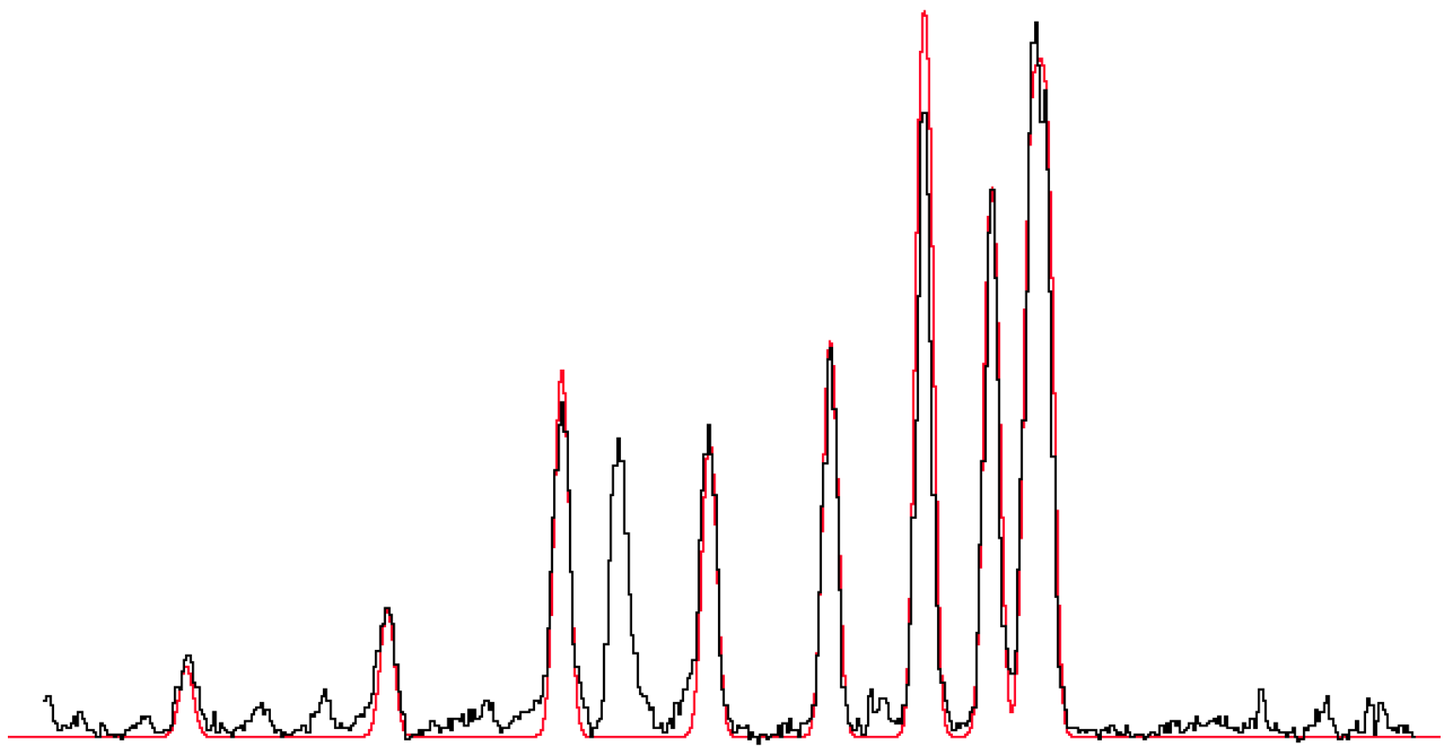
Sterrewacht Leiden



Change From ASCII to CASSIS

to_cassis_from_casaviewer_txt.py

~/Documents/PhD /CASSIS/to_cassis_from_casaviewer_txt.py — write_file

```
1  import numpy as np
2  from astropy.table import Table
3  import astropy.units as u
4  import astropy.constants as c
5  import os
6
7  #TODO identify gaps in the spectra
8
9  ###########################################################################
10 # user parameters
11 # fill in before running script
12
13 path = '/path/to/folder/'
14 file_spectra = 'casaviewer_spectral_profile.txt'
15 # Vlsr of source
16 vlsr = -52 * u.km/u.s
17 # name of output file
18 outfile = 'cassis_spectrum_file.fus'
19
20 ###########################################################################
21 # Reading the text file with the frequency and flux
22 names_spectra = ['freq', 'flux',]
23 units_spectra = [u.GHz, u.Kelvin]
24 def read_data(infile, colnames, colunits):
25     # read table
26     data = Table.read(infile,
27         format='ascii.fast_basic',
28         comment='#',
29         fast_reader={'parallel': True, 'use_fast_converter': True},
30         guess=False,
31         names=colnames,
32         data_start=0,
33         )
```

L: 67 C: 63 Python Unicode (UTF-8) Unix (LF) Saved: 16/11/2018, 14:21:31 2.826 / 351 / 87 100%

- Only need to change name of file and velocity of source

Telescope File

alma_900m

Currently Open Documents

- alma_900m
- to_cassis_from_casaviewer_txt.py

~/Documents/PhD /CASSIS/alma_900m

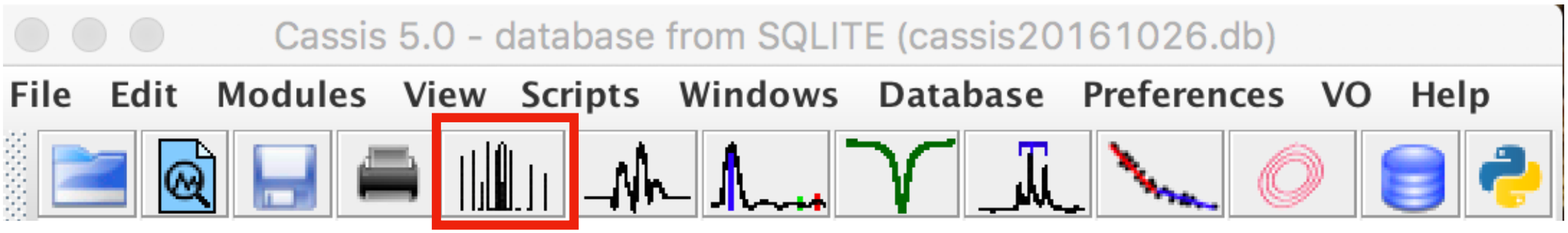
```
// Diameter (m)
900
// Frequency (MHz), Beam efficiency, IF (GHz), LSB gain (%), USB gain (%)
4.5000e+05  1.0000  16.000  1.0000  1.0000
4.5500e+05  1.0000  16.000  1.0000  1.0000
4.6000e+05  1.0000  16.000  1.0000  1.0000
4.6500e+05  1.0000  16.000  1.0000  1.0000
4.7000e+05  1.0000  16.000  1.0000  1.0000
4.7500e+05  1.0000  16.000  1.0000  1.0000
7.2000e+05  1.0000  16.000  1.0000  1.0000
4.8500e+05  1.0000  16.000  1.0000  1.0000
4.9000e+05  1.0000  16.000  1.0000  1.0000
4.9500e+05  1.0000  16.000  1.0000  1.0000
5.0000e+05  1.0000  16.000  1.0000  1.0000
5.0500e+05  1.0000  16.000  1.0000  1.0000
5.1000e+05  1.0000  16.000  1.0000  1.0000
5.1500e+05  1.0000  16.000  1.0000  1.0000
5.2000e+05  1.0000  16.000  1.0000  1.0000
5.2500e+05  1.0000  16.000  1.0000  1.0000
5.3000e+05  1.0000  16.000  1.0000  1.0000
5.3500e+05  1.0000  16.000  1.0000  1.0000
5.4000e+05  1.0000  16.000  1.0000  1.0000
5.4500e+05  1.0000  16.000  1.0000  1.0000
5.5000e+05  1.0000  16.000  1.0000  1.0000
5.5500e+05  1.0000  16.000  1.0000  1.0000
5.6000e+05  1.0000  16.000  1.0000  1.0000
5.6500e+05  1.0000  16.000  1.0000  1.0000
5.7000e+05  1.0000  16.000  1.0000  1.0000
5.7500e+05  1.0000  16.000  1.0000  1.0000
5.8000e+05  1.0000  16.000  1.0000  1.0000
5.8500e+05  1.0000  16.000  1.0000  1.0000
5.9000e+05  1.0000  16.000  1.0000  1.0000
5.9500e+05  1.0000  16.000  1.0000  1.0000
```

L: 68 C: 19 (none) Unicode (UTF-8) Unix (LF) Saved: 05/09/2017, 09:41:30 13.338 / 3.324 / 305 100%

- Needs to be made yourself in accordance with your observations

Open CASSIS

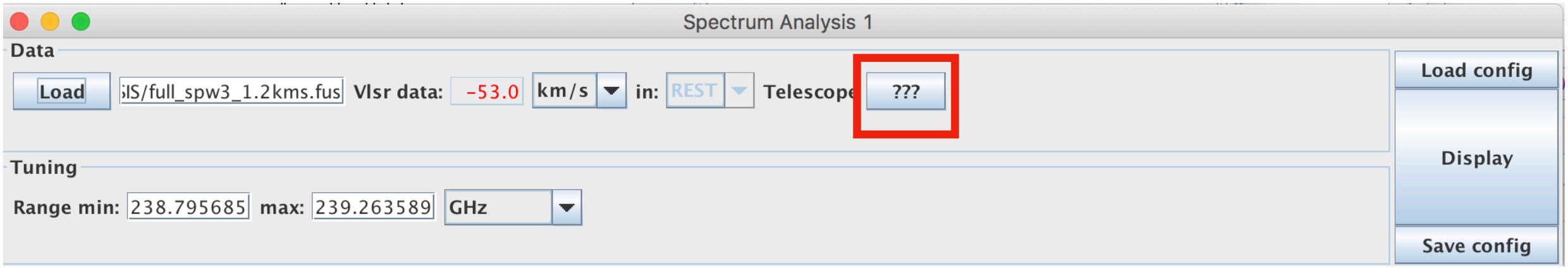
- In terminal run: cassis 2048 &
- Then open spectra with ‘Spectrum Analysis’



Load Spectrum

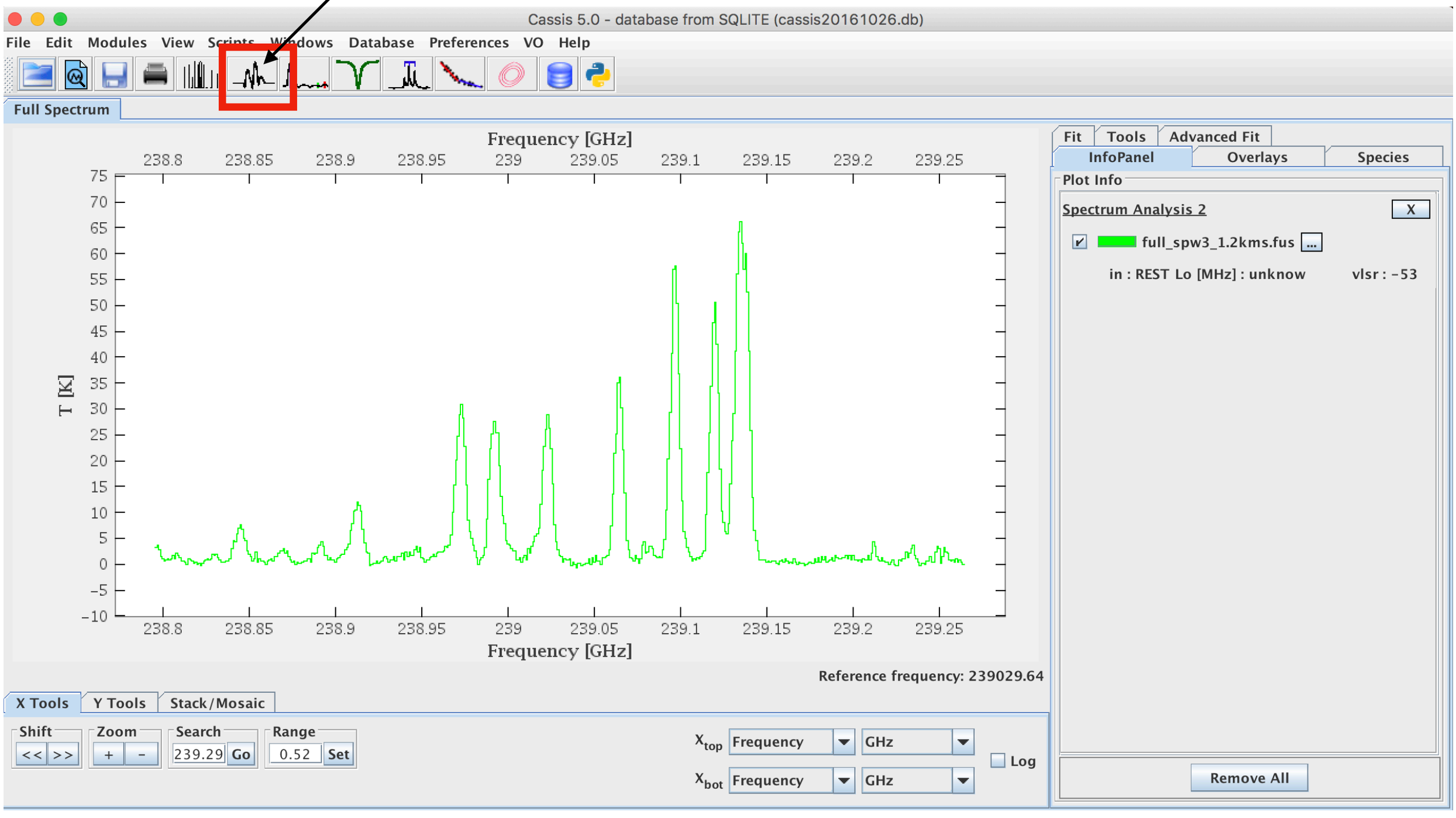
- Before you can load the spectrum you need to include the correct corresponding telescope file

- Then click display



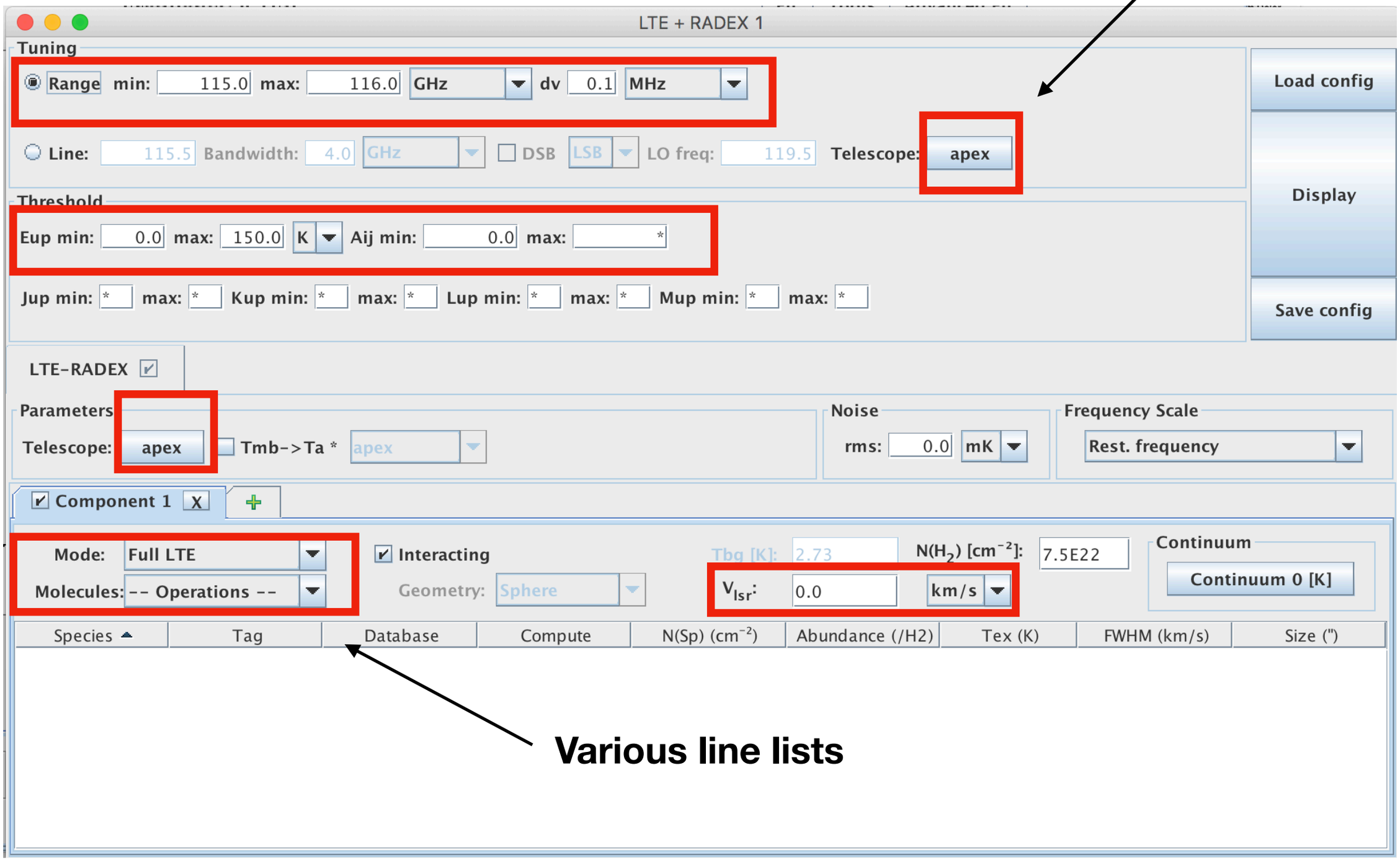
CASSIS Interface

LTE Radex opens up line identification



LTE Radex

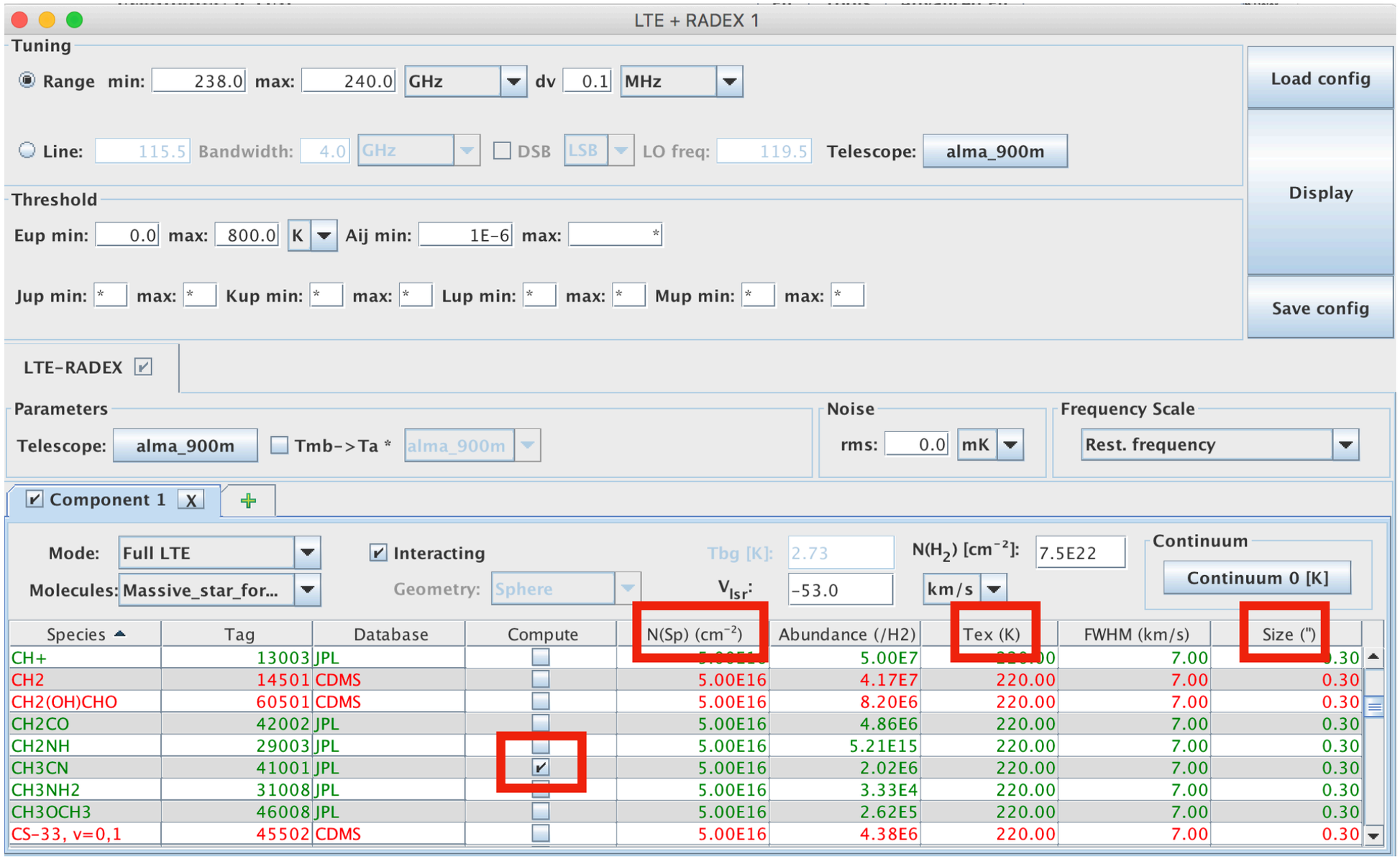
Important to change telescope file



Various line lists

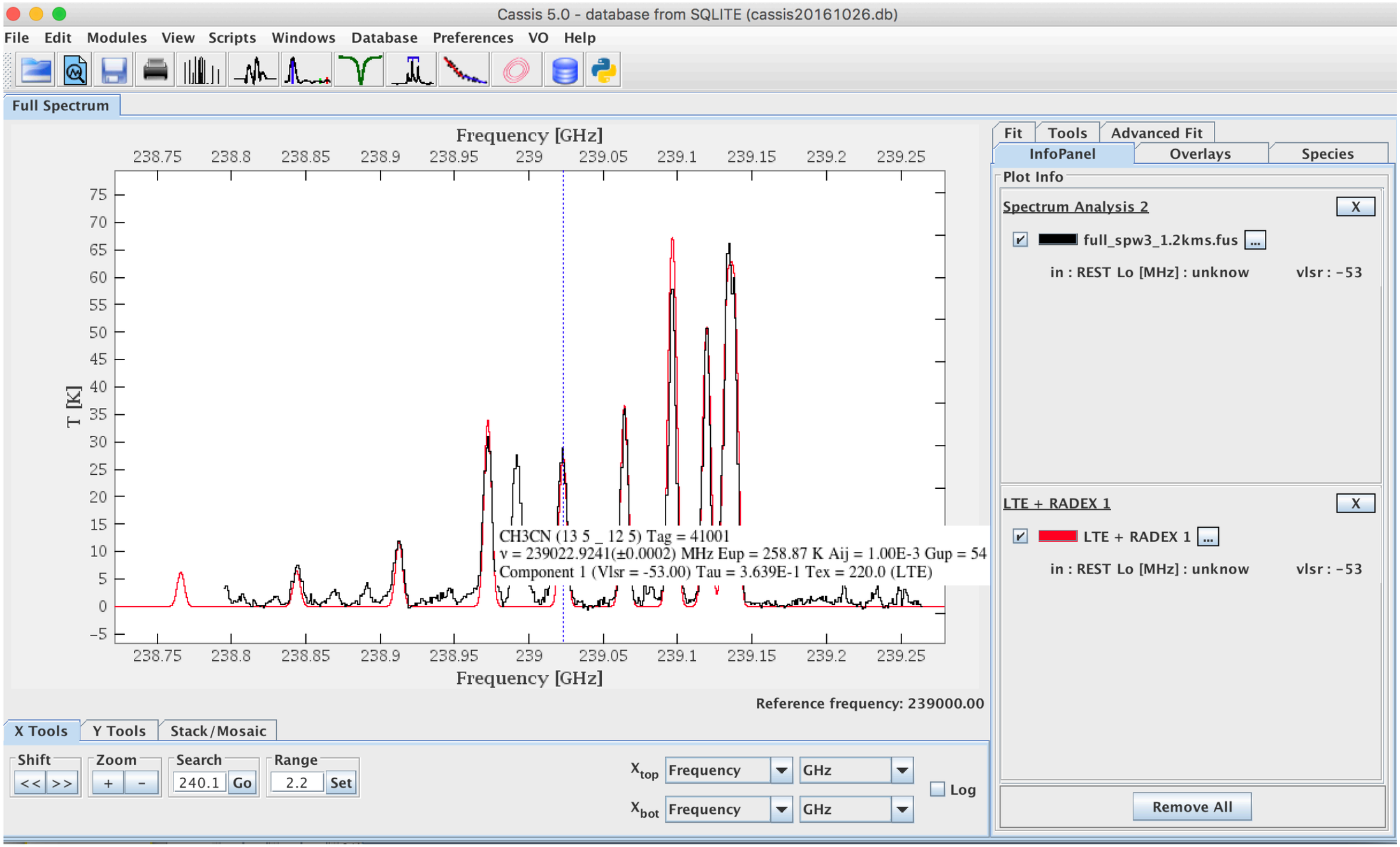
LTE Radex

- Double click headers to change entire column



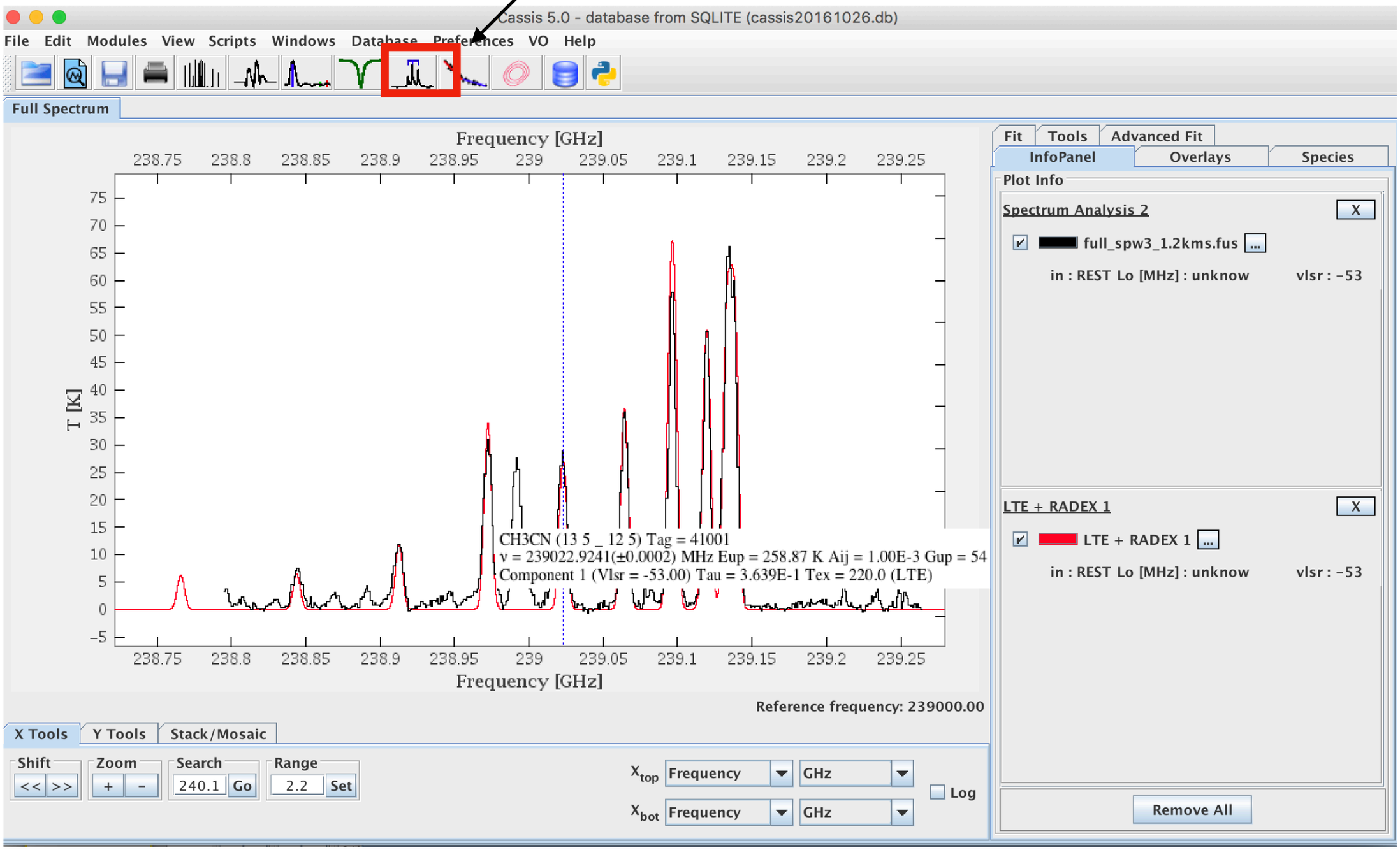
CH_3CN Model

- Can click on lines for information - especially useful for blended lines



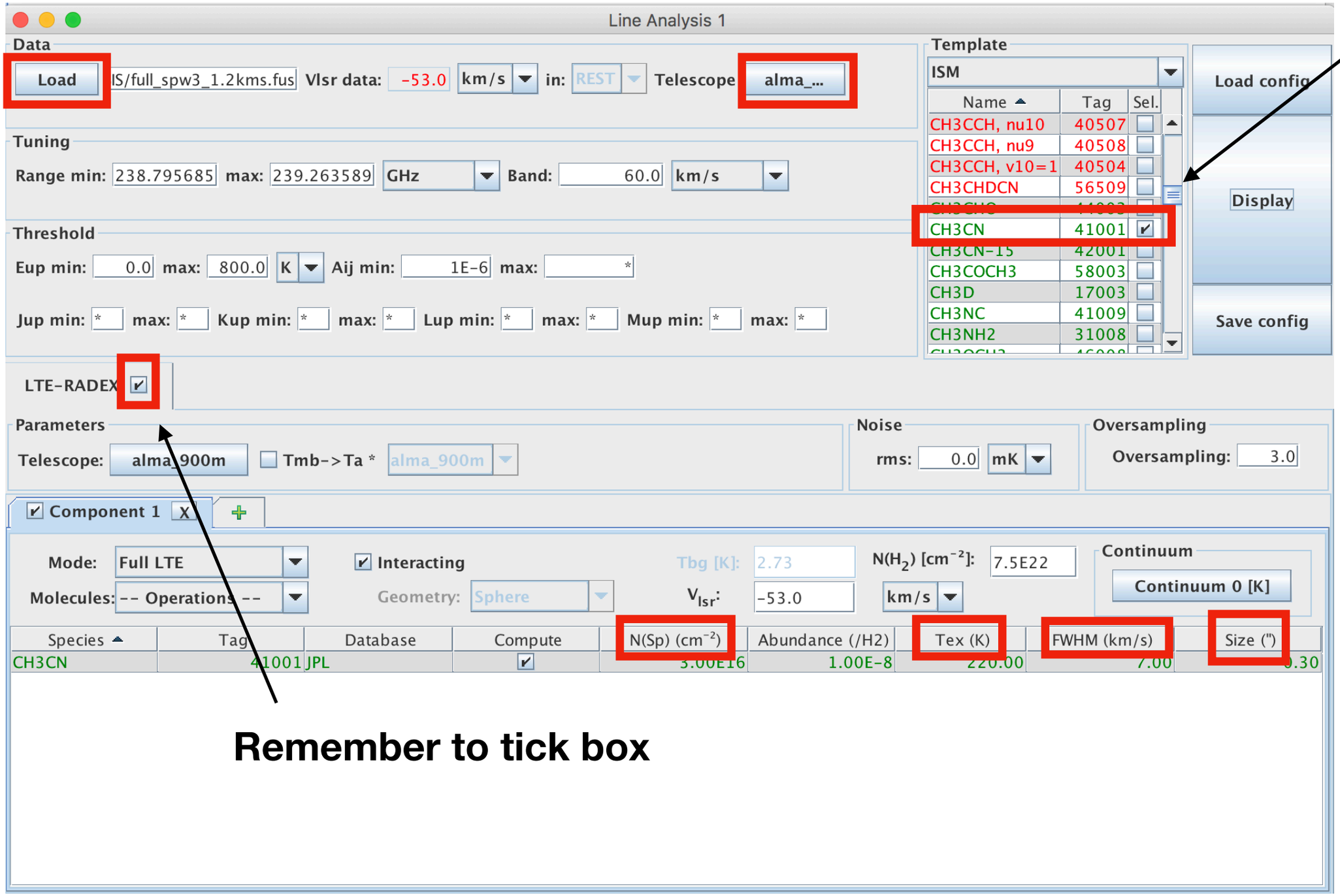
Line Analysis

Click ‘Line analysis’ to begin



Line Analysis

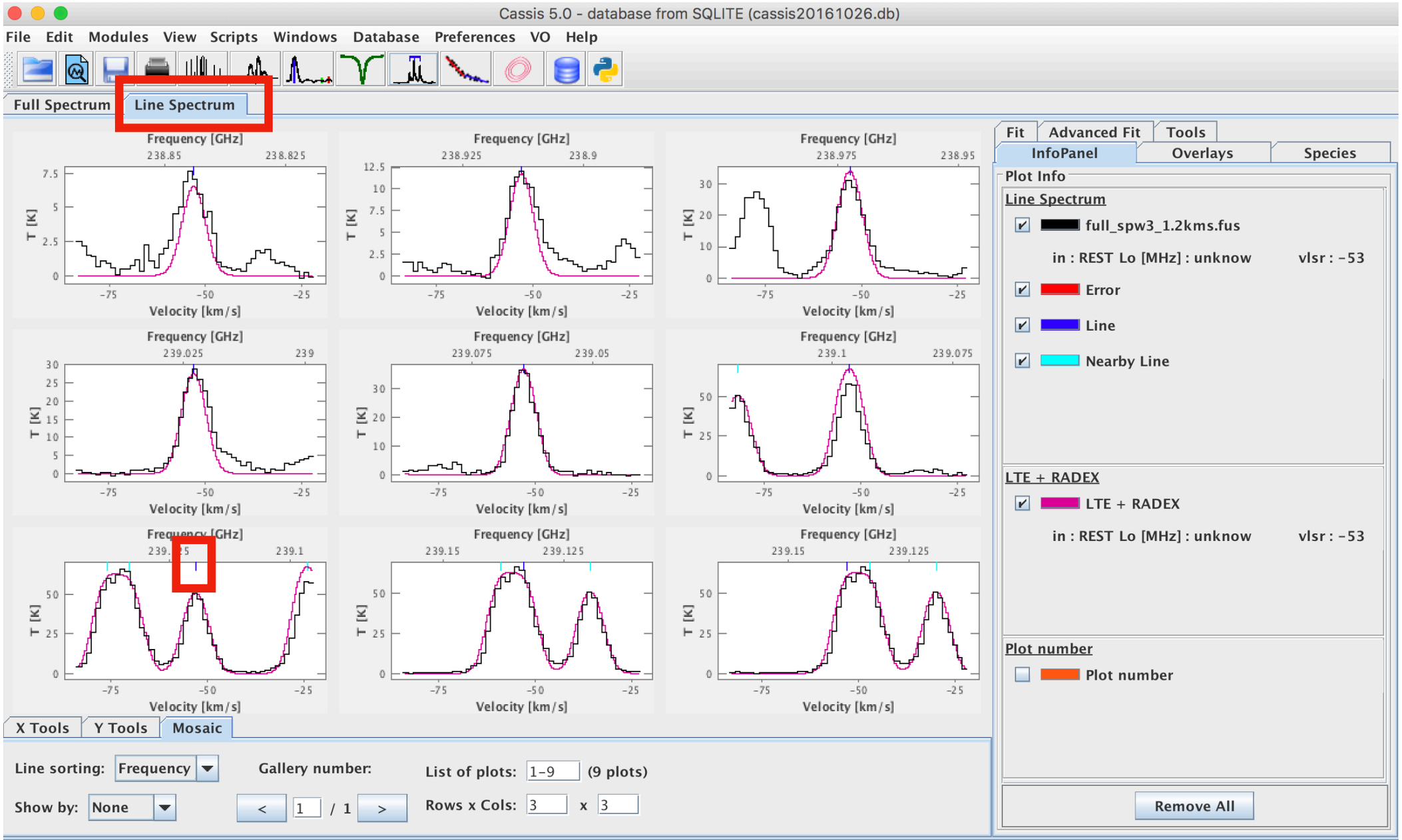
Select species here now



Remember to tick box

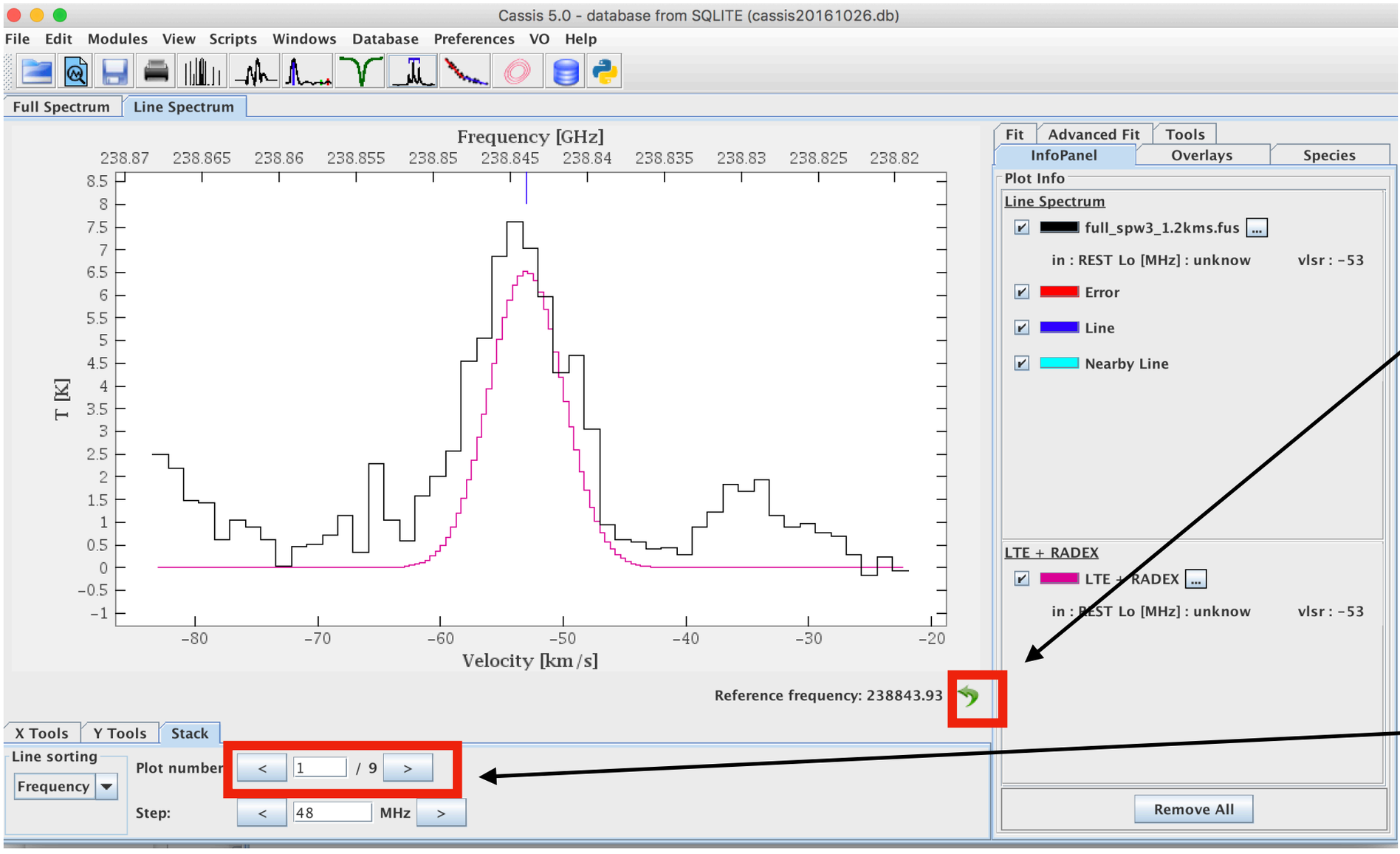
Line Analysis

- New tab opens
- Dark blue marks frame of the line of interest



Line Analysis

- Double clicking on a panel takes you here



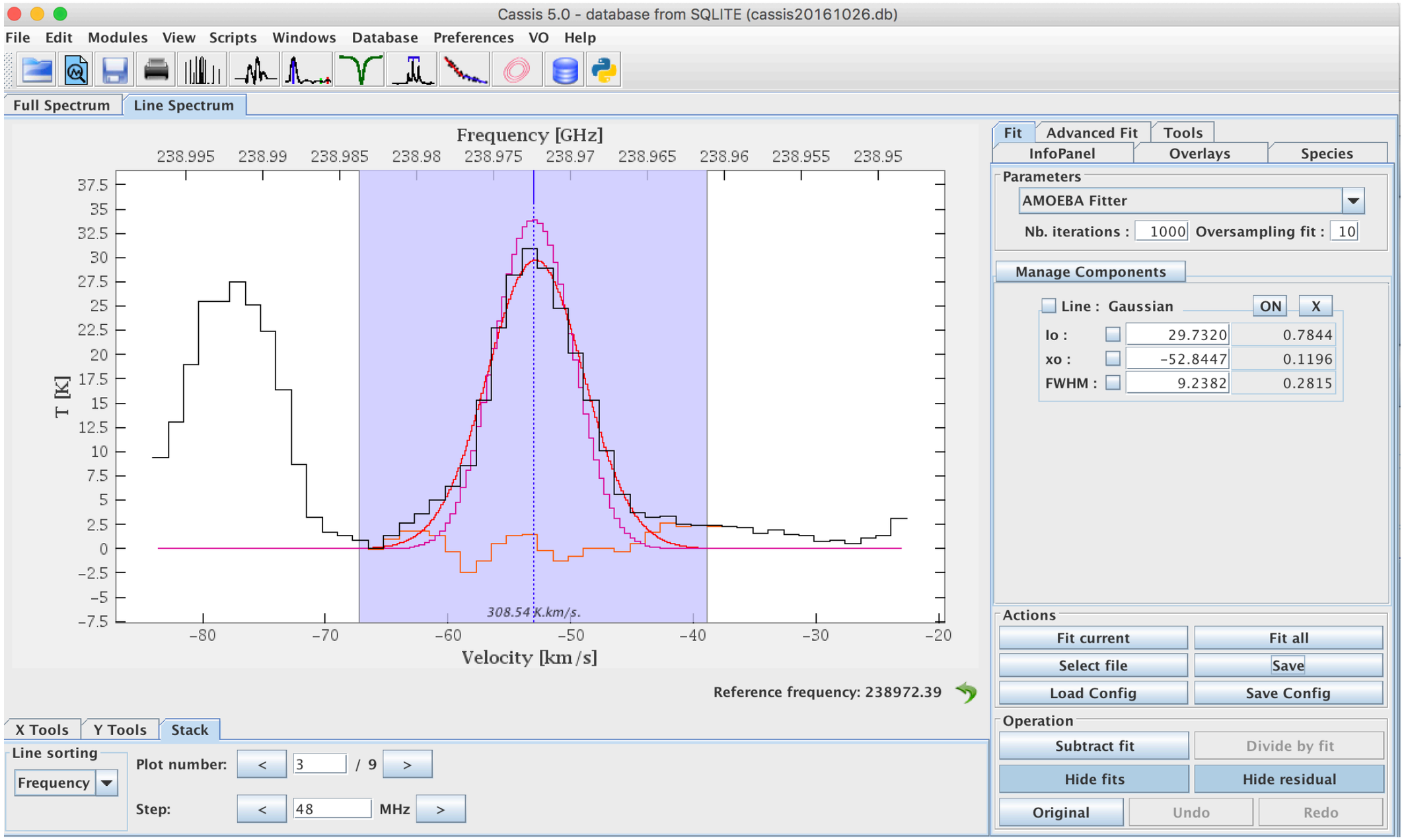
Takes you back

Change lines

Line Fitting

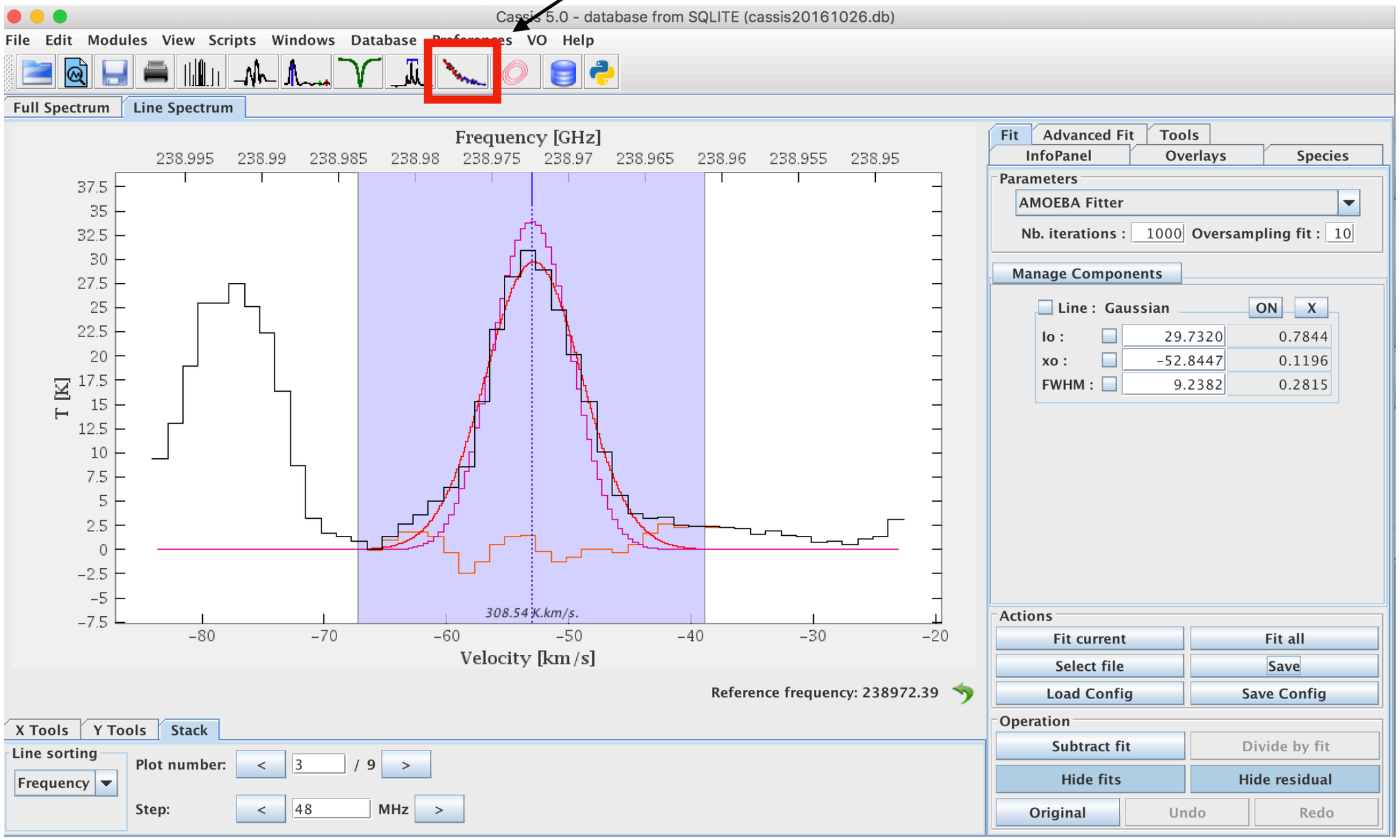
- Click on the ‘fit’ tab on the right
- Then click ‘manage components’, then ‘add line’ and select ‘gaussian’
- Leave the box next to ‘line’ unchecked
- Select the line by pressing the scroll button on the mouse, and then moving it over the line. The region selected will show up after you let go of the scroll button
- Then click ‘fit current’
- If you want to save the results of the fitting for input to a rotation diagram:
    - Click ‘select file’, then create new file
    - Then click save
    - Then go to the next line and repeat the above steps for fitting the line

Line Fitting



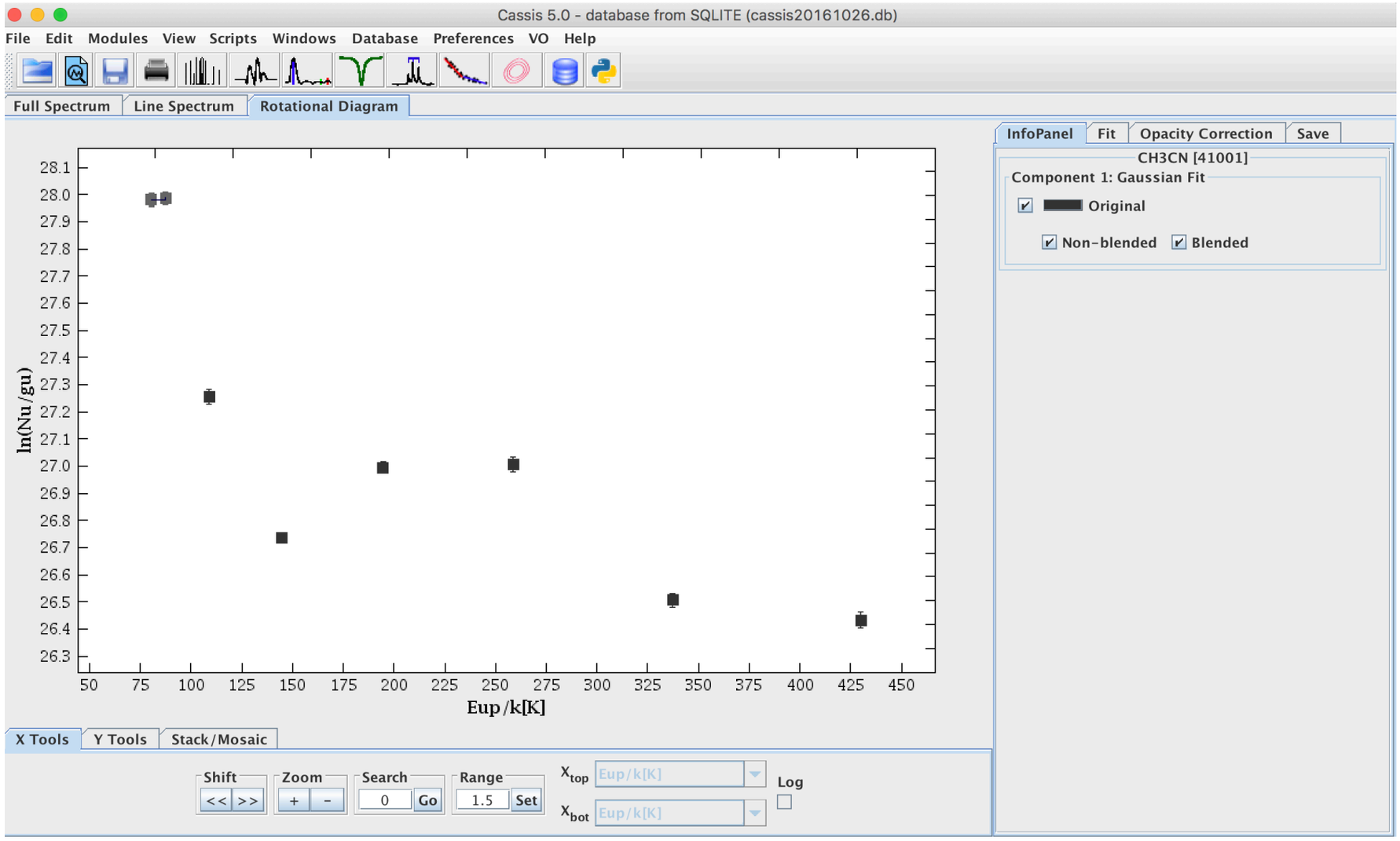
Rotation Diagram

Click to start rotation diagram analysis

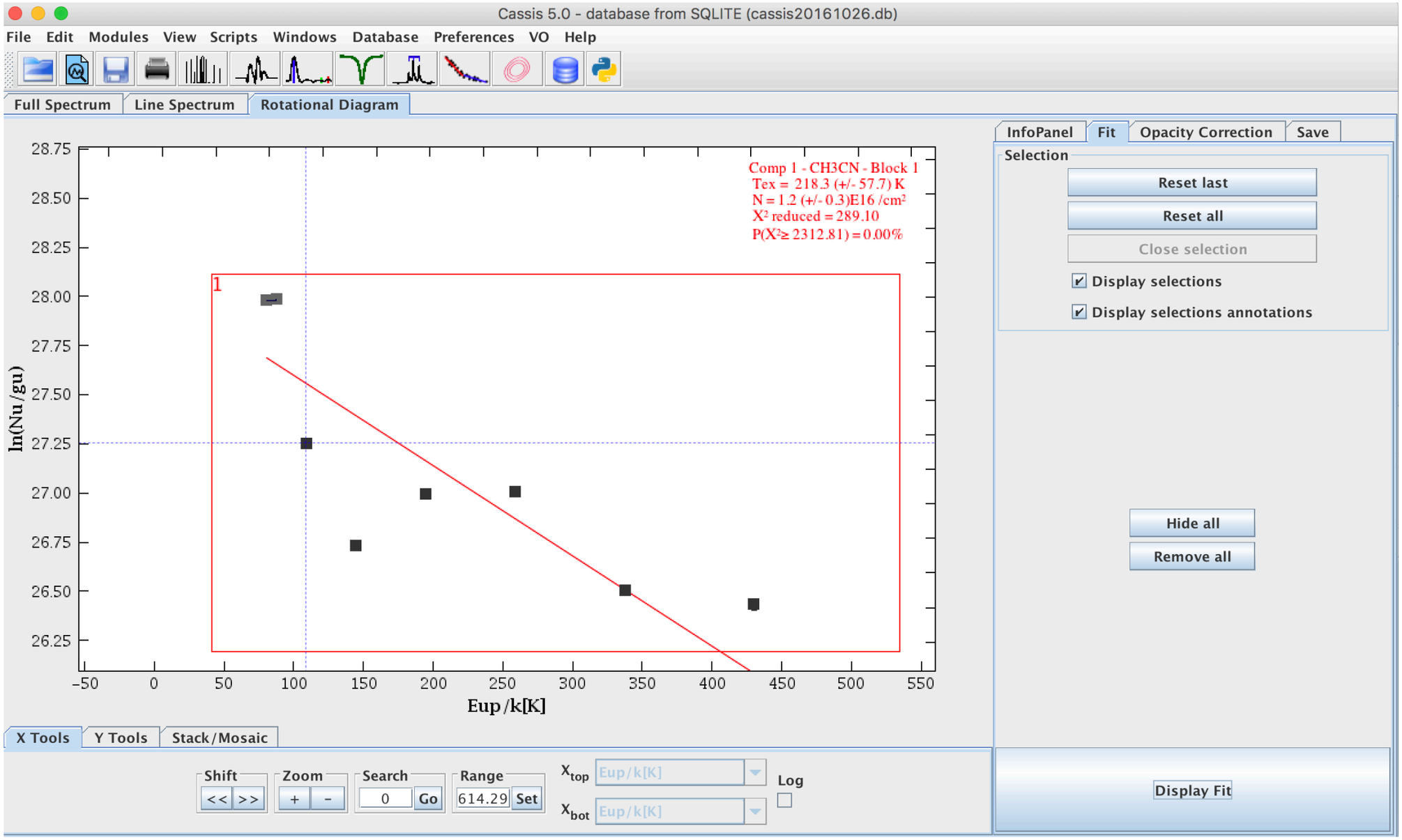


Rotation Diagram

- Load file that has the line data saved
- Then click display
- Again using the scroll bar, select the region around the scatter plot. It will come up as a red box
- Then go the the ‘fit’ tab on the right
- Click ‘close selection’ then click ‘display fit’
- Then right click the plot and chose ‘save’ to save the image as .png



Rotation Diagram



Extract Line List

- Important detail in the end, if you want to get a line list of the identified lines in the model, there is an option in the ‘file’ tab called ‘save lines’