

SPIRE spectrum analysis with CASSIS-2.9.6 in HIPE



Contents:

1. Create a spectrum Id	2	4. Spectrum Id Analysis	27
2. Check the metadata	3	4.1. Line identification	29
3. Spectrum Id Loomis-Wood	10	4.2. Baseline removal + Line fitting ..	30
A-3. Creating a template within L-W ..	21	4.3. Sinc profile removal	48

Note: Spectrum Id Line Analysis is currently not working with SPIRE data.

2. Check your metadata

In order for CASSIS to recognize your data's units and hence to work correctly, you need to check the metadata of your spectrumId by opening with Dataset Viewer.

The screenshot displays the HIPE (Herschel Interactive Pipeline Environment) software interface. The main window is titled "HIPE - hspirespectrometer1342189124_a1060001_20spss". The interface includes a menu bar (File, Edit, Run, Pipelines, Scripts, Window, Tools, Help), a toolbar, and several panels:

- Editor:** Contains tabs for "average_sp...tasets.py", "masking.py", "speclist.py", and "SDS Explor...01_20spss". The "Meta Data" tab is active, showing two detector maps: "SLW" (left) and "SSW" (right). Both maps show a hexagonal arrangement of detector elements labeled A1 through E6.
- Control Panel:** Located at the bottom left, it includes "Scan Selection" (Forward, Reverse, Single, All Scans) and "Thumbnails" (Select thu...).
- Preferences Panel:** Located at the bottom right, it includes "Nominal detectors only", "Unvignetted only", "Initial scale" (User, Passband), "Edit Title", "Edit SubTitle", "Edit Legend", "Legend", "Errors" (1 σ), and "Phase" (Radians, Degrees).
- Tasks:** A panel on the right showing a list of tasks: "All", "Applicable", and "By Category".
- Variables:** A panel on the right showing a list of variables: "hspirespectrometer1342189124" and "hspirespectrometer1342189124".
- Dataset Viewer:** A context menu is open over the "Variables" panel, showing options: "Open", "Open With", "Send to", "Show contents", "Show methods", "Rename", "Delete", "Cassiss Spectrum1d Analysis", "Cassiss Spectrum1d Loomis Wood", "Spectrum Explorer (SpectrumContainer)", "Power Spectrum Generator", "TablePlotter", "OverPlotter", "Dataset Viewer" (highlighted), and "Cassiss Spectrum1d Line Analysis".

The "Dataset Viewer" option is highlighted in the context menu, indicating the next step in the process.

3

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752 of 4091 MB



2. Check your metadata

Check the 'waveunit' and 'wavename' fields ; defaults in CASSIS for SPIRE data are:

waveunit = cm-1

wavename = wave

(Note: the values 'cm-1' and 'wave' must match the column header of the table data as shown in the screenshot)

In this case, you are in principle good to go. However, for consistency/good practice, we recommend that you add an 'instrument' field in the metadata by typing the following command in the console (see also next page):

```
HIPE> variable_name_of_spectrumId.meta['instrument'] = StringParameter('SPIRE')
```

HIPE - hspirespectrometer1342189124_a1060001_20spss_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...01_20spss hspirespec...000_SSWD4 x

Meta Data

name	value	unit	description
dec	42.23564091732352	deg	Dec pointing for this channel
ra	316.75668320239544	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
waveunit	cm-1		Units of the WaveColumn
wavenumber			Description of WaveColumn
wavename	wave		Actual name of the WaveColumn

Table Data

Index	wave	cm ⁻¹	Flux [Jy]	error [Jy]	mask
0	31.2		6.07526...	19.5253...	0
1	31.21		6.96912...	20.0962...	0
2	31.22		7.91761...	19.5953...	0
3	31.23		8.73230...	18.0923...	0
4	31.24		9.28912...	15.8586...	0
5	31.25		9.62872...	13.2531...	0
6	31.26		9.93487...	10.6261...	0

Tasks x

Variables x

Navigator x

hspirespectrometer1342189124
hspirespectrometer1342189124

2. Check your metadata

Close tab after you are done and
reopen with Dataset Viewer to
verify that the field has been added

The screenshot shows the HIPE software interface with several panels. The main panel displays the 'Meta Data' and 'Table Data' for a dataset named 'hspirespec...000_SSWD4'. The 'Meta Data' panel shows a table with columns: name, value, unit, and description. The 'Table Data' panel shows a table with columns: Index, wave [cm⁻¹], flux [Jy], error [Jy], and mask.

Meta Data Table:

name	value	unit	description
dec	42.23564091732352	deg	Dec pointing for this channel
ra	316.75668320239544	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
waveunit	cm-1		Units of the WaveColumn
wavedescription	Wavenumber		Description of WaveColumn
wavename	wave		Actual name of the WaveColumn

Table Data Table:

Index	wave [cm ⁻¹]	flux [Jy]	error [Jy]	mask
0	31.2	6.07526...	19.5253...	0
1	31.21	6.96912...	20.0962...	0
2	31.22	7.91761...	19.5953...	0
3	31.23	8.73230...	18.0923...	0
4	31.24	9.28912...	15.8586...	0
5	31.25	9.62872...	13.2531...	0
6	31.26	9.93487...	10.6261...	0
7	31.27	10.4305...	8.26578...	0
8	31.28	11.2557...	6.37508...	0
9	31.29	12.3786...	5.05779...	0
10	31.3	13.5783...	4.30197...	0
11	31.31	14.5248...	3.96628...	0
12	31.32	14.9414...	3.79814...	0
13	31.33	14.7561...	3.51806...	0
14	31.34	14.1307...	2.94698...	0
15	31.35	13.3453...	2.08434...	0
16	31.36	12.6437...	1.08004...	0
17	31.37	12.1476...	0.14187...	0
18	31.38	11.8620...	0.54830...	0
19	31.39	11.7306...	0.87880...	0
20	31.4	11.6986...	0.82366...	0
21	31.41	11.7519...	0.44622...	0

The 'Variables' panel on the right shows a list of variables, including 'hspirespectrometer1342189124'. The 'Outline' panel at the bottom right shows the dataset structure, including 'hspirespectrometer1342189124' and its associated variables.

A red arrow points from the 'hspirespectrometer1342189124' variable in the 'Variables' panel to the 'Console' panel at the bottom, which contains the following command:

```
HIPE> hspirespectrometer1342189124_a1060001_20spss_0000_SSWD4.meta['instrument']=StringParameter('SPIRE')
```

A red arrow also points from the 'Console' panel to the 'Table Data' panel, indicating the relationship between the command and the data.

2. Check your metadata

The screenshot displays the HIPE (Herschel Interactive Pipeline Environment) software interface. The main window shows the metadata for a dataset named `hspirespec...000_SSWD4`. The metadata is organized into two sections: **Meta Data** and **Table Data**.

Meta Data Table:

name	value	unit	description
dec	42.23564091732352	deg	Dec pointing for this channel
ra	316.75668320239544	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
waveunit	cm-1		Units of the WaveColumn
wavedescription	Wavenumber		Description of WaveColumn
wavename	wave		Actual name of the WaveColumn
instrument	SPIRE		

Table Data Table:

Index	wave [cm ⁻¹]	flux [Jy]	error [Jy]	mask
0	31.2	6.07526...	19.5253...	0
1	31.21	6.96912...	20.0962...	0
2	31.22	7.91761...	19.5953...	0
3	31.23	8.73230...	18.0923...	0
4	31.24	9.28912...	15.8586...	0
5	31.25	9.62872...	13.2531...	0
6	31.26	9.93487...	10.6261...	0
7	31.27	10.4305...	8.26578...	0
8	31.28	11.2557...	6.37508...	0
9	31.29	12.3786...	5.05779...	0
10	31.3	13.5783...	4.30197...	0
11	31.31	14.5248...	3.96628...	0
12	31.32	14.9414...	3.79814...	0
13	31.33	14.7561...	3.51806...	0
14	31.34	14.1307...	2.94698...	0
15	31.35	13.3453...	2.08434...	0
16	31.36	12.6437...	1.08004...	0
17	31.37	12.1476...	0.14187...	0
18	31.38	11.8620...	0.54830...	0
19	31.39	11.7306...	0.87880...	0
20	31.4	11.6986...	0.82366...	0
21	21.41	11.7510...	0.44622...	0

The **instrument** field in the Meta Data table is circled in red, indicating it is the focus of the check.

Variables Panel: The **Variables** panel on the right shows the dataset `hspirespectrometer1342189124` selected.

Outline Panel: The **Outline** panel on the right shows the dataset structure, including `hspirespectrometer1342189124` and its associated files.

Console: The console at the bottom shows the command `hspirespectrometer1342189124_a1060001_20spss_0000_SSWD4.meta['instrument']=StringParameter('SPIRE')` being executed.



2. Check your metadata

- If waveunit \neq cm-1, or wavename \neq wave (or if they are missing - cf. next point), then you *must* add the 'instrument' field:

```
HIPE> variable_name_of_spectrumId.meta['instrument'] = StringParameter('SPIRE')
```

- If 'waveunit' or 'wavename' are missing, you must add the corresponding field in the metadata by typing the following command(s) (with the appropriate corresponding value) in the console:

```
HIPE> variable_name_of_spectrumId.meta['waveunit'] = StringParameter('unit')
```

```
HIPE> variable_name_of_spectrumId.meta['wavename'] = StringParameter('name')
```

where unit and name are the values from the column header of the table data.

HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748_000_SSWD4 x

Meta Data

name	value	unit	description
dec	42.236589737800465	deg	Dec pointing for this channel
ra	316.7569241001546	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
wavedescription	Frequency		Description of WaveColumn
waveunit	GHz		Units of the WaveColumn

Table Data

Index	wave [GHz]	flux [Jy]	error [Jy]	mask
0	959.3358...	12.8497...	0.89270...	0
1	959.6356...	13.9821...	0.84828...	0
2	959.9354...	15.4772...	0.88357...	0
3	960.2352...	16.6432...	0.82573...	0
4	960.5350...	17.0659...	0.65496...	0
5	960.8348...	16.7441...	0.60334...	0
6	961.1346...	15.9778...	0.85417...	0
7	961.4344...	15.1674...	1.16525...	0
8	961.7342...	14.6345...	1.33355...	0

Tasks x

Variables x

Navigator x

Annotations:

- waveunit ok (blue arrow pointing to 'GHz' in the Meta Data table)
- wavename and instrument are missing (red text)

2. Check your metadata

The screenshot displays the HIPE software interface with the title bar "HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4". The main window is divided into several panels:

- Editor:** Contains tabs for "average_sp...tsets.py", "masking.py", "speclist.py", "SDS Explor...CR_unapod", and "p134219748_000_SSWD4". The "Meta Data" section shows a table with the following data:

name	value	unit	description
dec	42.236589737800465	deg	Dec pointing for this channel
ra	316.7569241001546	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
wavedescription	Frequency		Description of WaveColumn
waveunit	GHz		Units of the WaveColumn

The "Table Data" section shows a table with 5 columns: Index, wave [GHz], flux [Jy], error [Jy], and mask. It contains 22 rows of data.

On the right side, there are three panels:

- Tasks:** Shows a list of tasks with categories "All", "Applicable", and "By Category".
- Variables:** Shows a list of variables, including "p1342197486_spectrum_point_C" and "p1342197486_spectrum_point_C".
- Outline:** Shows a tree view of the project structure, including "p1342197486_spectrum" and "p1342197486_spectrum_point_C".

At the bottom, the "Console" panel shows the following code being executed:

```
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['wavename']=StringParameter('wave')
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['instrument']=StringParameter('SPIRE')
```

A red box highlights the code in the console, and a red arrow points to it with the text "Add the missing field".

The status bar at the bottom indicates "Jython Interpreter 100%" and "750 of 4091 MB".

2. Check your metadata

Close tab and reopen with Dataset Viewer to verify that the fields have been added

The screenshot displays the HIPE software interface with the following components:

- Editor x**: Shows the file `p1342197486_spectrum_point_CR_unapod_0000_SSWD4`. The **Meta Data** table is visible, with fields `waveunit`, `wavename`, and `instrument` highlighted in a red box. The **Table Data** view shows a table with columns: Index, wave [GHz], flux [Jy], error [Jy], and mask.
- Variables x**: Lists the dataset `p1342197486_spectrum_point_C`.
- Outline x**: Shows the class `SpireSpectrum1d` from the package `herschel.spire.ia.dataset`.
- History**: Shows the commands used to set the metadata fields.

Meta Data Table:

name	value	unit	description
dec	42.236589737800465	deg	Dec pointing for this channel
ra	316.7569241001546	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
wavedescription	Frequency		Description of WaveColumn
waveunit	GHz		Units of the WaveColumn
wavename	wave		
instrument	SPIRE		

Table Data:

Index	wave [GHz]	flux [Jy]	error [Jy]	mask
0	959.3358...	12.8497...	0.89270...	0
1	959.6356...	13.9821...	0.84828...	0
2	959.9354...	15.4772...	0.88357...	0
3	960.2352...	16.6432...	0.82573...	0
4	960.5350...	17.0659...	0.65496...	0
5	960.8348...	16.7441...	0.60334...	0
6	961.1346...	15.9778...	0.85417...	0
7	961.4344...	15.1674...	1.16525...	0
8	961.7342...	14.6345...	1.33355...	0
9	962.0339...	14.5005...	1.28641...	0
10	962.3337...	14.6522...	1.08501...	0
11	962.6335...	14.8233...	0.94091...	0
12	962.9333...	14.7838...	0.98040...	0
13	963.2331...	14.5206...	1.01148...	0
14	963.5329...	14.2434...	0.89947...	0
15	963.8327...	14.2035...	0.74326...	0
16	964.1325...	14.4921...	0.71874...	0
17	964.4323...	14.9780...	0.77269...	0
18	964.7321...	15.3947...	0.74497...	0
19	965.0319...	15.4941...	0.67284...	0
20	965.3317...	15.1837...	0.79365...	0
21	965.6315...	14.6002...	1.07240...	0

Console:

```
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4 = p1342197486_spectrum_point_CR_unapod[ 0000 ][ SSWD4 ]
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['wavename']=StringParameter('wave')
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['instrument']=StringParameter('SPIRE')
HIPE>
```

746 of 4091 MB

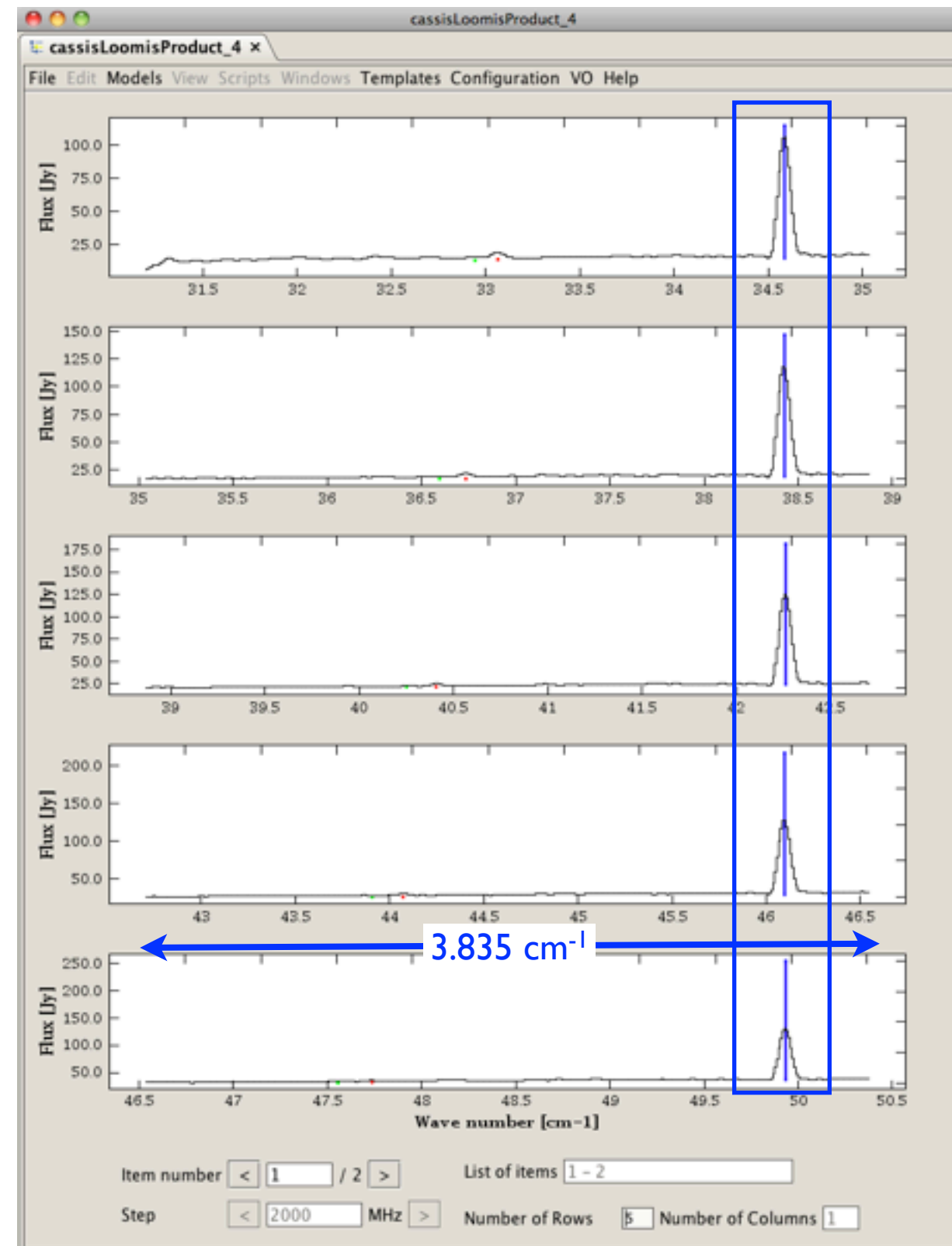
3. Spectrum Id Loomis-Wood

A Loomis-Wood diagram is a two-dimensional peak diagram in which:

- the occurrence of a transition is plotted versus frequency/wavenumber/wavelength, in segments of a given width
- the height of a line is proportional to the column density, weighted by the partition function at the chosen excitation temperature

Interactive Loomis-Wood assignment programs help assign spectra, and estimate column densities.

Note that, **at the moment**, for the calculation of the line intensity (and hence the estimate of the column density) to be correct, **the data must be in Jy**. Any other unit will only allow you to determine relative column densities (assuming you look at more than one species).



Exemple: separation between CO line is 3.835 cm^{-1} ; setting the segment width to this value yields a Loomis-Wood diagram with aligned CO transitions.

3. Spectrum Id Loomis-Wood

The screenshot displays the HIPE (Herschel Interactive Pipeline Environment) software interface. The main window shows a dataset named 'p1342197486_spectrum_point_CR_unapod_0000_SSWD4'. The 'Meta Data' section lists parameters such as 'dec', 'ra', 'channelName', 'wavedescription', 'waveunit', 'wavename', and 'instrument'. The 'Table Data' section shows a table with columns: Index, wave [GHz], flux [Jy], error [Jy], and mask. A right-click context menu is open over the 'Variables' panel, listing various analysis tools. The 'Outline' panel on the right shows the dataset hierarchy. The 'Console' at the bottom displays HIPE commands and their output.

Meta Data

name	value	unit	description
dec	42.236589737800465	deg	Dec pointing for this channel
ra	316.7569241001546	deg	Ra pointing for this channel
channelName	SSWD4		Channel name
wavedescription	Frequency		Description of WaveColumn
waveunit	GHz		Units of the WaveColumn
wavename	wave		
instrument	SPIRE		

Table Data

Index	wave [GHz]	flux [Jy]	error [Jy]	mask
0	959.3358...	12.8497...	0.89270...	0
1	959.6356...	13.9821...	0.84828...	0
2	959.9354...	15.4772...	0.88357...	0
3	960.2352...	16.6432...	0.82573...	0
4	960.5350...	17.0659...	0.65496...	0
5	960.8348...	16.7441...	0.60334...	0
6	961.1346...	15.9778...	0.85417...	0
7	961.4344...	15.1674...	1.16525...	0
8	961.7342...	14.6345...	1.33355...	0
9	962.0339...	14.5005...	1.28641...	0
10	962.3337...	14.6522...	1.08501...	0
11	962.6335...	14.8233...	0.94091...	0
12	962.9333...	14.7838...	0.98040...	0
13	963.2331...	14.5206...	1.01148...	0
14	963.5329...	14.2434...	0.89947...	0
15	963.8327...	14.2035...	0.74326...	0
16	964.1325...	14.4921...	0.71874...	0
17	964.4323...	14.9780...	0.77269...	0
18	964.7321...	15.3947...	0.74497...	0
19	965.0319...	15.4941...	0.67284...	0
20	965.3317...	15.1837...	0.79365...	0
21	965.6315...	14.6003...	1.07240...	0

Right-click

- Open
- Open With
- Send to
- Show contents
- Show methods
- Rename
- Delete

Variables

- p1342197486_spectrum_point_C
- p1342197486_spectrum_point_C

Outline

Name	Class	Package
p1342197486_spectrum	SpireSpectrumId	herschel.spire.ia.dataset
p1342197486_spectrum_point_C		

Console

```
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4 = p1342197486_spectrum_point_CR_unapod[0000][SSWD4]
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['wavename']=StringParameter('wave')
HIPE> p1342197486_spectrum_point_CR_unapod_0000_SSWD4.meta['instrument']=StringParameter('SPIRE')
HIPE>
```

3. Spectrum Id Loomis-Wood

Double-click to maximize/minimize

Editor x

average_sp...tsets.py masking.py spectist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood1 x

File Edit Run Pipelines Scripts Window Tools Help

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOW Vlsr : 0 km/s Telescope SPIRE Automatic

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 150.0 K Aij min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

Load config

Display

Save config

Loomis Wood

ISM

Continuum

Continuum 0 [K]

Vlsr [km/s] : 0 Emission

Species	Tag	Database	Compute	N(Sp) (/cm2)	Tex(K)
H2D+				7.0E14	100.0
HD2+				7.0E14	100.0
C-atom				7.0E14	100.0
C-13				7.0E14	100.0
CH				7.0E14	100.0
CH+				7.0E14	100.0
CH2				7.0E14	100.0
C-13-H+				7.0E14	100.0
C-13-H+, v=1-0				7.0E14	100.0
CD+, v=1-0				7.0E14	100.0
NH				7.0E14	100.0
NH2				7.0E14	100.0
ND				7.0E14	100.0
CH2D+				7.0E14	100.0
OH+				7.0E14	100.0
NH2D				7.0E14	100.0

The * indicates that all data will be display in a single segment ; change it to a number, e.g. 100, in order to display the data in segments of 100 GHz

Template of species : here choose "COs" (if not available or would like to make your own, see §A. I. or the help file on templates at <http://cassis.cesr.fr>)

Tip: if you are interested in only one species, leave the ISM template and right-click on "Species": this will bring up a search window (case-sensitive)

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3. Spectrum Id Loomis-Wood

HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood1 x

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOWN Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 550.0 K Aij min : 0.0 max : 0.0

0.0-0.0 means no limits on Aij

Make sure Eup_max is high enough

COs

Continuum

Continuum 0

Compute

Emission

Species	Tag	Database	Continuum	Compute	N(Sp) (/cm2)	Tex(K)
CO, v=0	28503	CDMS		<input checked="" type="checkbox"/>	1.0E18	100.0
C-13-O	29501	CDMS		<input checked="" type="checkbox"/>	1.0E17	100.0
CO-17	29503	CDMS		<input type="checkbox"/>	7.0E14	100.0
CO-18	30502	CDMS		<input checked="" type="checkbox"/>	7.0E14	100.0
C-13-O-17	30503	CDMS		<input type="checkbox"/>	7.0E14	100.0
C-13-O-18	31502	CDMS		<input type="checkbox"/>	7.0E14	100.0

Input

Value of Tex(K)

800.0

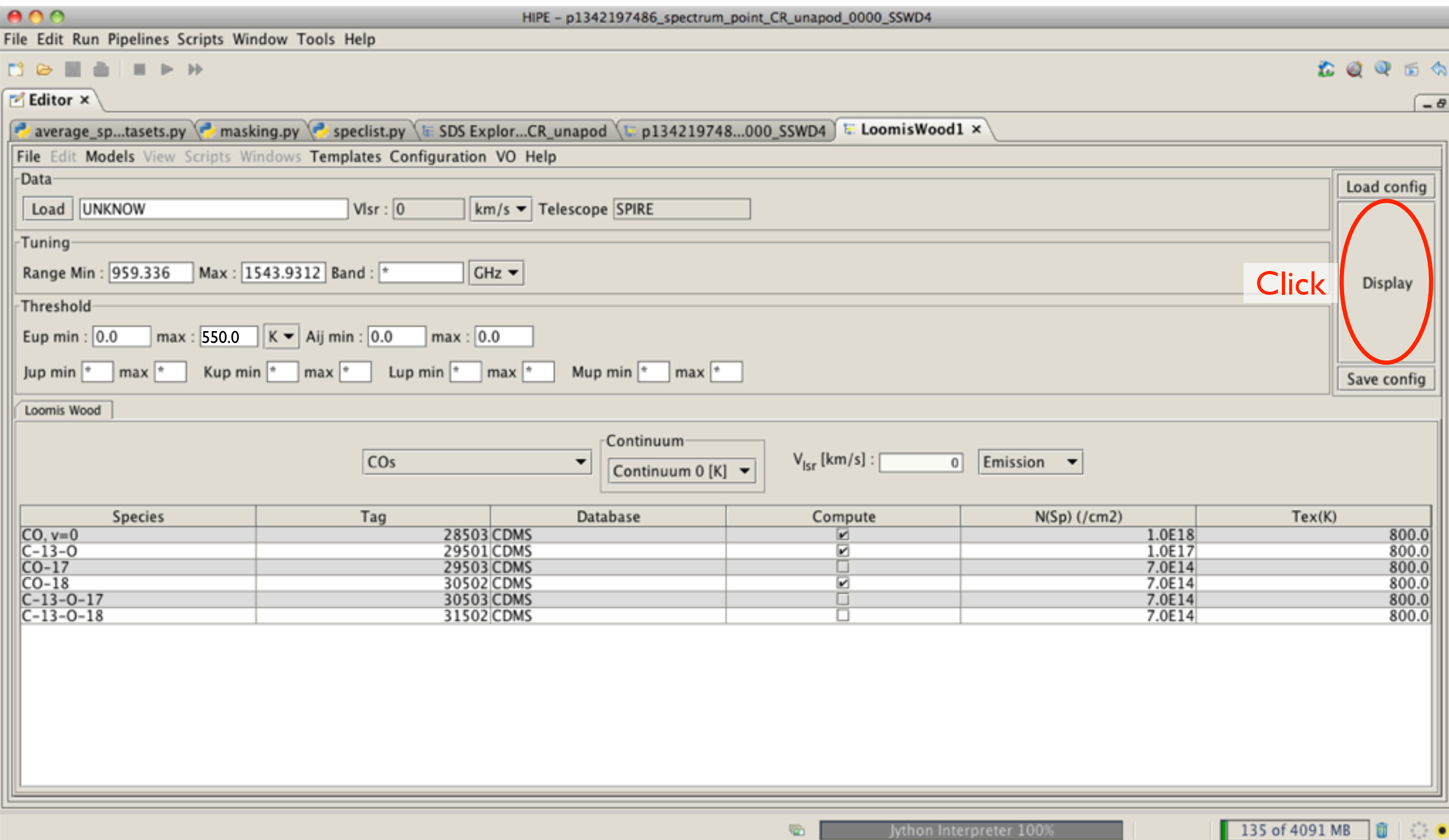
OK Cancel

Click column header to change all values (brings up pop-up)

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135 of 4091 MB

3. Spectrum Id Loomis-Wood



HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood1 x

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOWN Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 550.0 K Aij min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

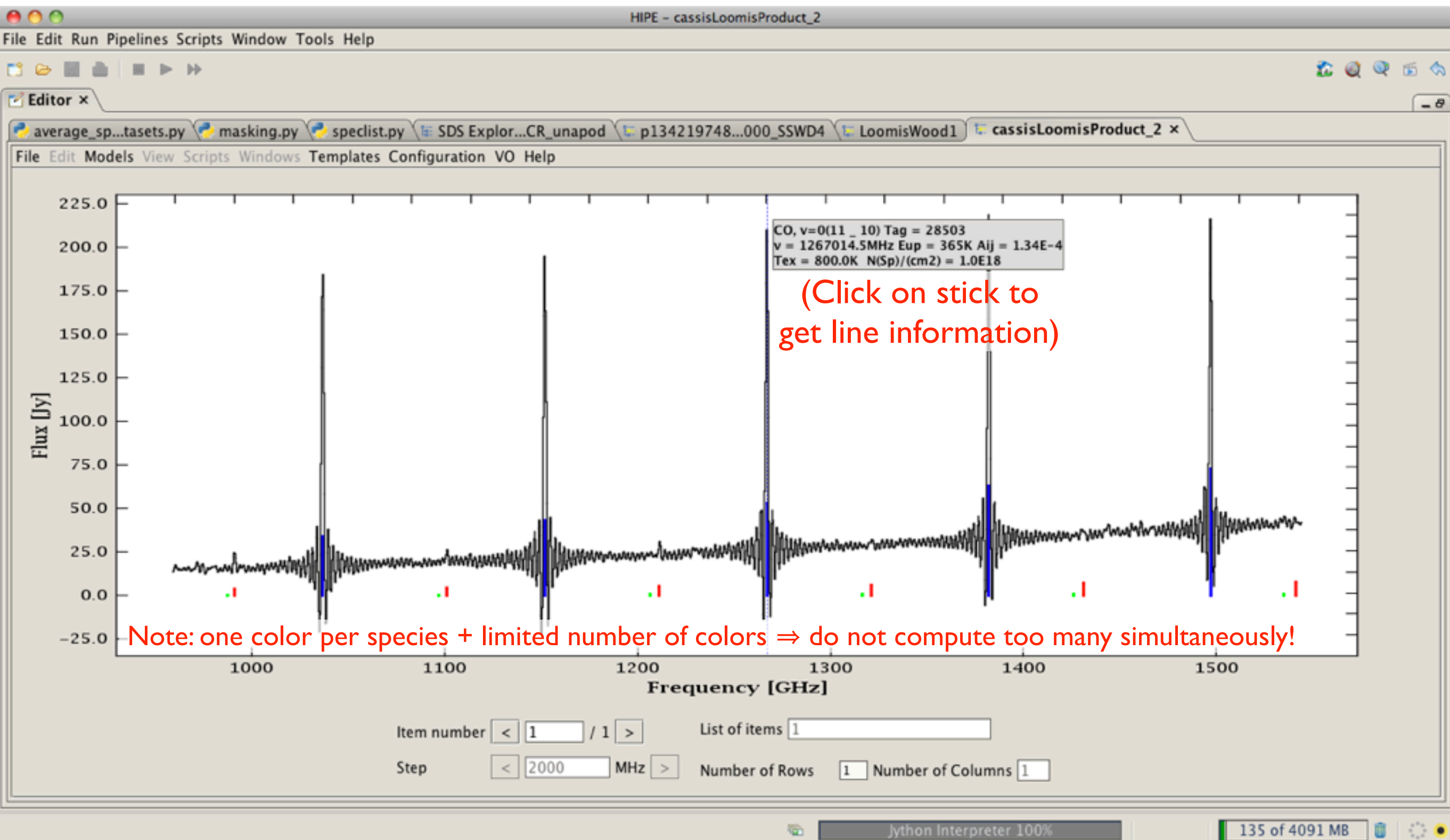
Loomis Wood

COs Continuum Continuum 0 [K] Vlsr [km/s] : 0 Emission

Species	Tag	Database	Compute	N(Sp) (/cm2)	Tex(K)
CO, v=0	28503	CDMS	<input checked="" type="checkbox"/>	1.0E18	800.0
C-13-O	29501	CDMS	<input checked="" type="checkbox"/>	1.0E17	800.0
CO-17	29503	CDMS	<input type="checkbox"/>	7.0E14	800.0
CO-18	30502	CDMS	<input checked="" type="checkbox"/>	7.0E14	800.0
C-13-O-17	30503	CDMS	<input type="checkbox"/>	7.0E14	800.0
C-13-O-18	31502	CDMS	<input type="checkbox"/>	7.0E14	800.0

Python Interpreter 100% 135 of 4091 MB

3. Spectrum Id Loomis-Wood





3. Spectrum Id Loomis-Wood : adding continuum

1. In YOUR_CASSIS_DIR/user/continuum/, create an ascii file with the name of your choice, no extension
2. Fill it in with the continuum information, following the format below:

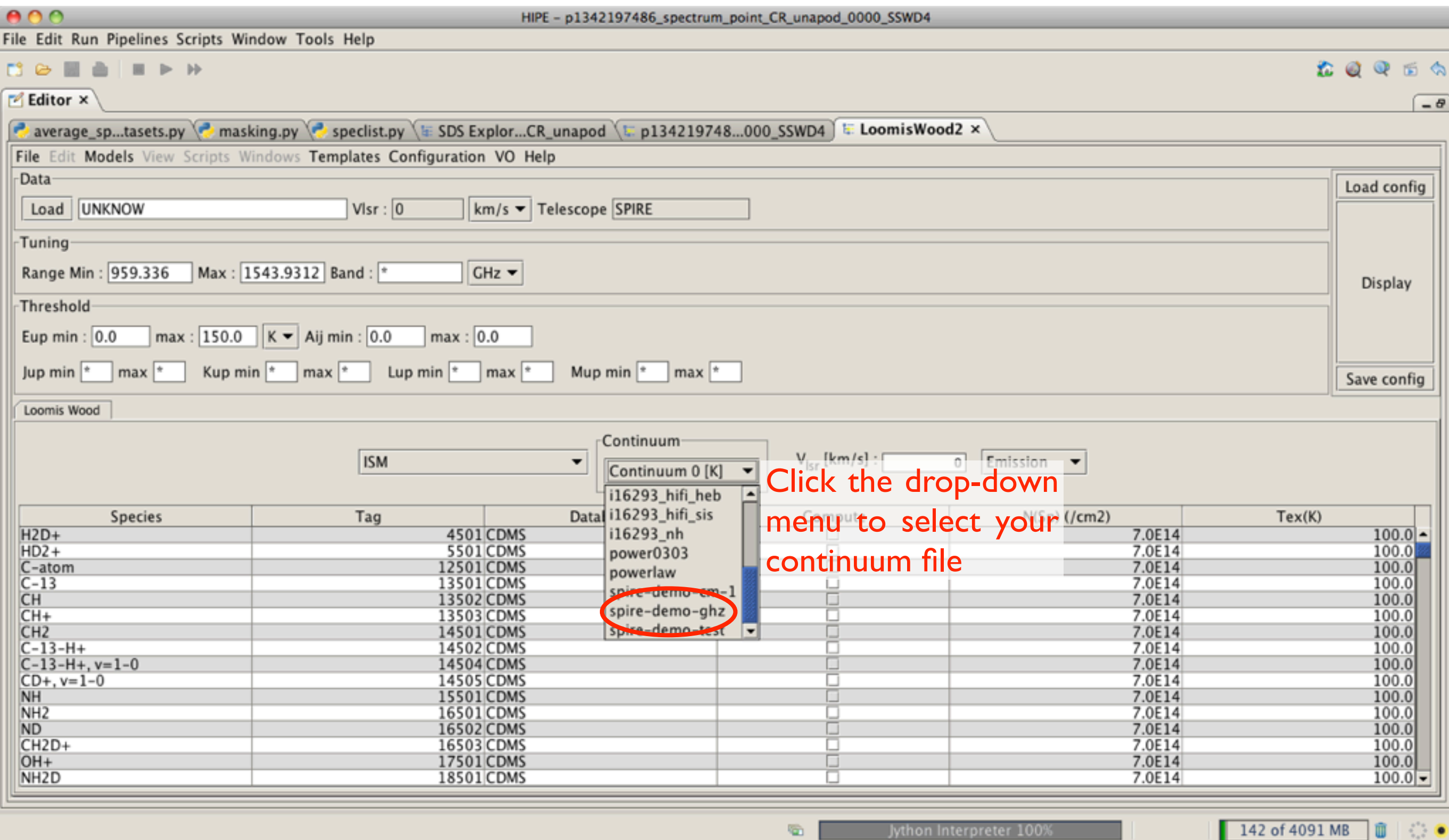
```
//unitx : GHz
950.00 13.
1000.00 15.
1100.00 19.
1200.00 22.
1300.00 27.
1450.00 35.
1550.00 42.
```

(Space) Value on x-axis Corresponding flux (Jy)

3. Close and re-open your spectrum Id with “Cassis Spectrum Id Loomis Wood”

3. Spectrum Id Loomis-Wood :

adding continuum



The screenshot shows the HIPE software interface. The 'Loomis Wood' tab is active. The 'Continuum' dropdown menu is open, showing a list of files. The file 'spire-demo-ghz' is selected and circled in red. A red text box with an arrow points to the dropdown menu, containing the text: 'Click the drop-down menu to select your continuum file'.

File Edit Run Pipelines Scripts Window Tools Help

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood2 x

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOWN Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 150.0 K Aij min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

Loomis Wood

ISM

Continuum

Continuum 0 [K]

i16293_hifi_heb

i16293_hifi_sis

i16293_nh

power0303

powerlaw

spire-demo-em-1

spire-demo-ghz

spire-demo-test

Vlsr [km/s] : 0 Emission

Species	Tag	Data	Continuum	N(S ₀) (/cm ²)	Tex(K)
H2D+	4501	CDMS			
HD2+	5501	CDMS			
C-atom	12501	CDMS			
C-13	13501	CDMS			
CH	13502	CDMS			
CH+	13503	CDMS			
CH2	14501	CDMS			
C-13-H+	14502	CDMS			
C-13-H+, v=1-0	14504	CDMS			
CD+, v=1-0	14505	CDMS			
NH	15501	CDMS			
NH2	16501	CDMS			
ND	16502	CDMS			
CH2D+	16503	CDMS			
OH+	17501	CDMS			
NH2D	18501	CDMS			

jython Interpreter 100%

142 of 4091 MB

3. Spectrum Id Loomis-Wood : adding continuum

HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...taset.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood2 x cassisLoomisProduct_3

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOW Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 550.0 K min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

Loomis Wood

COs Continuum spire-demo-ghz Vlsr [km/s] : 0 Emission

Species	Tag	Database	Compute	N(Sp) (/cm2)	Tex(K)
CO, v=0	28503	CDMS	<input checked="" type="checkbox"/>	3.0E18	800.0
C-13-O	29501	CDMS	<input checked="" type="checkbox"/>	1.0E17	800.0
CO-17	29503	CDMS	<input type="checkbox"/>	7.0E14	800.0
CO-18	30502	CDMS	<input checked="" type="checkbox"/>	7.0E14	800.0
C-13-O-17	30503	CDMS	<input type="checkbox"/>	7.0E14	800.0
C-13-O-18	31502	CDMS	<input type="checkbox"/>	7.0E14	800.0

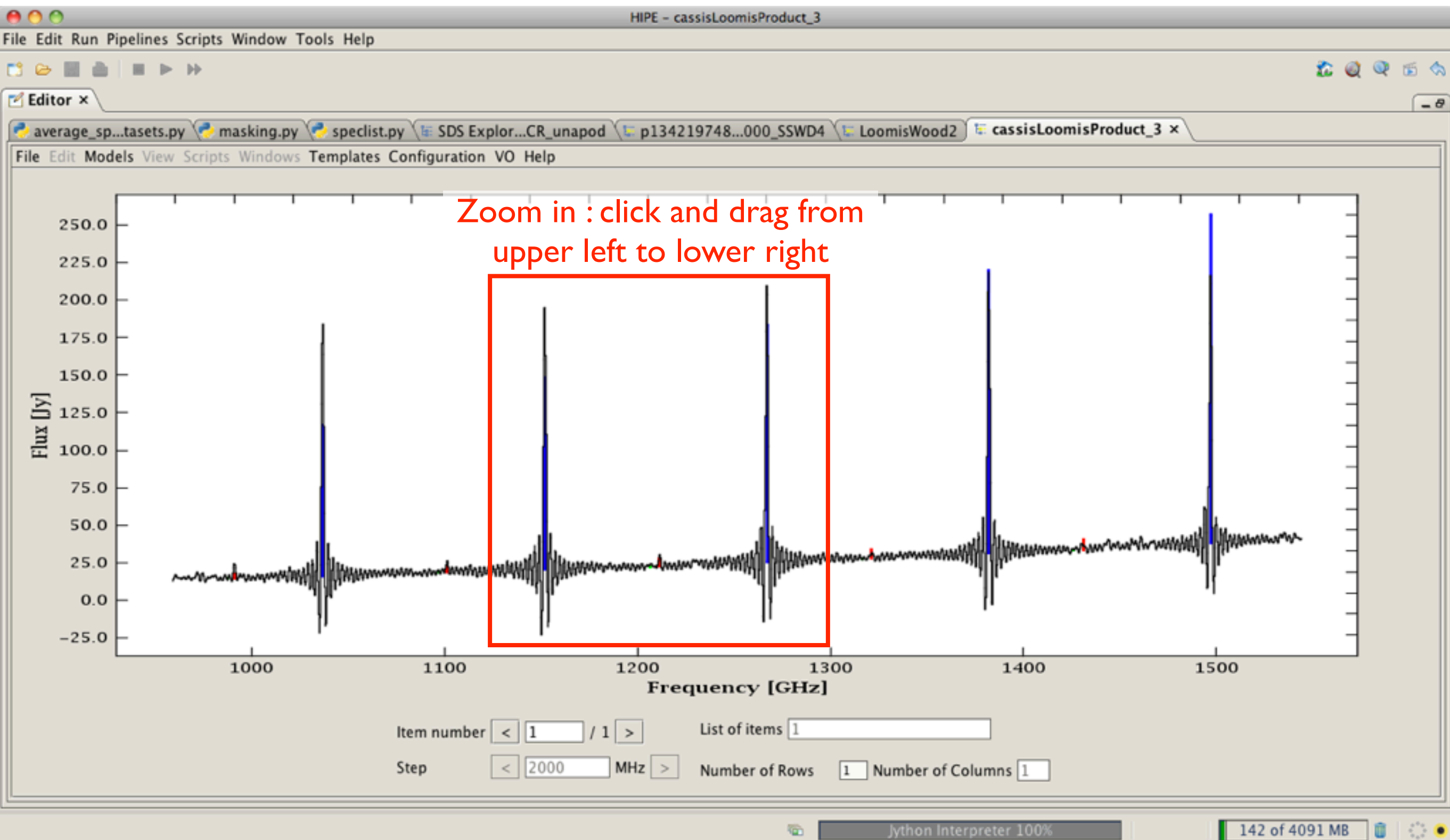
1. Change again thresholds and parameters

2. Click Display

jython Interpreter 100%

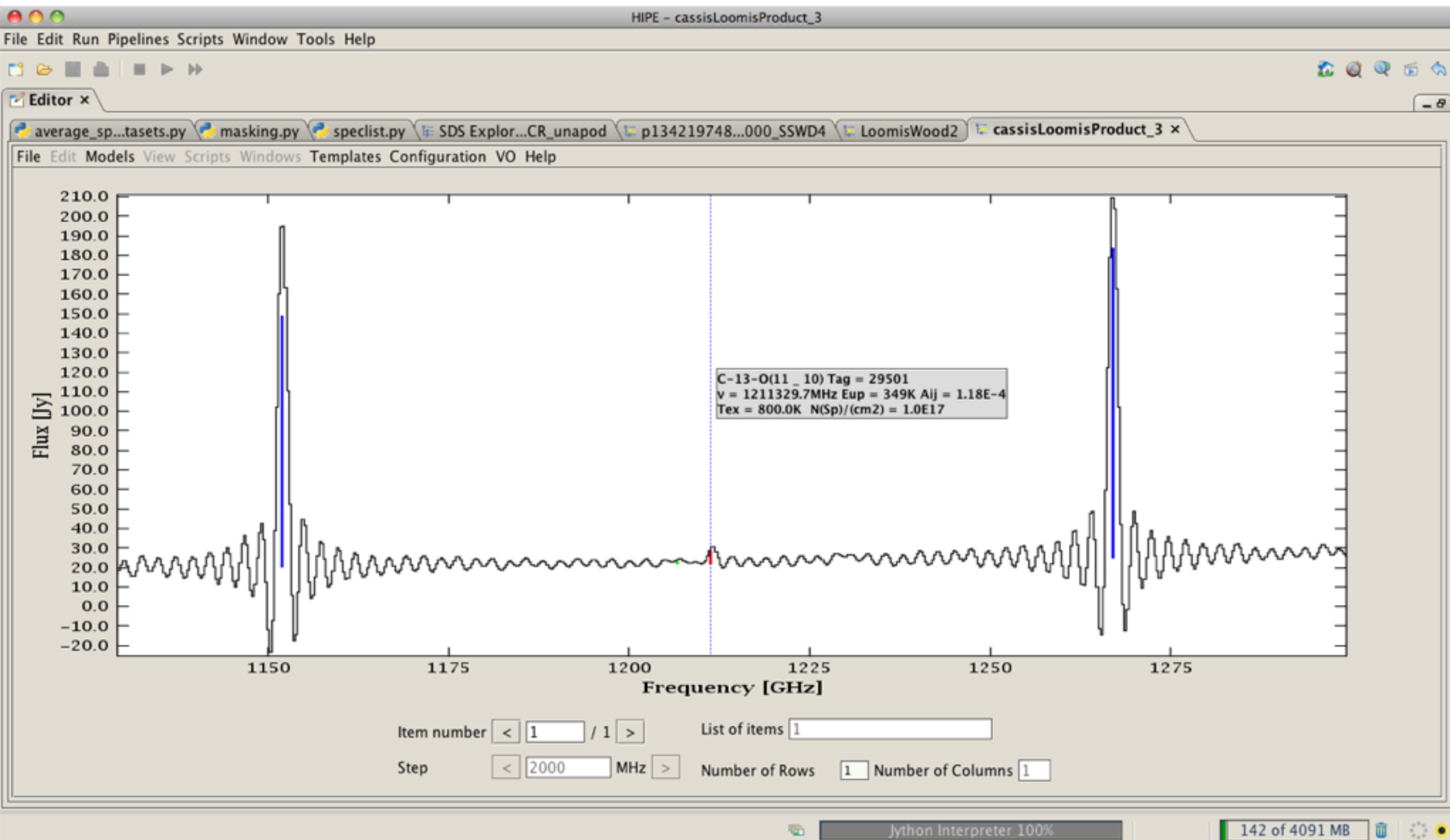
142 of 4091 MB

3. Spectrum Id Loomis-Wood : adding continuum



3. Spectrum Id Loomis-Wood :

adding continuum



The screenshot shows the LoomisWood1 software interface. At the top, a list of species is displayed, with 'CO' selected. A red circle highlights 'CO' and a red arrow points to it from the text '2. Enter name of species (case-sensitive)'. Another red arrow points to the 'CO' entry in the list from the text '3. Click on desired species and hit "Return"'. Below the species list, there are input fields for 'sr', 'km/s', and 'Telescope'. The 'Telescope' field is set to 'SPIRE'. The 'Tuning' section shows 'Range Min: 959.336' and 'Max: 1543.9312'. The 'Threshold' section shows 'Eup min: 0.0' and 'max: 150.0'. The 'Loomis Wood' section shows 'ISM' and 'Continuum 0 [K]'. The 'V_{lsr} [km/s]' field is set to '0'. The 'Emission' dropdown is set to 'Emission'. At the bottom, a table lists species and their properties. A red circle highlights the 'Species' column header, and a red arrow points to it from the text '1. Right-click ⇒ brings up search window'. The table has columns for 'Species', 'Tag', 'Compute', 'N(Sp) (/cm2)', and 'Tex(K)'. The species listed are H2D+, HD2+, C-atom, C-13, CH, CH+, CH2, C-13-H+, C-13-H+, v=1-0, CD+, v=1-0, NH, NH2, ND, CH2D+, OH+, and NH2D.

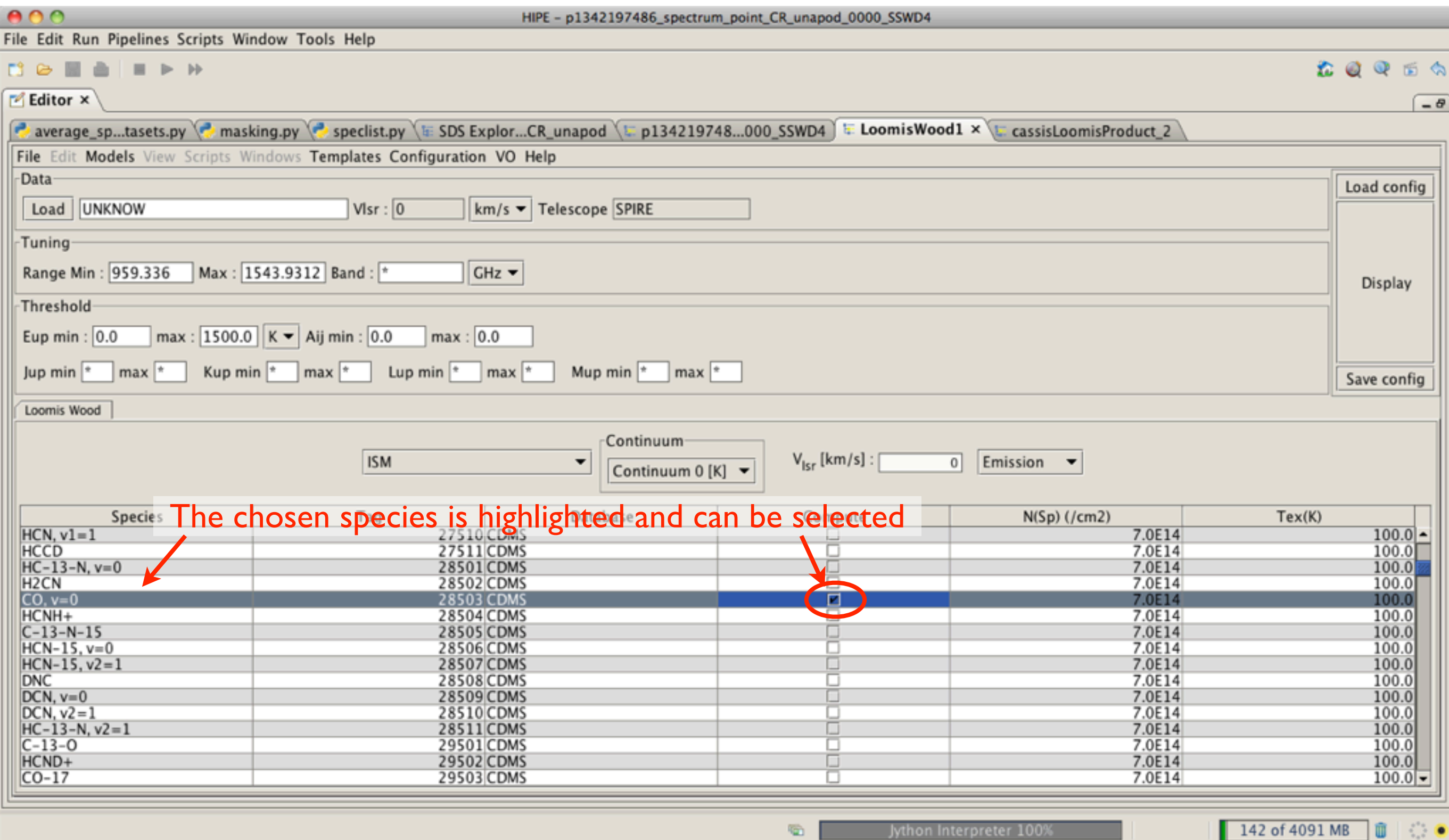
2. Enter name of species (case-sensitive)

3. Click on desired species and hit "Return"

1. Right-click ⇒ brings up search window

Species	Tag	Compute	N(Sp) (/cm2)	Tex(K)
H2D+	4501 CDMS	<input type="checkbox"/>	7.0E14	100.0
HD2+	5501 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-atom	12501 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13	13501 CDMS	<input type="checkbox"/>	7.0E14	100.0
CH	13502 CDMS	<input type="checkbox"/>	7.0E14	100.0
CH+	13503 CDMS	<input type="checkbox"/>	7.0E14	100.0
CH2	14501 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-H+	14502 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-H+, v=1-0	14504 CDMS	<input type="checkbox"/>	7.0E14	100.0
CD+, v=1-0	14505 CDMS	<input type="checkbox"/>	7.0E14	100.0
NH	15501 CDMS	<input type="checkbox"/>	7.0E14	100.0
NH2	16501 CDMS	<input type="checkbox"/>	7.0E14	100.0
ND	16502 CDMS	<input type="checkbox"/>	7.0E14	100.0
CH2D+	16503 CDMS	<input type="checkbox"/>	7.0E14	100.0
OH+	17501 CDMS	<input type="checkbox"/>	7.0E14	100.0
NH2D	18501 CDMS	<input type="checkbox"/>	7.0E14	100.0

A-3. Creating your template within L-W



The screenshot shows the L-W (Loomis Wood) software interface. The 'Loomis Wood' tab is active, displaying a table of species and their properties. A red arrow points to the 'Species' column, and another red arrow points to a checked checkbox in the 'N(Sp) (/cm2)' column for the 'CO, v=0' species.

The table contains the following data:

Species	Model	Continuum	N(Sp) (/cm2)	Tex(K)
HCN, v1=1	27510 CDMS	<input type="checkbox"/>	7.0E14	100.0
HCCD	27511 CDMS	<input type="checkbox"/>	7.0E14	100.0
HC-13-N, v=0	28501 CDMS	<input type="checkbox"/>	7.0E14	100.0
H2CN	28502 CDMS	<input type="checkbox"/>	7.0E14	100.0
CO, v=0	28503 CDMS	<input checked="" type="checkbox"/>	7.0E14	100.0
HCNH+	28504 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-N-15	28505 CDMS	<input type="checkbox"/>	7.0E14	100.0
HCN-15, v=0	28506 CDMS	<input type="checkbox"/>	7.0E14	100.0
HCN-15, v2=1	28507 CDMS	<input type="checkbox"/>	7.0E14	100.0
DNC	28508 CDMS	<input type="checkbox"/>	7.0E14	100.0
DCN, v=0	28509 CDMS	<input type="checkbox"/>	7.0E14	100.0
DCN, v2=1	28510 CDMS	<input type="checkbox"/>	7.0E14	100.0
HC-13-N, v2=1	28511 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-O	29501 CDMS	<input type="checkbox"/>	7.0E14	100.0
HCND+	29502 CDMS	<input type="checkbox"/>	7.0E14	100.0
CO-17	29503 CDMS	<input type="checkbox"/>	7.0E14	100.0



A-3. Creating your template within L-W

Repeat the search and selection steps for isotopologues of CO :
 ^{13}CO , C^{18}O , C^{17}O , $^{13}\text{C}^{18}\text{O}$, $^{13}\text{C}^{17}\text{O}$.

Note that, for example, ^{13}CO and C^{18}O are listed as C-13-O and CO-18

A-3. Creating your template within L-W

The screenshot shows the L-W (LoomisWood) software interface. The main window has a menu bar with 'File', 'Edit', 'Run', 'Pipelines', 'Scripts', 'Window', 'Tools', and 'Help'. Below the menu bar is a toolbar with various icons. The main panel is divided into several sections: 'Data' (with 'Load' button and 'UNKNOWN' text), 'Tuning' (with 'Range Min', 'Max', 'Band', and 'GHz' dropdown), 'Threshold' (with 'Eup min', 'max', 'K' dropdown, 'Aij min', 'max', and several 'Jup min', 'max', 'Kup min', 'max', 'Lup min', 'max', 'Mup min', 'max' fields), and a table of species data. The table has columns for 'Species', 'Compute', 'N(Sp) (/cm2)', and 'Tex(K)'. A 'Save Template' dialog box is open in the foreground, with the text 'Save template as:' and 'CO-isotopologues' in the input field. The dialog has 'OK' and 'Cancel' buttons. A red circle highlights the 'Save Template' button in the background, and a red arrow points to the input field in the dialog box.

1. Click on "Save Template"

2. In the pop-up that appears, write the name of your choice

Species	Compute	N(Sp) (/cm2)	Tex(K)
HC-13-N-15, v2=1	<input type="checkbox"/>	7.0E14	100.0
HC-13-NH+	<input type="checkbox"/>	7.0E14	100.0
H2CO	<input type="checkbox"/>	7.0E14	100.0
CO-18	<input checked="" type="checkbox"/>	7.0E14	100.0
C-13-O-17	<input checked="" type="checkbox"/>	7.0E14	100.0
HCO-17+	<input type="checkbox"/>	7.0E14	100.0
DOC+	<input type="checkbox"/>	7.0E14	100.0
N-15-NH+	<input type="checkbox"/>	7.0E14	100.0
NN-15-H+	<input type="checkbox"/>	7.0E14	100.0
N2D+	<input type="checkbox"/>	7.0E14	100.0
DC-13-N-15	<input type="checkbox"/>	7.0E14	100.0
HDCO	<input type="checkbox"/>	7.0E14	100.0
C-13-O-18	<input checked="" type="checkbox"/>	7.0E14	100.0
H2C-13-O	<input type="checkbox"/>	7.0E14	100.0
H2COH+	<input type="checkbox"/>	7.0E14	100.0
HCO-18+	<input type="checkbox"/>	7.0E14	100.0

A-3. Creating your template within L-W

The screenshot displays the L-W (Loomis Wood) software interface. The main window has a menu bar (File, Edit, Run, Pipelines, Scripts, Window, Tools, Help) and a toolbar. The 'Editor' tab is active, showing a file named 'average_sp...tassets.py'. The 'Data' section includes a 'Load' button, a text field with 'UNKNOWN', a 'Vlsr' field with '0', a 'km/s' unit dropdown, and a 'Telescope' field with 'SPIRE'. The 'Tuning' section has 'Range Min' (959.336), 'Max' (1543.9312), 'Band' (*), and 'GHz' unit. The 'Threshold' section has 'Eup min' (0.0), 'max' (1500.0), 'K' unit, 'Aij min' (0.0), 'max' (0.0), and several other fields for 'Jup min', 'Kup min', 'Lup min', and 'Mup min'. The 'Loomis Wood' section has a 'Save Template' button, a 'Continuum' dropdown (Continuum 0 [K]), a 'Vlsr [km/s]' field (0), and an 'Emission' dropdown. A table with columns 'Species', 'T', 'Compute', 'N(Sp) (/cm2)', and 'Tex(K)' is visible. A 'Template Information' dialog box is open, showing 'New template added' and an 'OK' button. The status bar at the bottom shows 'Jython Interpreter 100%' and '142 of 4091 MB'.

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood1 x cassisLoomisProduct_2

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOWN Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 1500.0 K Aij min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

Loomis Wood

Save Template Continuum Continuum 0 [K] Vlsr [km/s] : 0 Emission

Species	T	Compute	N(Sp) (/cm2)	Tex(K)
HC-13-N-15, v2=1		<input type="checkbox"/>	7.0E14	100.0
HC-13-NH+		<input type="checkbox"/>	7.0E14	100.0
H2CO		<input type="checkbox"/>	7.0E14	100.0
CO-18		<input checked="" type="checkbox"/>	7.0E14	100.0
C-13-O-17		<input checked="" type="checkbox"/>	7.0E14	100.0
HCO-17+		<input type="checkbox"/>	7.0E14	100.0
DOC+	30506 CDMS	<input type="checkbox"/>	7.0E14	100.0
N-15-NH+	30507 CDMS	<input type="checkbox"/>	7.0E14	100.0
NN-15-H+	30508 CDMS	<input type="checkbox"/>	7.0E14	100.0
N2D+	30509 CDMS	<input type="checkbox"/>	7.0E14	100.0
DC-13-N-15	30511 CDMS	<input type="checkbox"/>	7.0E14	100.0
HDCO	31501 CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-O-18	31502 CDMS	<input checked="" type="checkbox"/>	7.0E14	100.0
H2C-13-O	31503 CDMS	<input type="checkbox"/>	7.0E14	100.0
H2COH+	31504 CDMS	<input type="checkbox"/>	7.0E14	100.0
HCO-18+	31506 CDMS	<input type="checkbox"/>	7.0E14	100.0

Template Information

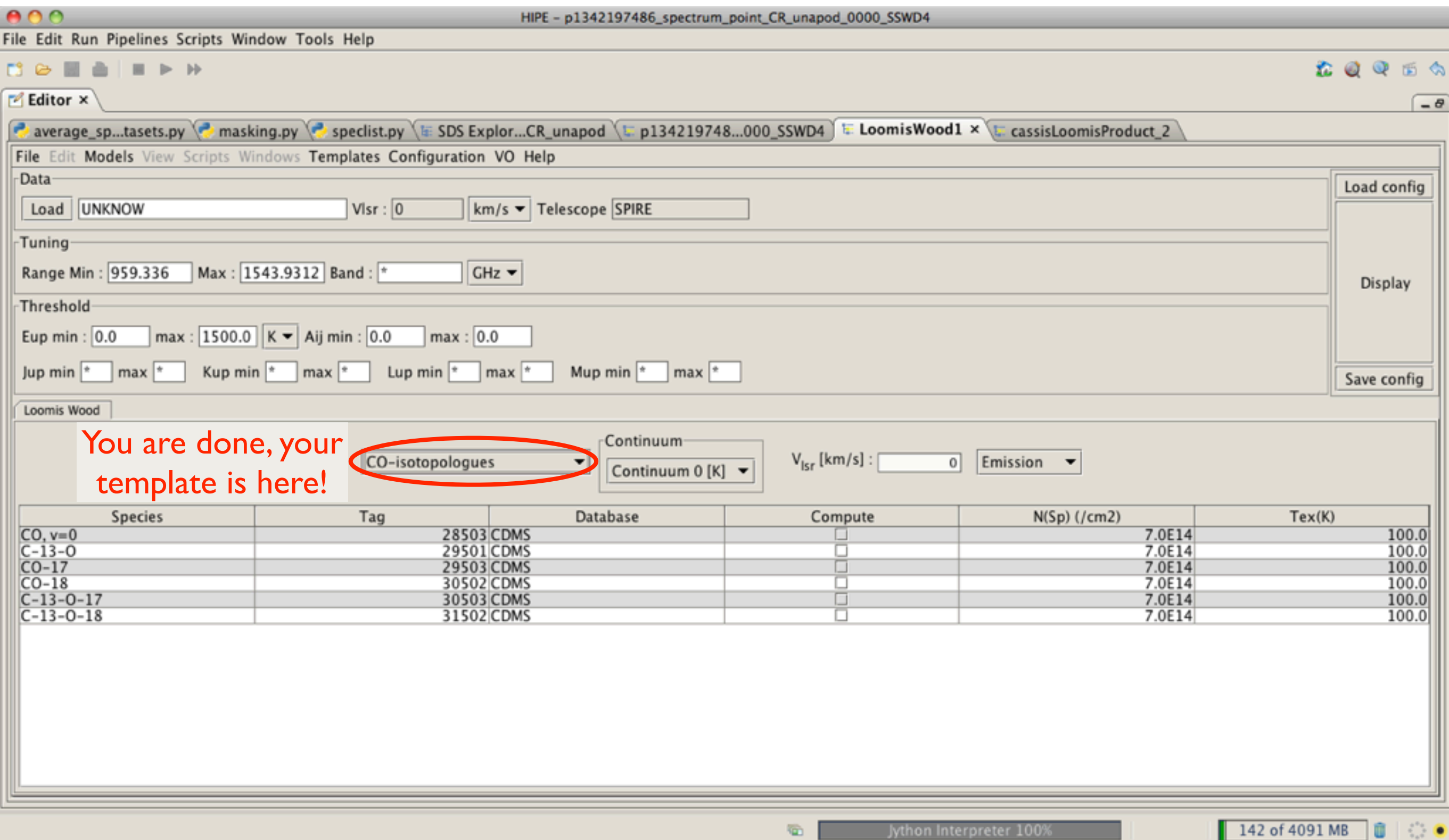
New template added

OK

Jython Interpreter 100%

142 of 4091 MB

A-3. Creating your template within L-W



HIPE - p1342197486_spectrum_point_CR_unapod_0000_SSWD4

File Edit Run Pipelines Scripts Window Tools Help

Editor x

average_sp...tassets.py masking.py speclist.py SDS Explor...CR_unapod p134219748...000_SSWD4 LoomisWood1 x cassisLoomisProduct_2

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOW Vlsr : 0 km/s Telescope SPIRE

Tuning

Range Min : 959.336 Max : 1543.9312 Band : * GHz

Threshold

Eup min : 0.0 max : 1500.0 K Aij min : 0.0 max : 0.0

Jup min * max * Kup min * max * Lup min * max * Mup min * max *

Loomis Wood

You are done, your template is here!

CO-isotopologues

Continuum

Continuum 0 [K]

Vlsr [km/s] : 0 Emission

Species	Tag	Database	Compute	N(Sp) (/cm2)	Tex(K)
CO, v=0	28503	CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-O	29501	CDMS	<input type="checkbox"/>	7.0E14	100.0
CO-17	29503	CDMS	<input type="checkbox"/>	7.0E14	100.0
CO-18	30502	CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-O-17	30503	CDMS	<input type="checkbox"/>	7.0E14	100.0
C-13-O-18	31502	CDMS	<input type="checkbox"/>	7.0E14	100.0

jython Interpreter 100%

142 of 4091 MB

4. Spectrum Id Analysis

The screenshot displays the HIPE (Herschel Interactive Pipeline Environment) software interface. The main window is titled "HIPE - hspirespectrometer1342189124_a1060001_20spss". The interface includes a menu bar (File, Edit, Run, Pipelines, Scripts, Window, Tools, Help), a toolbar, and several panels:

- Editor:** Contains tabs for "average_sp...taset.py", "masking.py", "speclist.py", and "SDS Explor...01_20spss". The "SDS Explor...01_20spss" tab is active, showing a "Display Panel" with "SLW" and "SSW" views. The "SLW" view displays a circular arrangement of detector labels (A1-A5, B1-B5, C1-C5, D1-D5, E1-E5). The "SSW" view displays a similar arrangement with labels A1-A5, B1-B5, C1-C5, D1-D7, E1-E6, F1-F5, G1-G4.
- Control Panel:** Located at the bottom left, it includes a "Scan Selection" section with checkboxes for "Forward" and "Reverse", a "Single" radio button, and a "Thumbnails" section with a "Select th..." button.
- Preferences Panel:** Located at the bottom right, it includes a "Nominal detectors only" checkbox, an "Unvignetted only" checkbox, an "Initial scale" section with "User" and "Passband" options, and a "Legend" section with a "Legend" checkbox and an "Errors" input field.
- Tasks:** A panel on the right side showing a list of tasks, including "Cassis Spectrum1d Analysis", "Cassis Spectrum1d Loomis Wood", "Spectrum Explorer (SpectrumContainer)", "Power Spectrum Generator", "TablePlotter", "OverPlotter", "Dataset Viewer", and "Cassis Spectrum1d Line Analysis".
- Navigator:** A panel on the far right showing a file tree structure, including folders like "cassis-data", "Desktop", "Downloads", "Dropbox", and files like "hspirespectrometer1342189124_a1060001_20spss".

A red arrow points from the text "Right-click on the (spectrum1d) variable and select 'Open With Cassis Spectrum1d Analysis'" to the "Cassis Spectrum1d Analysis" option in the "Tasks" panel.

At the bottom of the interface, a console window shows the following commands and output:

```
HIPE> hspirespectrometer1342189124_a1060001_20spss 0000_SSWD4 =  
hspirespectrometer1342189124_a1060001_20spss["0000"]("SSWD4")  
HIPE>
```



4. Spectrum Id Analysis

Double-click to maximize/minimize

(Automatic)

Click

Can change these to display a restricted range

Editor x

average_sp...sets.py (Masking.py) spectst.py SDS Explor...01_20spss hspirespec...000_SSWD4 x

File Edit Models View Scripts Windows Templates Configuration VO Help

Data

Load UNKNOWN Vlsr: 0 km/s Telescope SPIRE

Tuning

Range Min: 31.2 Max: 51.8 cm-1 Signal Band

Load config

Display

Save config

Tasks x

All

Applicable

By Category

Variables x

hspirespectrometer1342189124

hspirespectrometer1342189124

Outline x

Name	Class	Package
hspirespectrometer1342189124	SpireSpectrumId	herschel.spire.ia.dataset

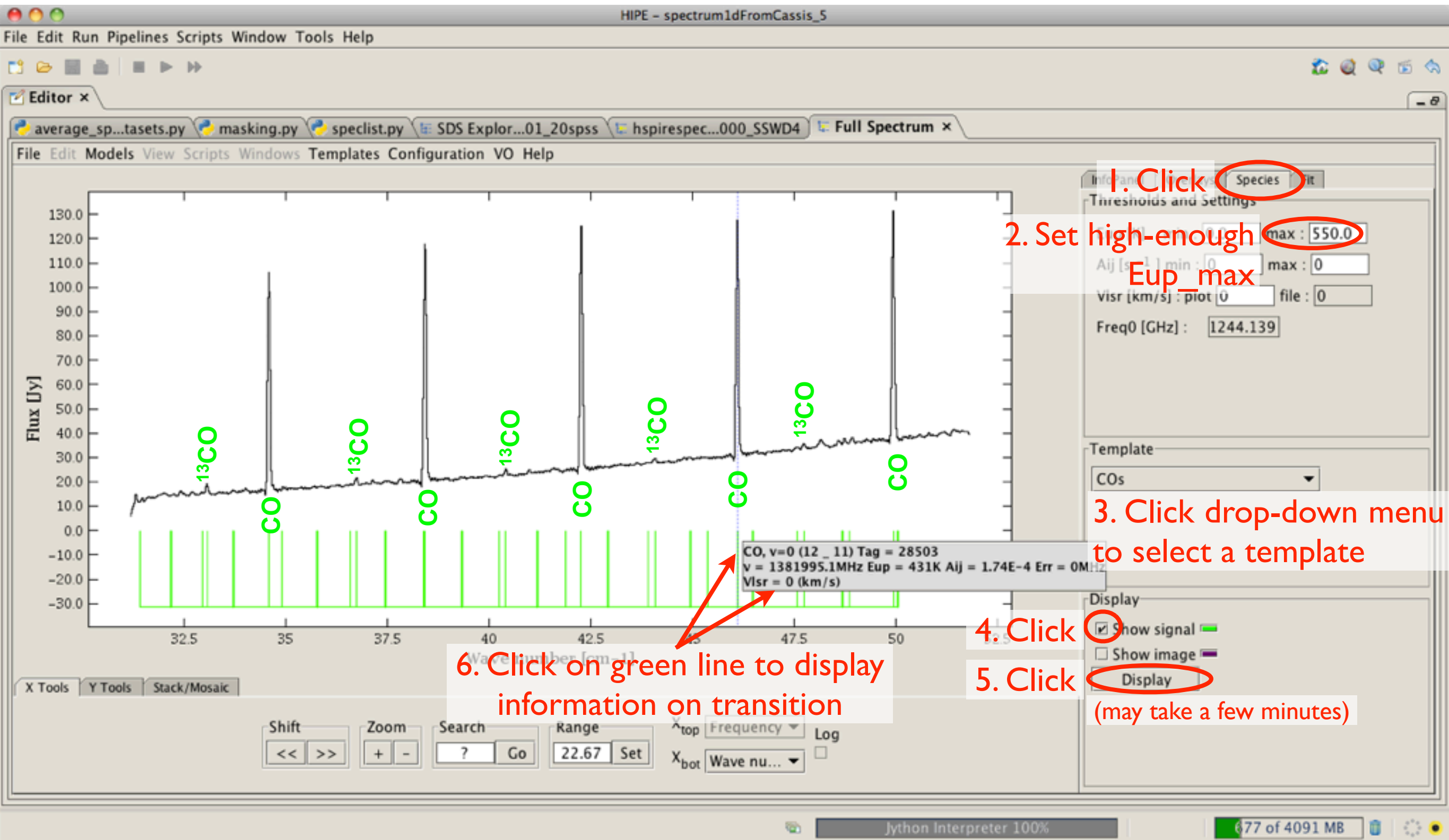
History Log Console x

```
/Users/bottine111/my_herschel_data/hspirespectrometer1342189124_a1060001_20spss.fits )
HIPE> hspirespectrometer1342189124_a1060001_20spss_0000_SSWD4 =
hspirespectrometer1342189124_a1060001_20spss["0000"]["SSWD4"]
HIPE>
```

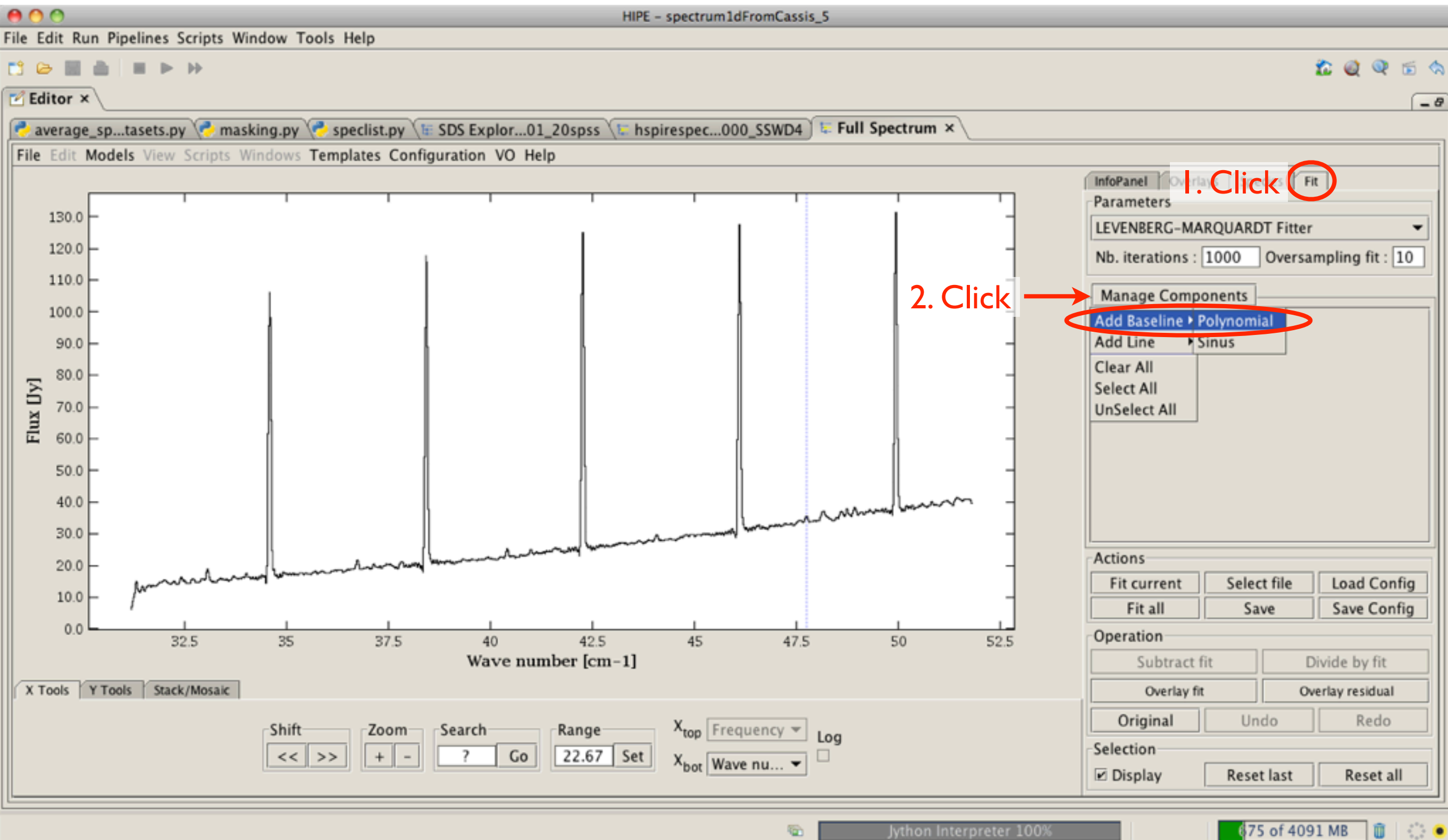
Jython Interpreter 100%

672 of 4091 MB

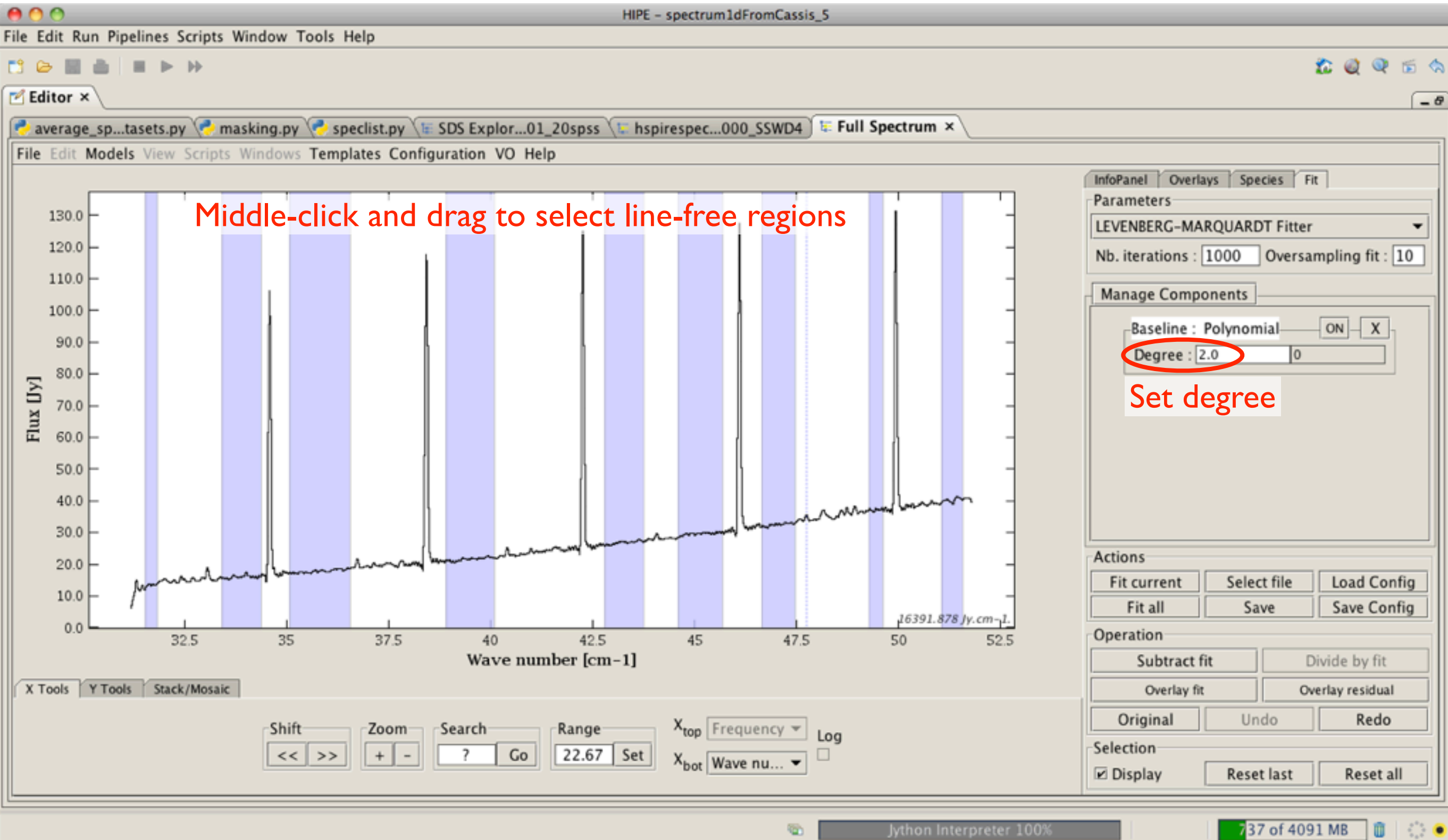
4.1. Line identification



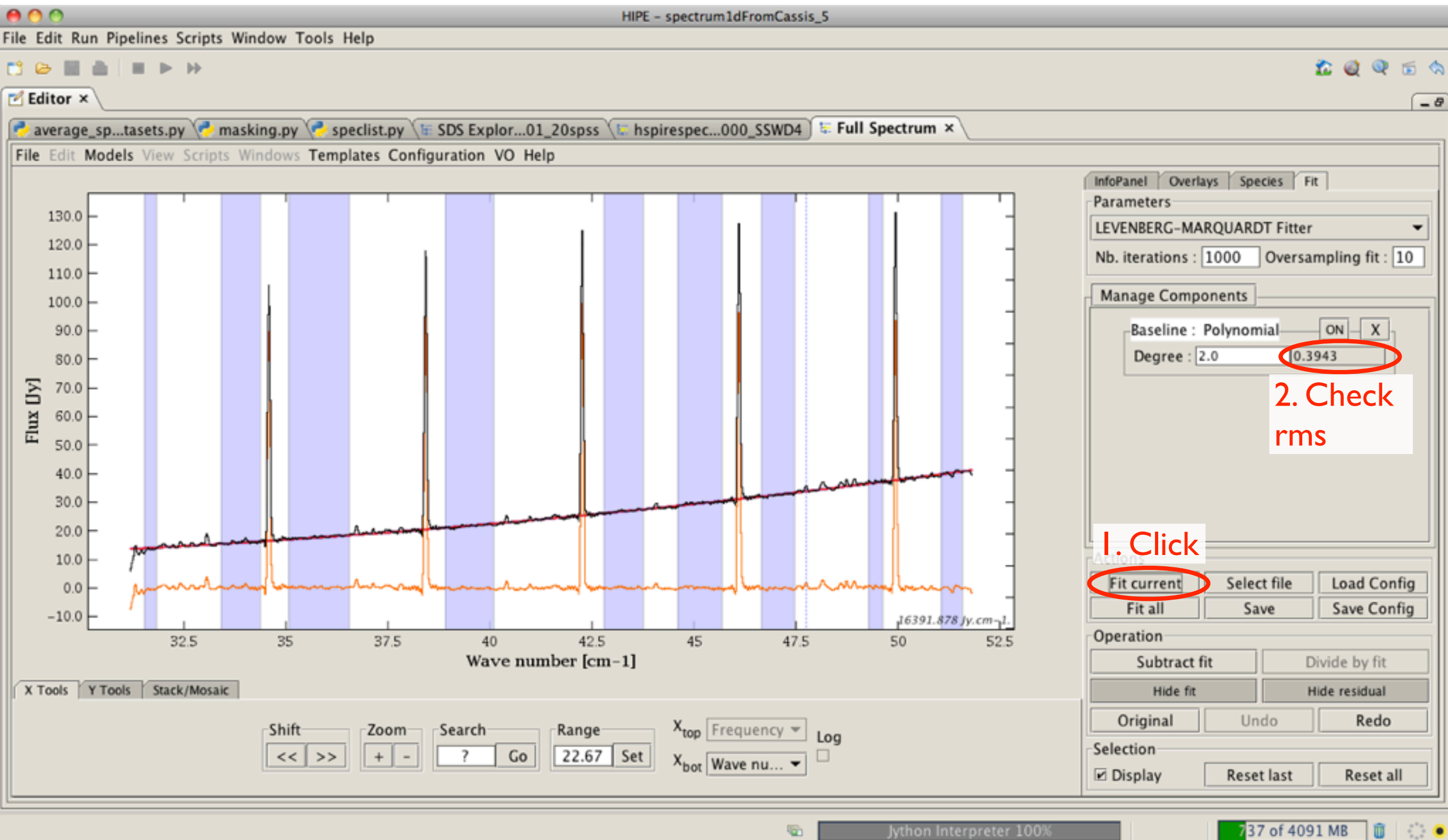
4.2. Baseline removal



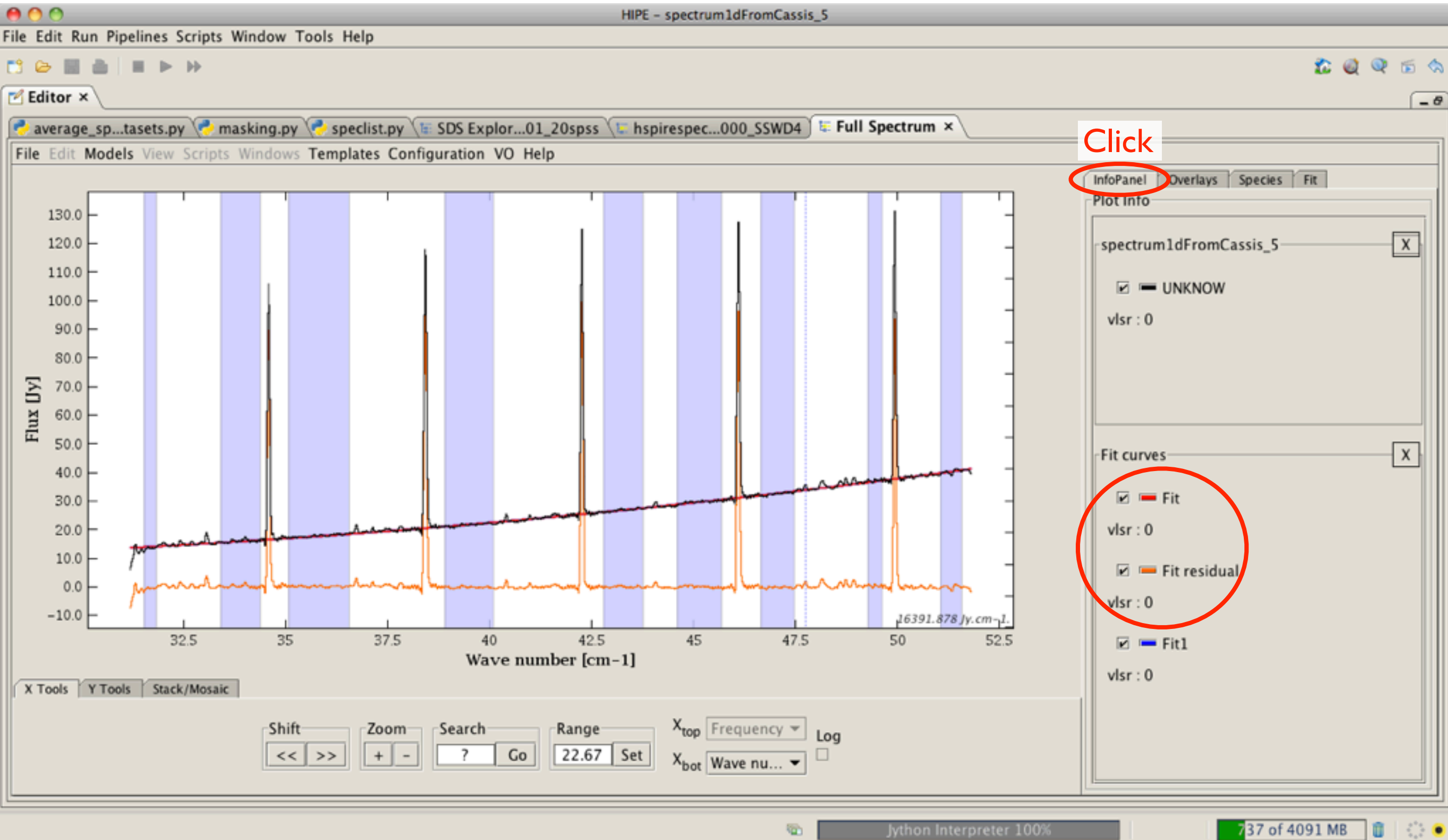
4.2. Baseline removal



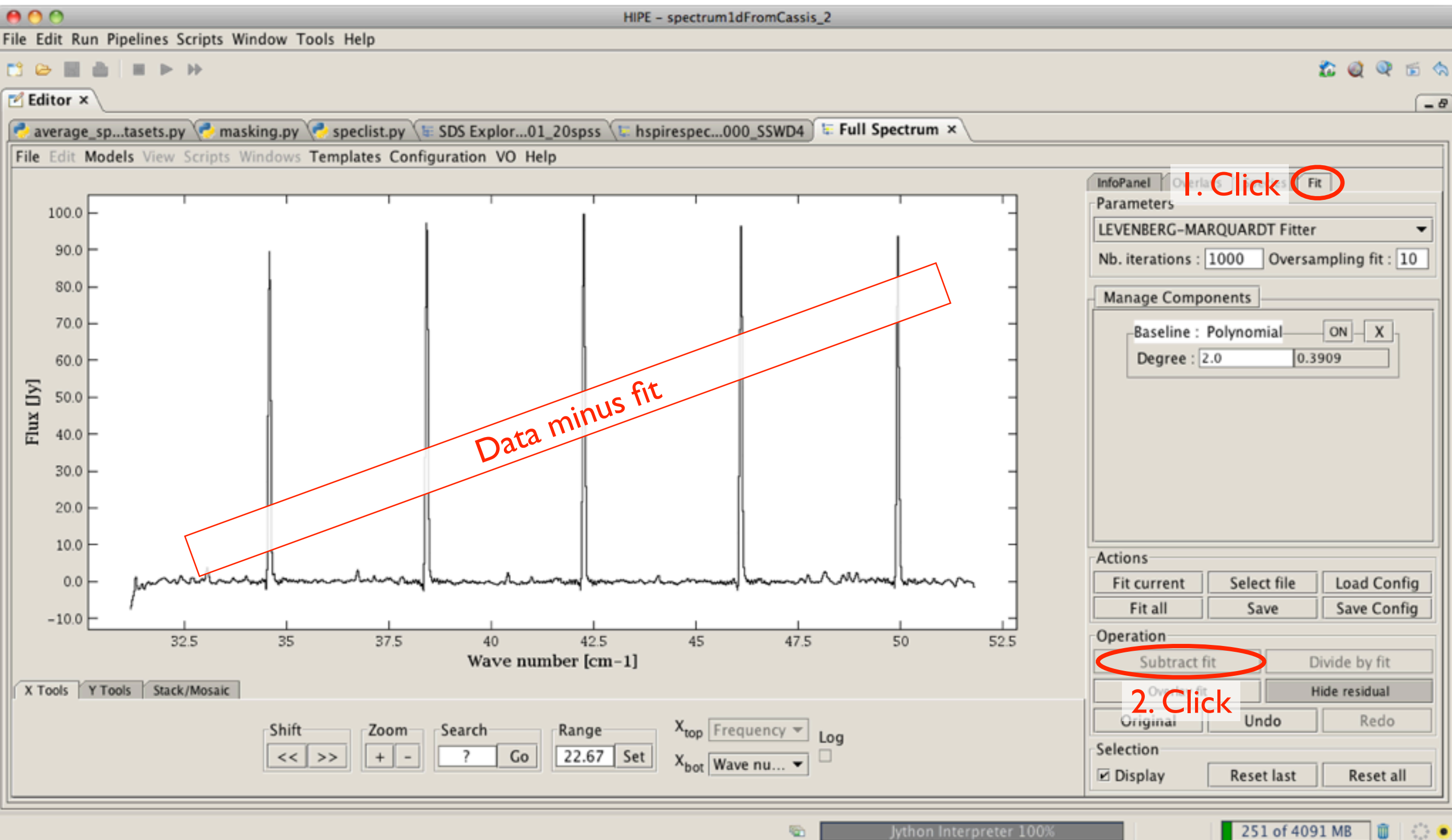
4.2. Baseline removal

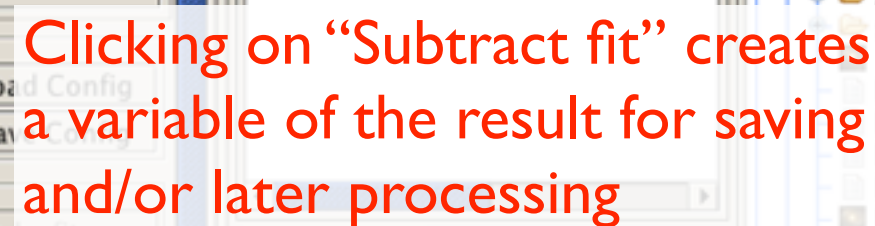


4.2. Baseline removal

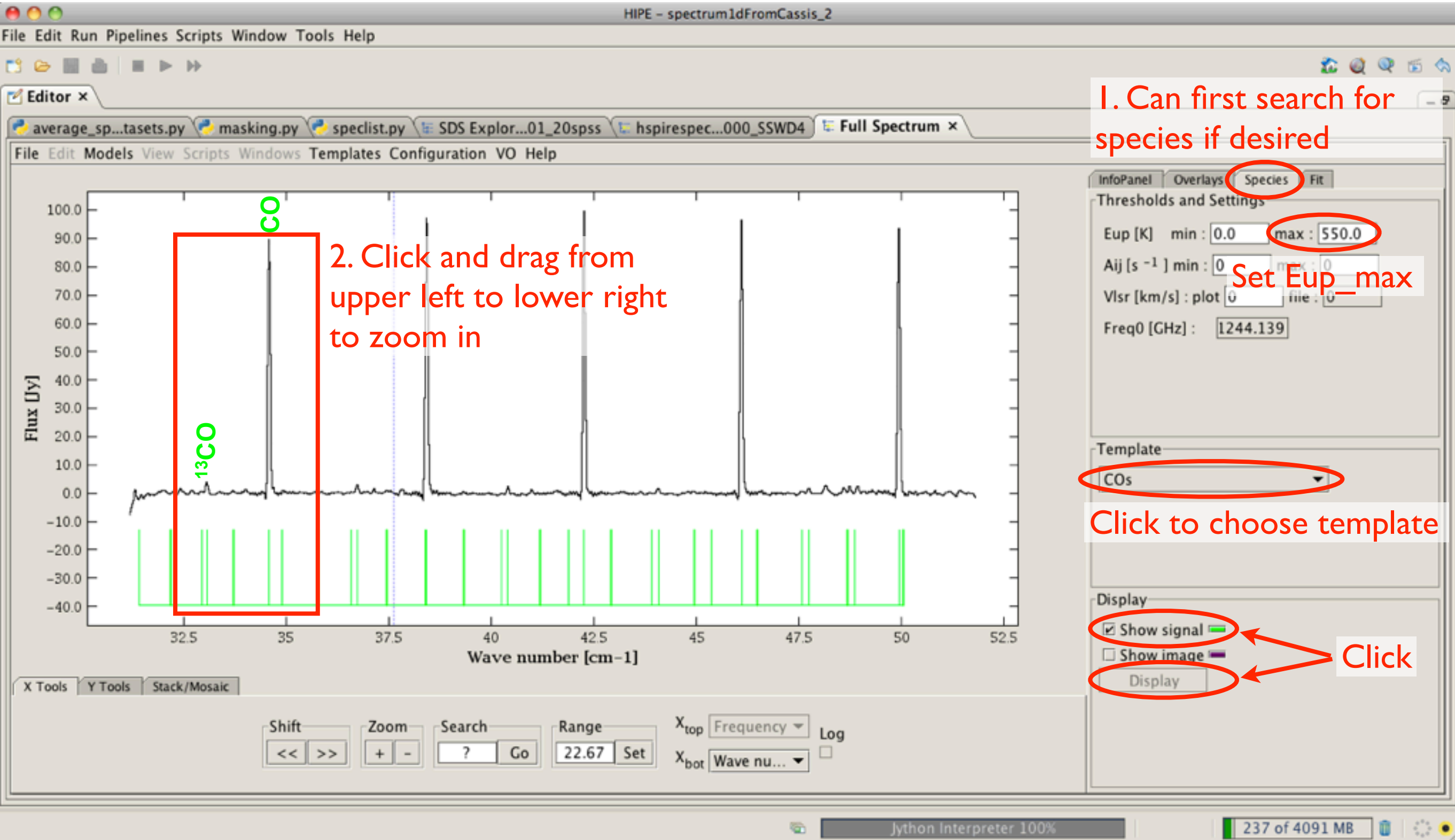


4.2. Baseline removal

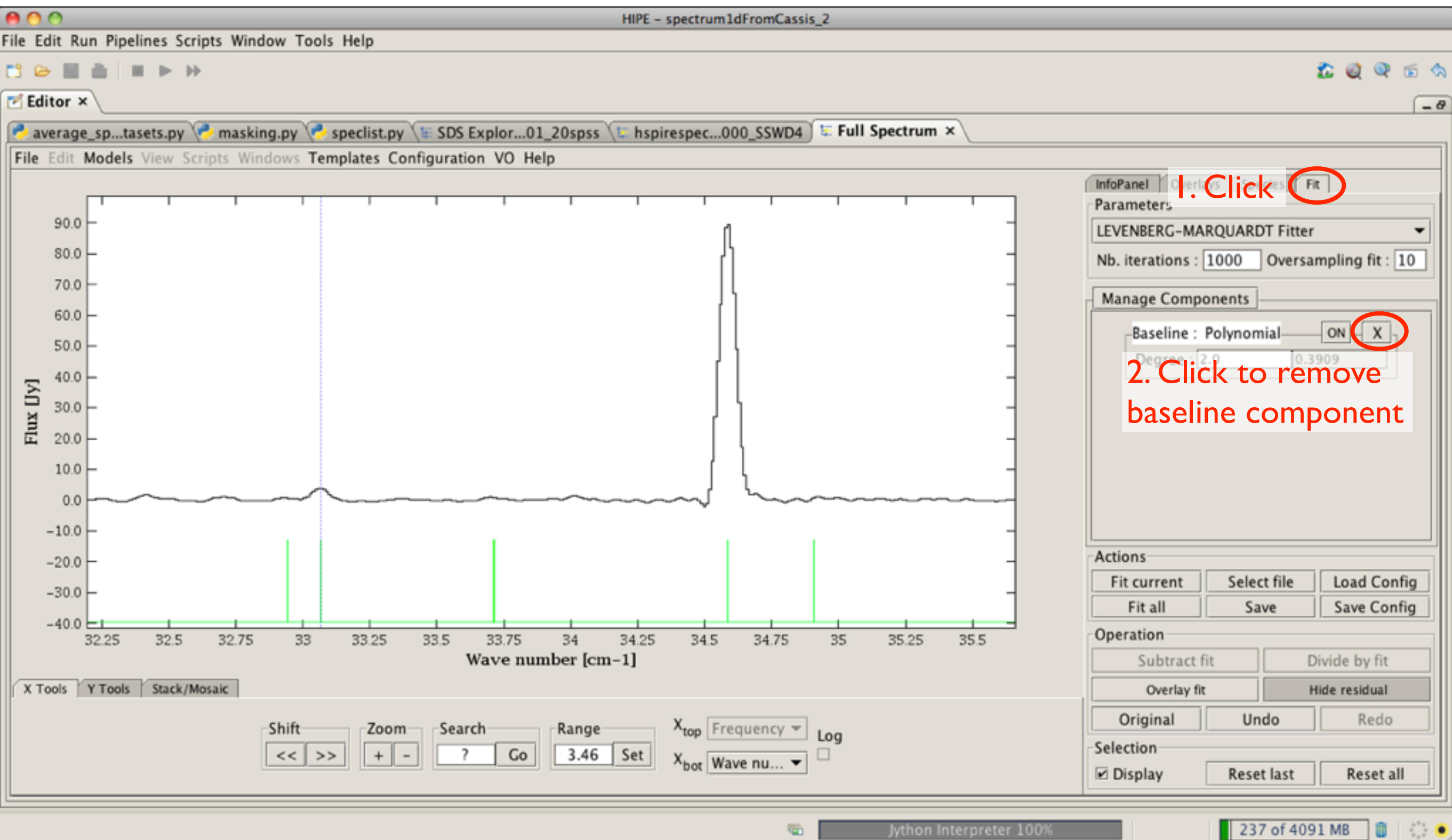




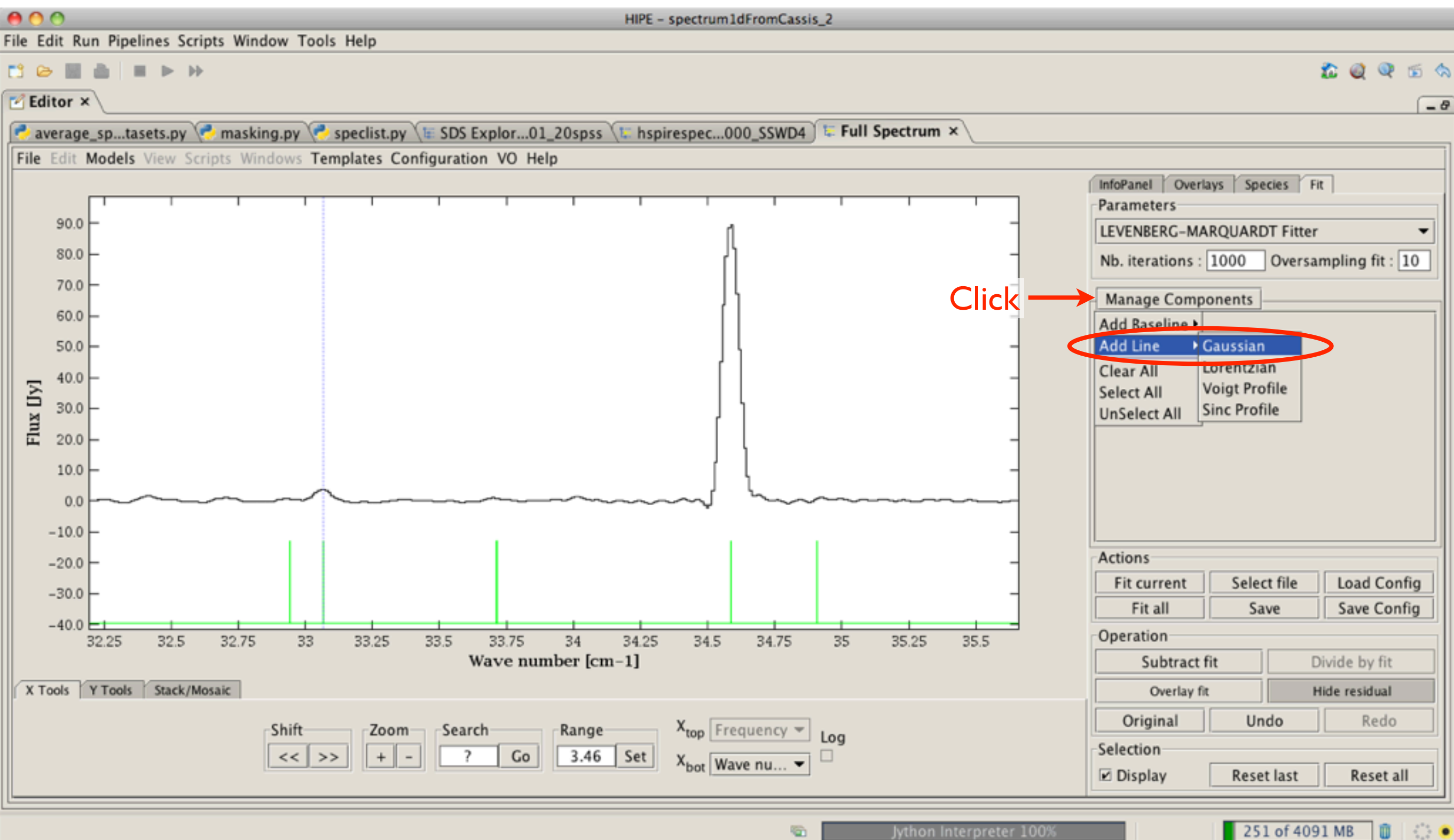
4.2. Line fitting



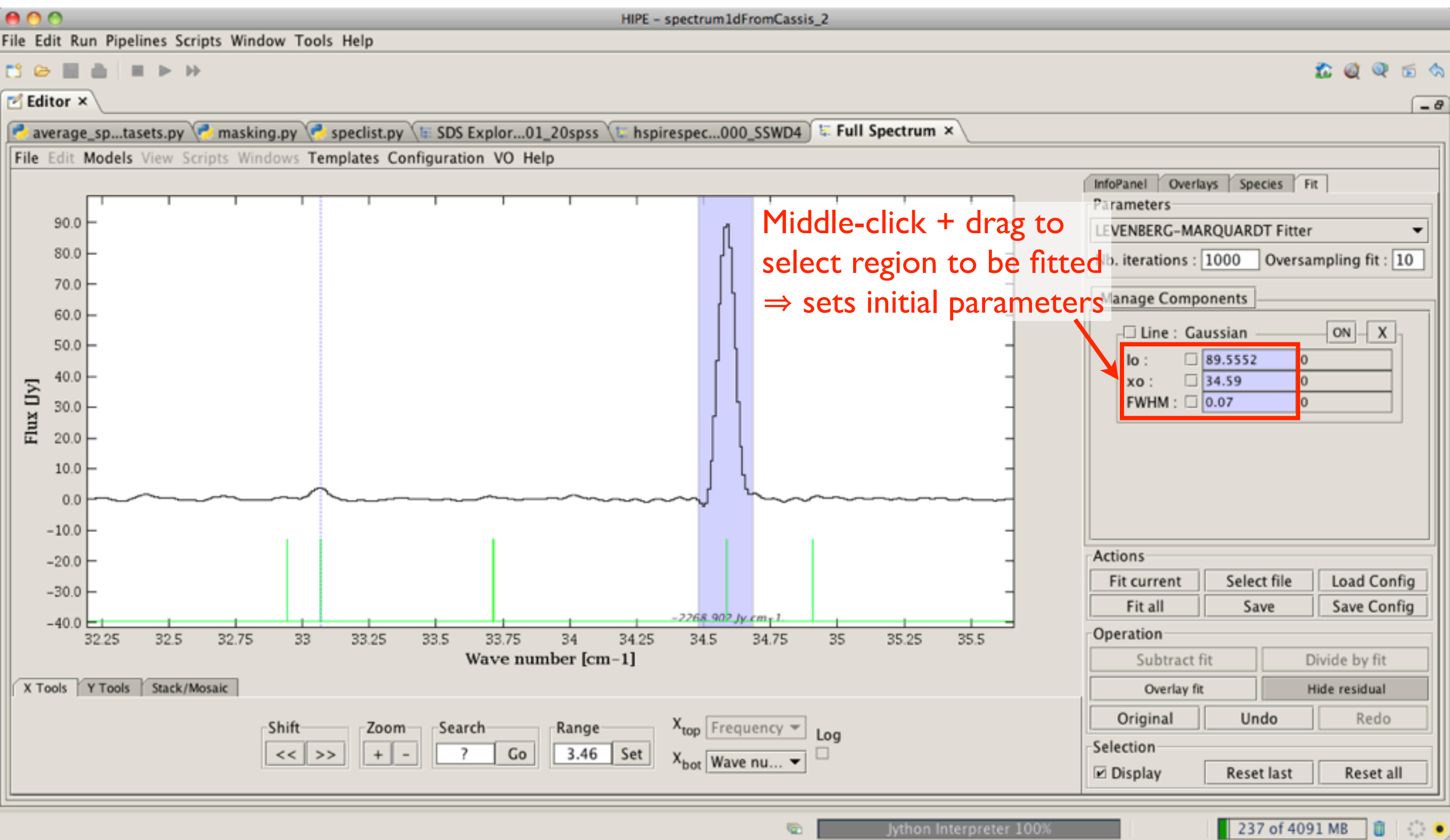
4.2. Line fitting



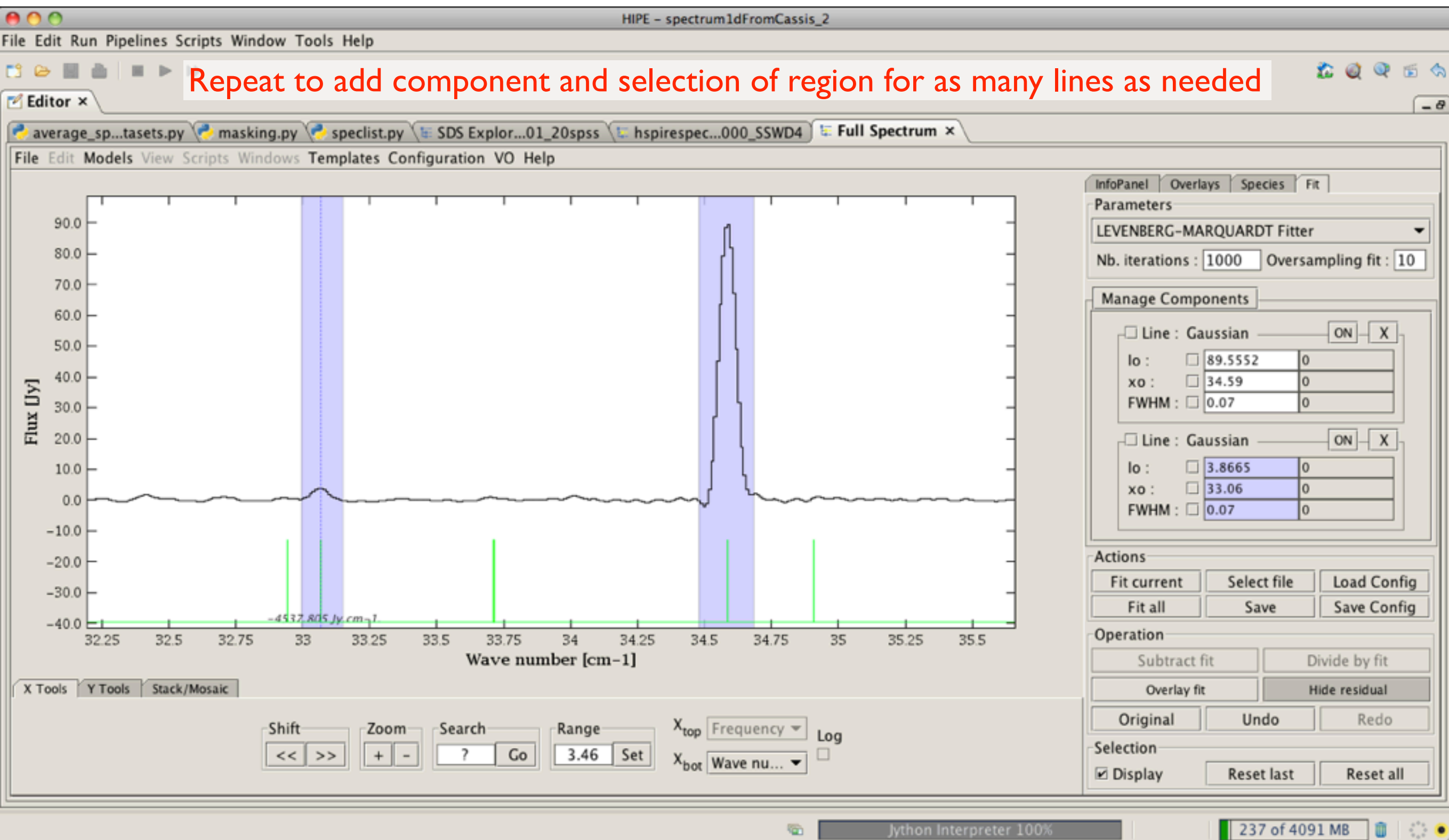
4.2. Line fitting



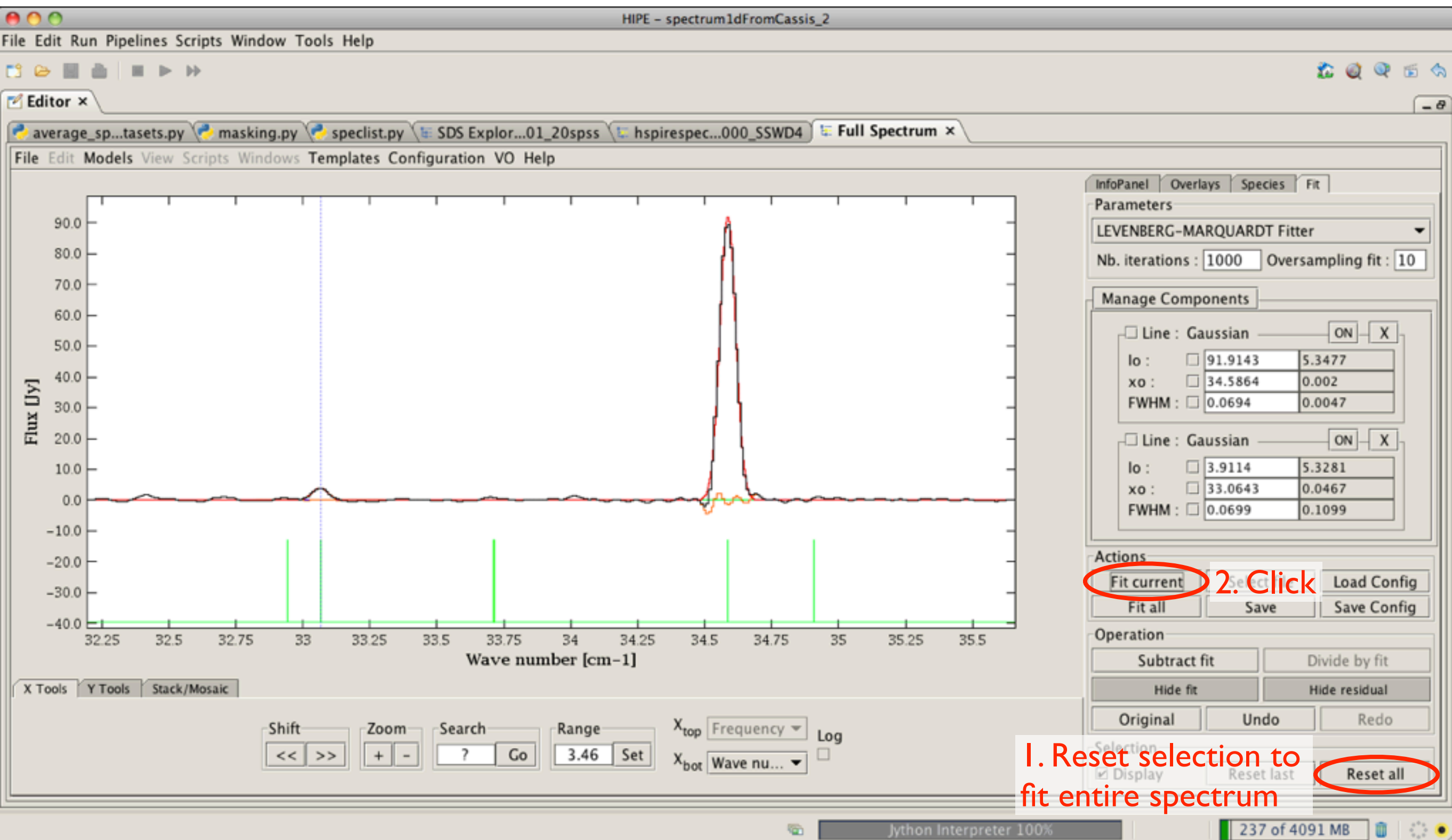
4.2. Line fitting



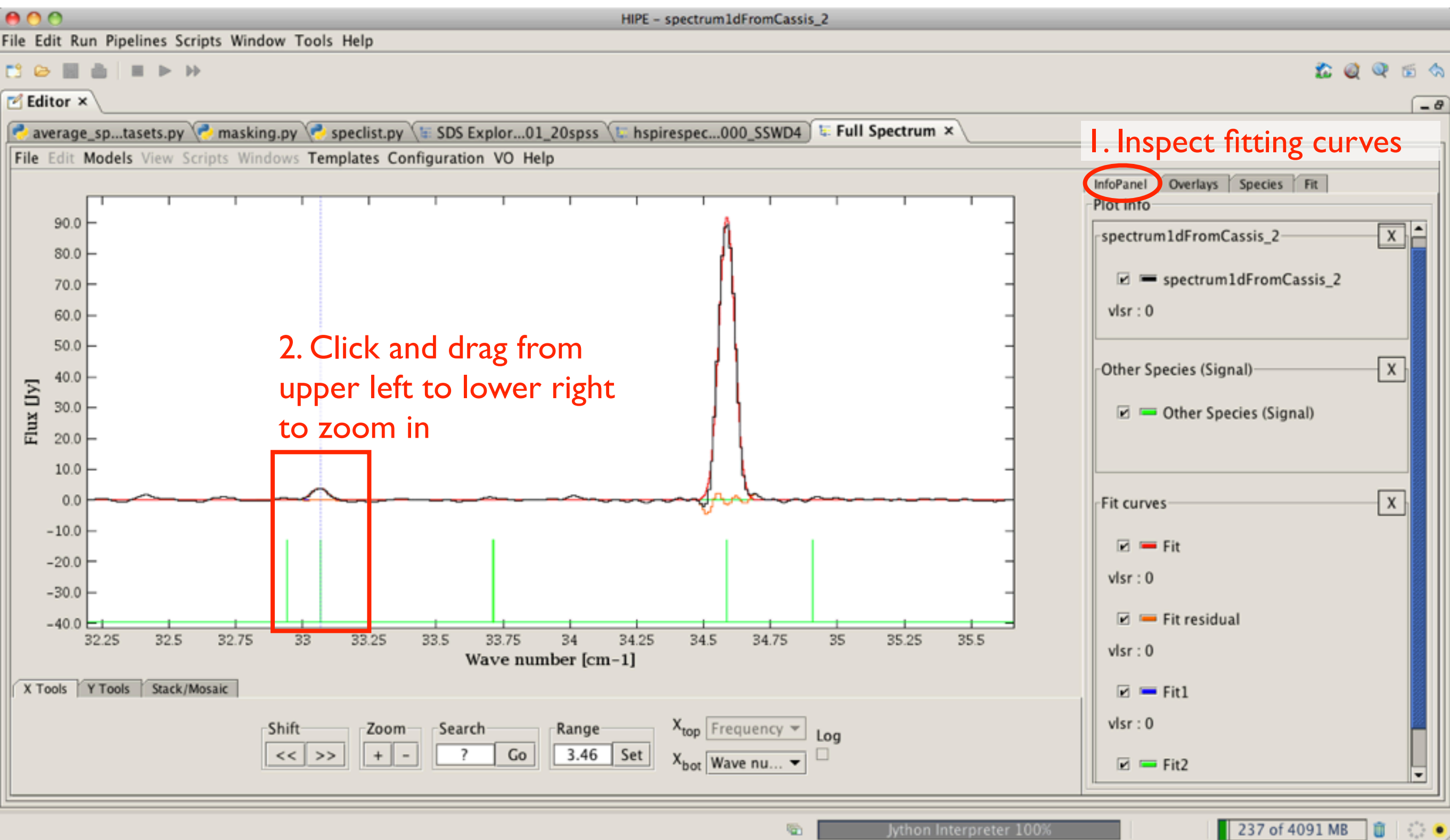
4.2. Line fitting



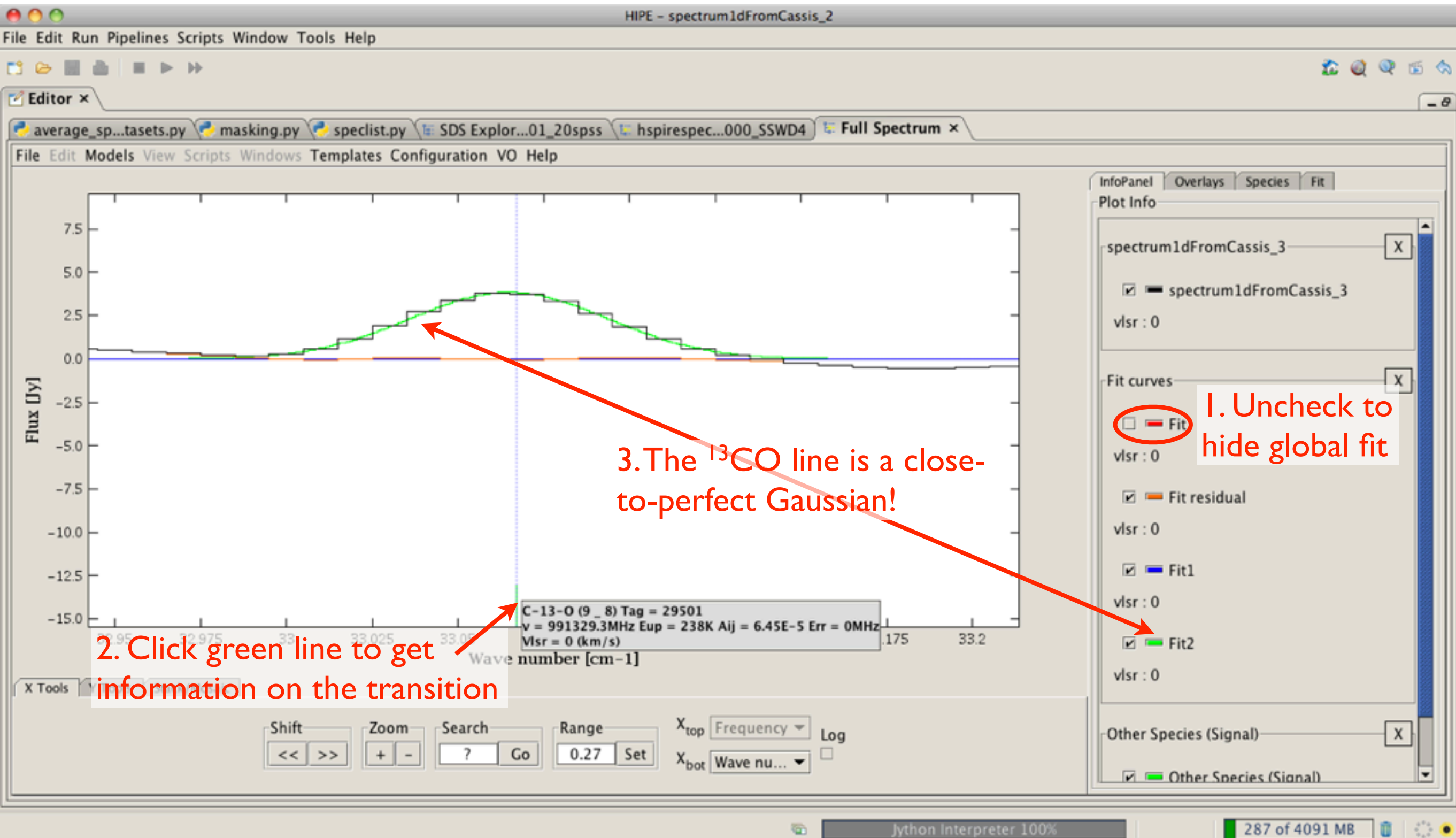
4.2. Line fitting



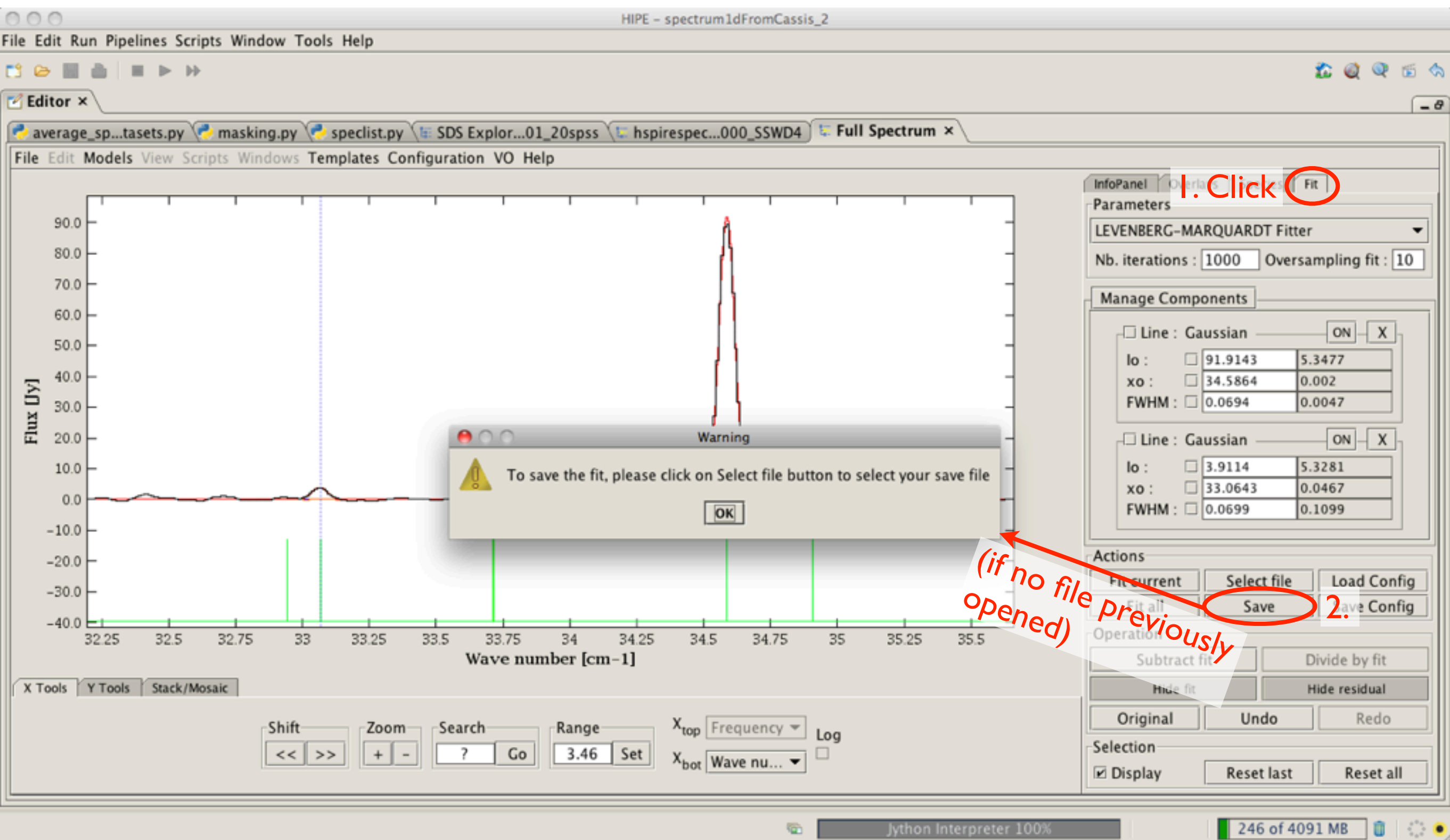
4.2. Line fitting



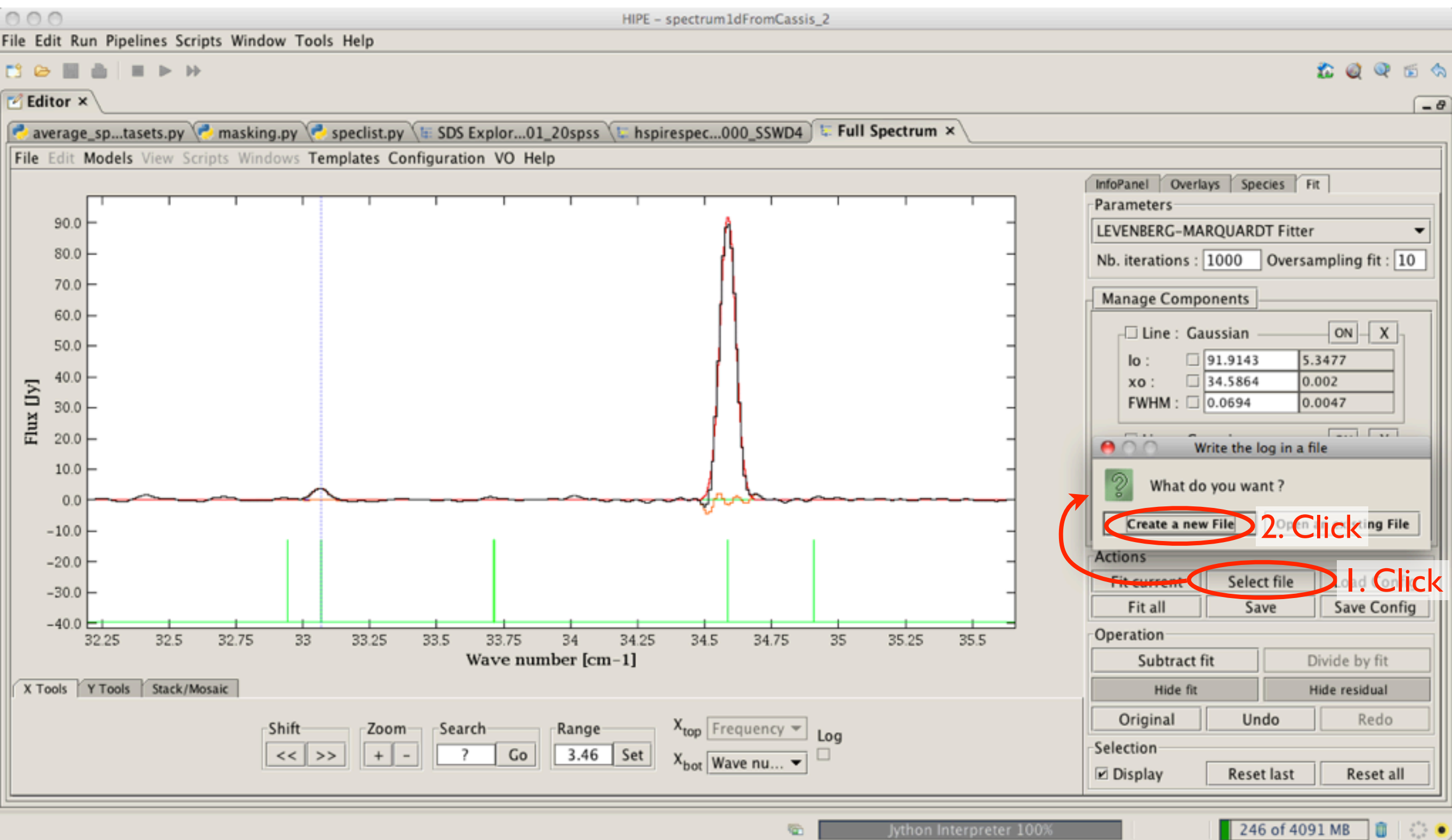
4.2. Line fitting



4.2. Line fitting : saving results of the fit



4.2. Line fitting : saving results of the fit



4.2. Line fitting : saving results of the fit

The screenshot displays the HIPE software interface. The main window shows a spectral plot with Flux [Jy] on the y-axis (ranging from -40.0 to 90.0) and Wave number [cm⁻¹] on the x-axis (ranging from 32.25 to 35). A prominent peak is visible around 34.6 cm⁻¹. The plot includes a black line for the observed data, a red line for the fit, and green vertical lines for reference peaks. The top menu bar includes File, Edit, Run, Pipelines, Scripts, Window, Tools, and Help. The bottom status bar shows 'Jython Interpreter 100%' and '246 of 4091 MB'.

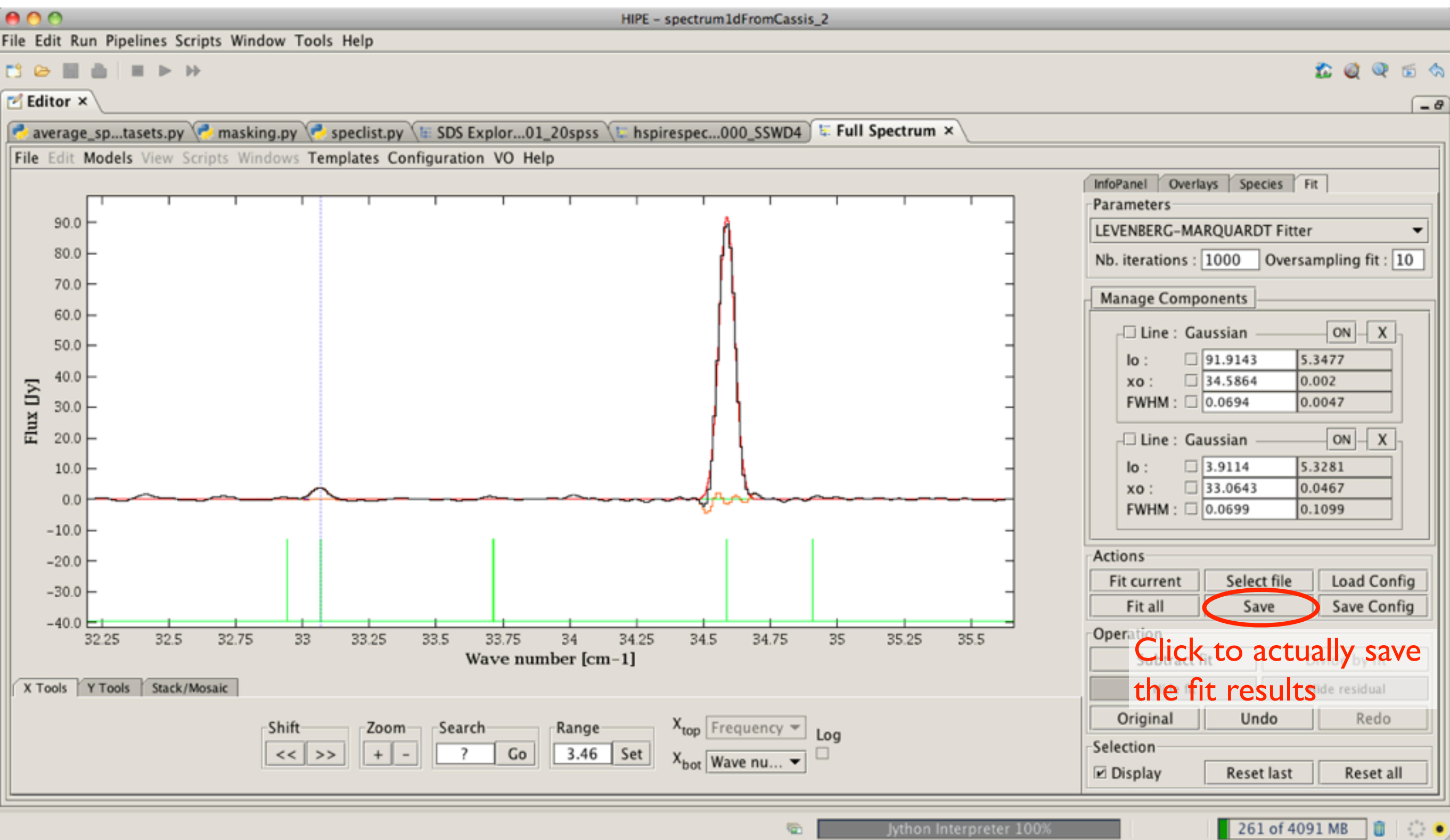
A 'Save' dialog box is open in the foreground, showing the file path 'bottinelli'. The 'File Name' field contains 'spire-fit-demo', and the 'Files of Type' is set to '*.txt'. The 'Save' button is circled in red.

Annotations in red text provide instructions:

- 1. Enter name (pointing to the 'File Name' field)
- 2. Click Save (pointing to the 'Save' button)

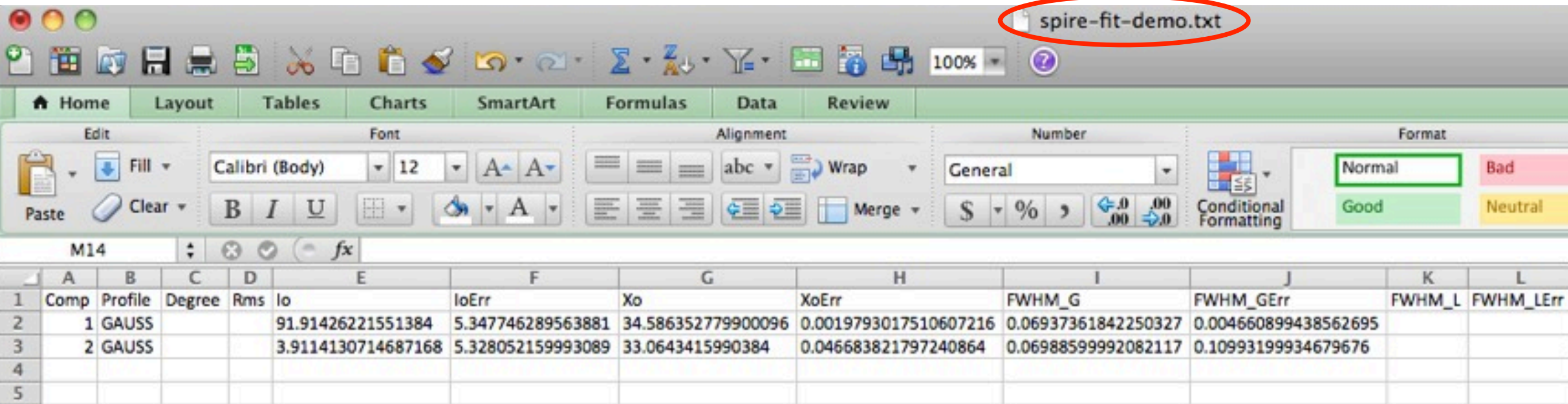
A warning message in red text states: 'Warning: this action "only" creates the file where the fit results will be saved'.

4.2. Line fitting : saving results of the fit



4.2. Line fitting : saving results of the fit

Import in / open with spreadsheet for easier viewing



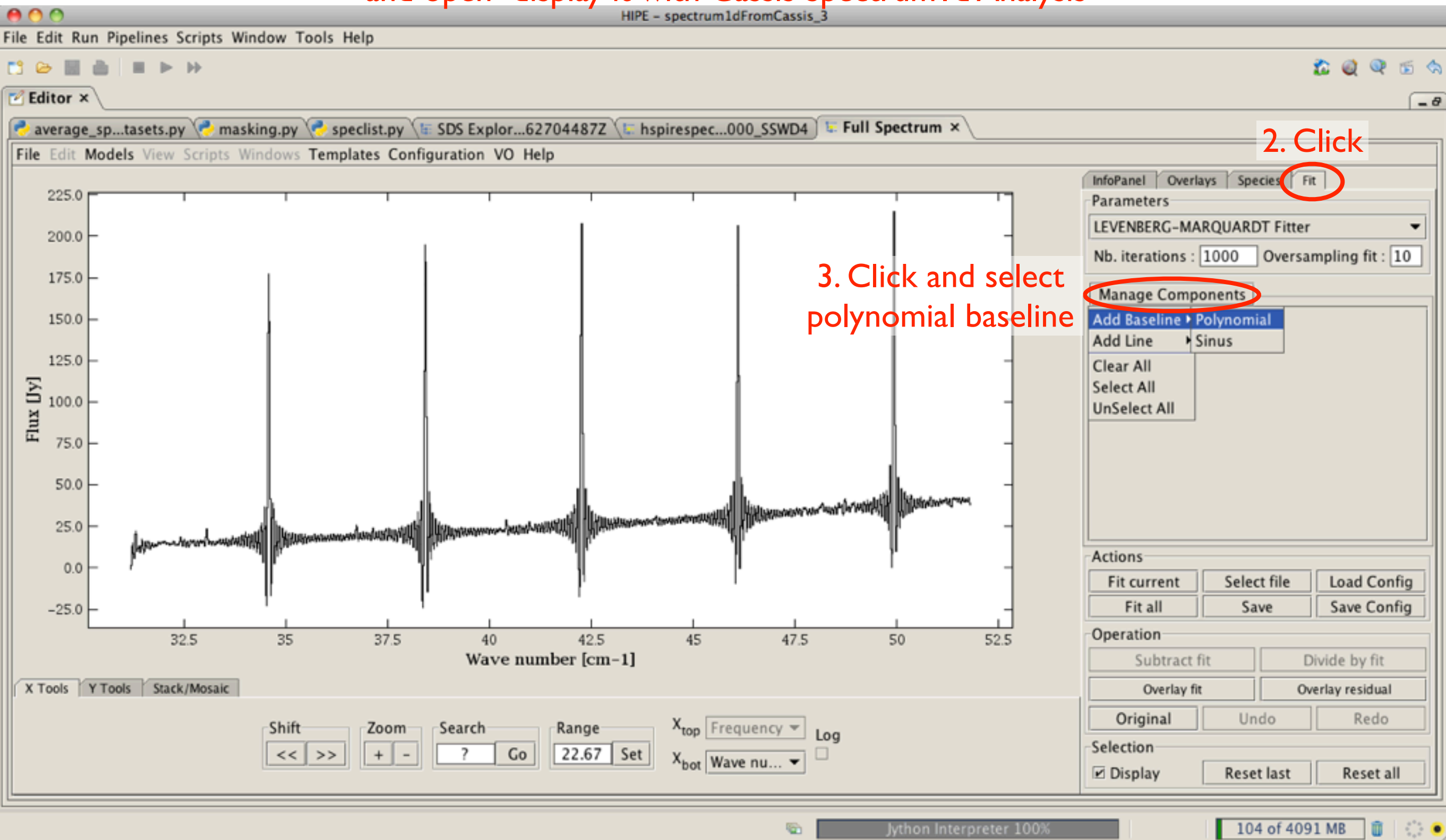
	A	B	C	D	E	F	G	H	I	J	K	L
1	Comp	Profile	Degree	Rms	Io	IoErr	Xo	XoErr	FWHM_G	FWHM_GErr	FWHM_L	FWHM_LErr
2	1	GAUSS			91.91426221551384	5.347746289563881	34.586352779900096	0.0019793017510607216	0.06937361842250327	0.004660899438562695		
3	2	GAUSS			3.9114130714687168	5.328052159993089	33.0643415990384	0.046683821797240864	0.06988599992082117	0.10993199934679676		
4												
5												

Notes:

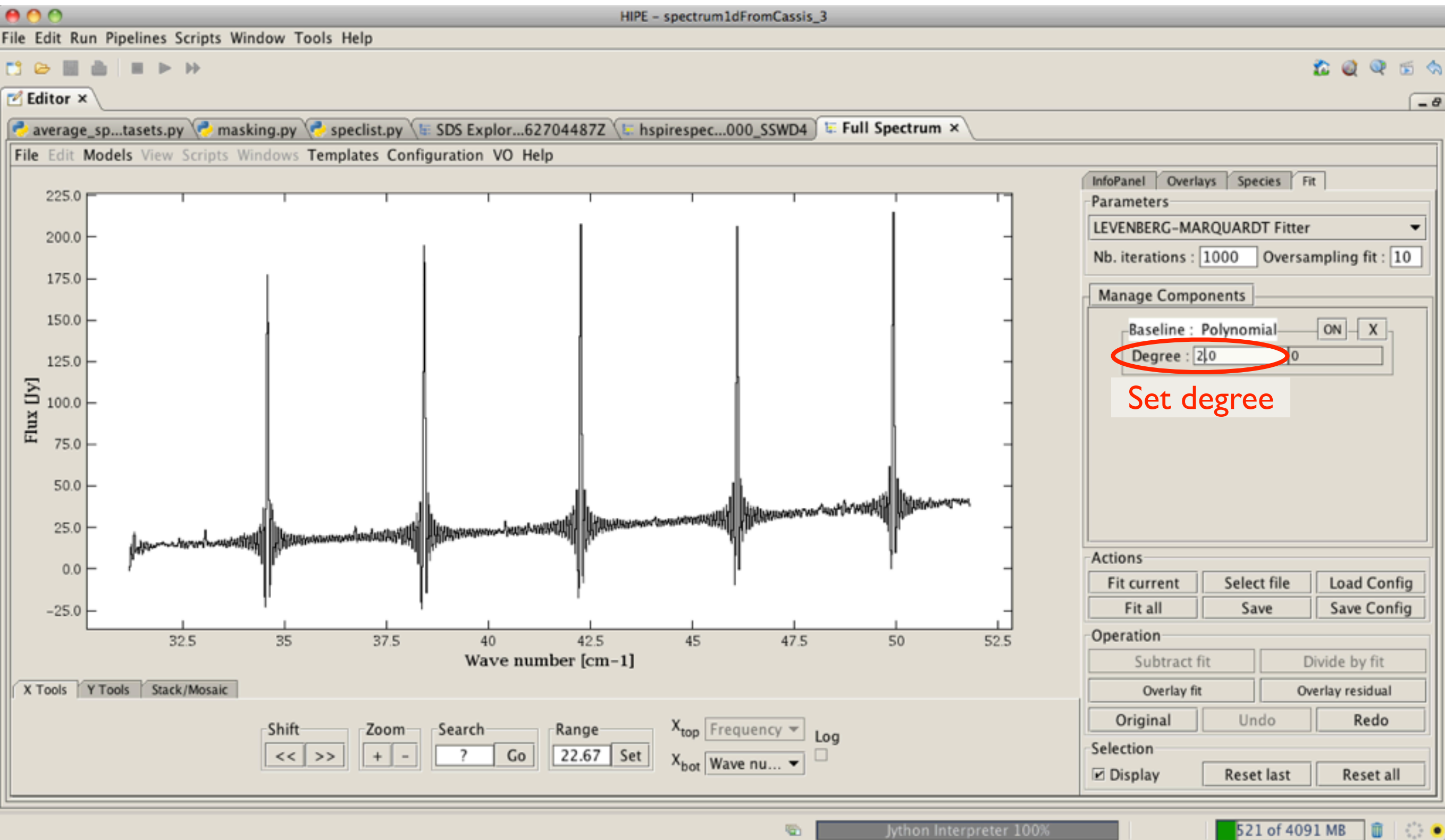
- columns C, D, K, L are not relevant for Gaussian fitting and are therefore empty here
- units are not written (here cm^{-1} and Jy)

4.3. Sinc profile removal

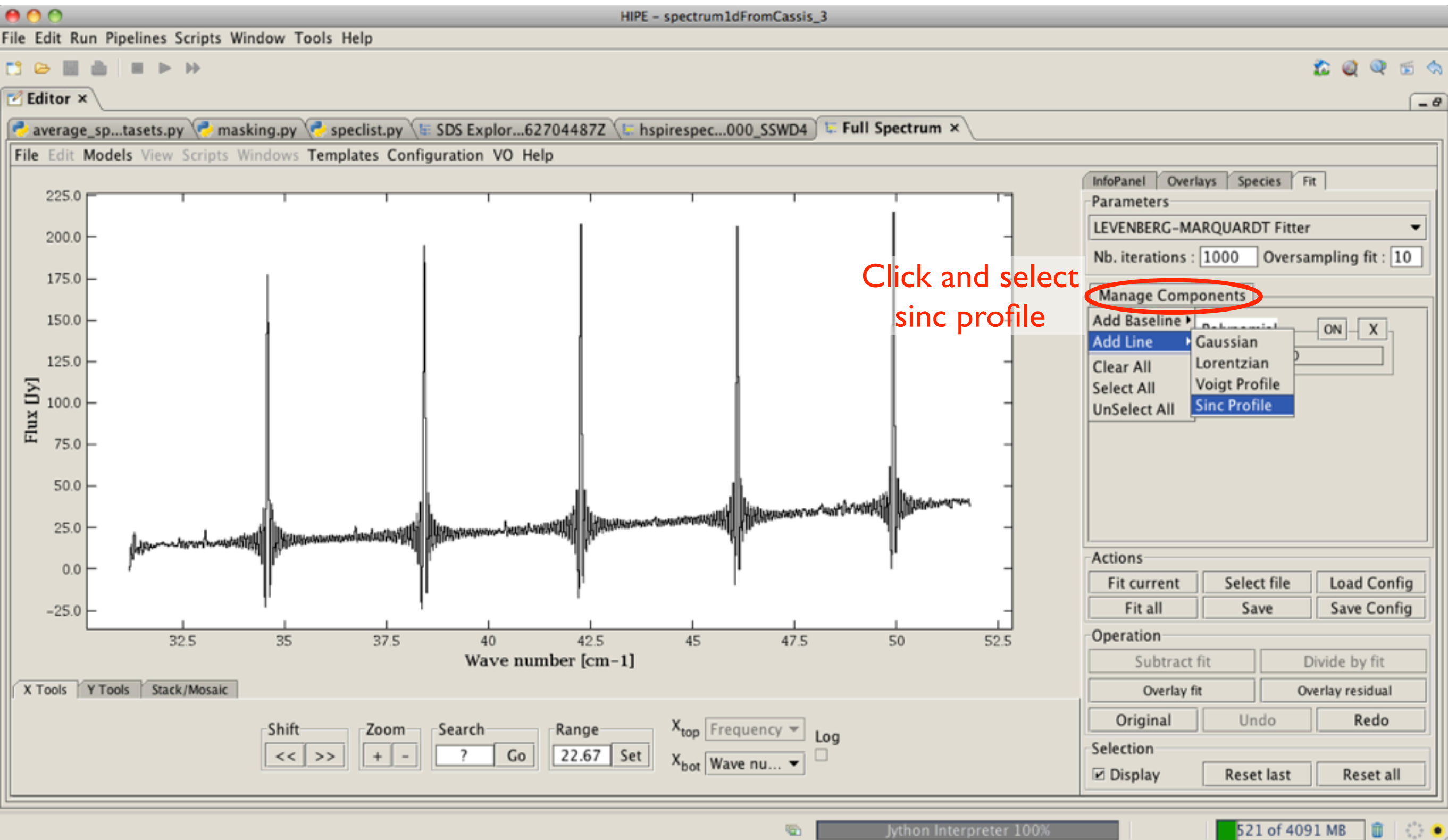
1. Start with a spectrum Id of an unapodized spectrum, and open+display it with Cassis Spectrum Id Analysis



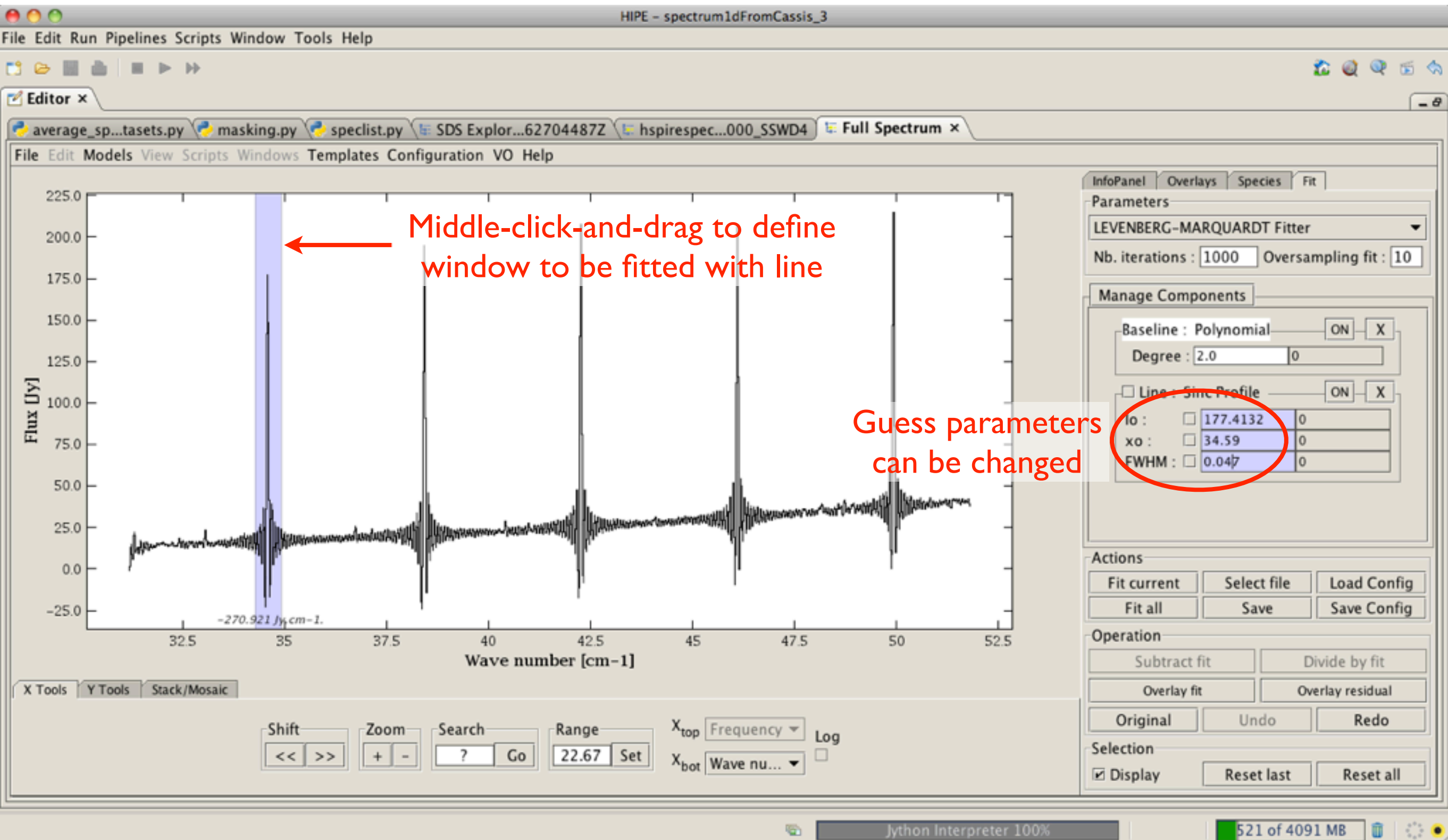
4.3. Sinc profile removal



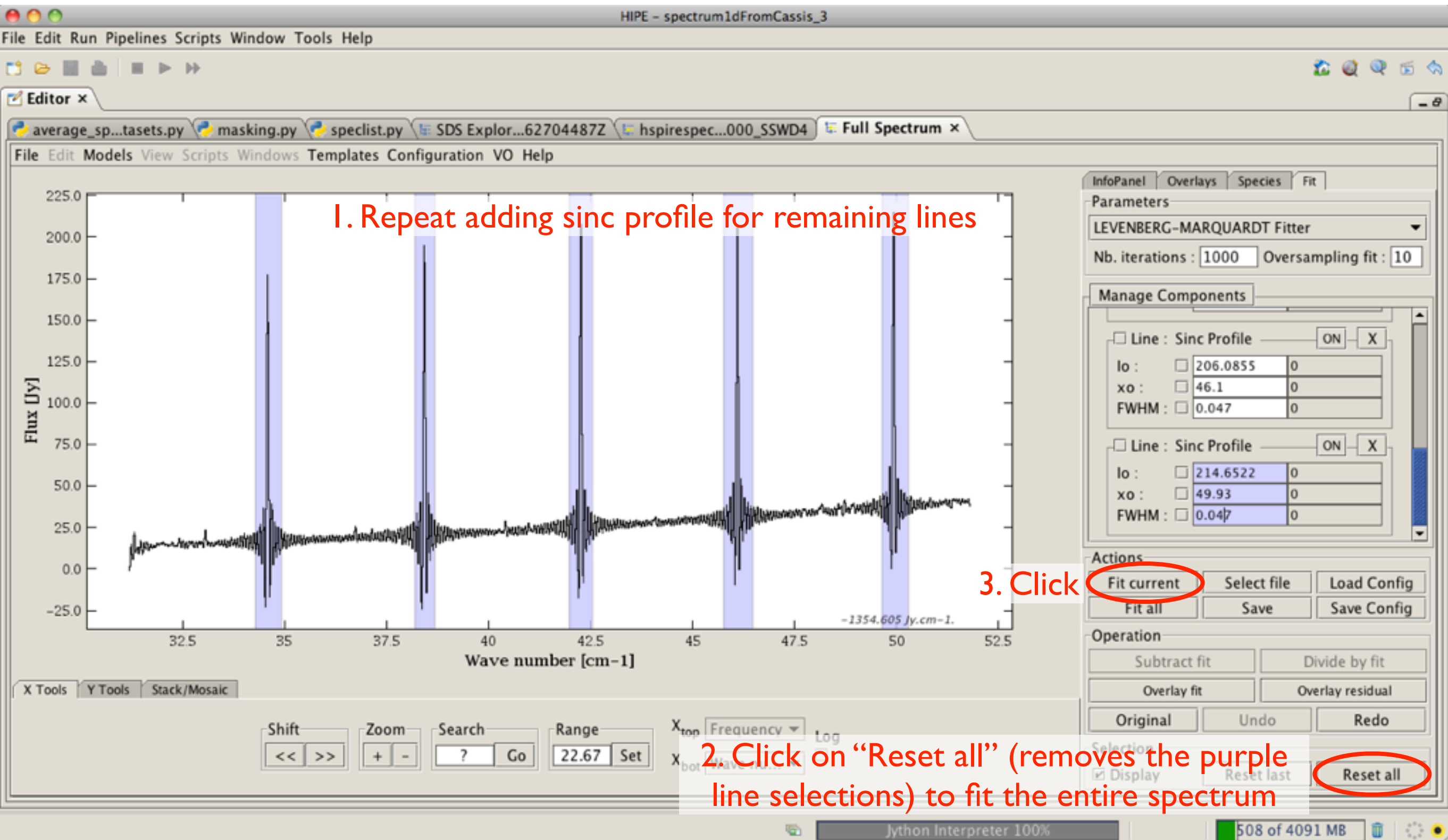
4.3. Sinc profile removal



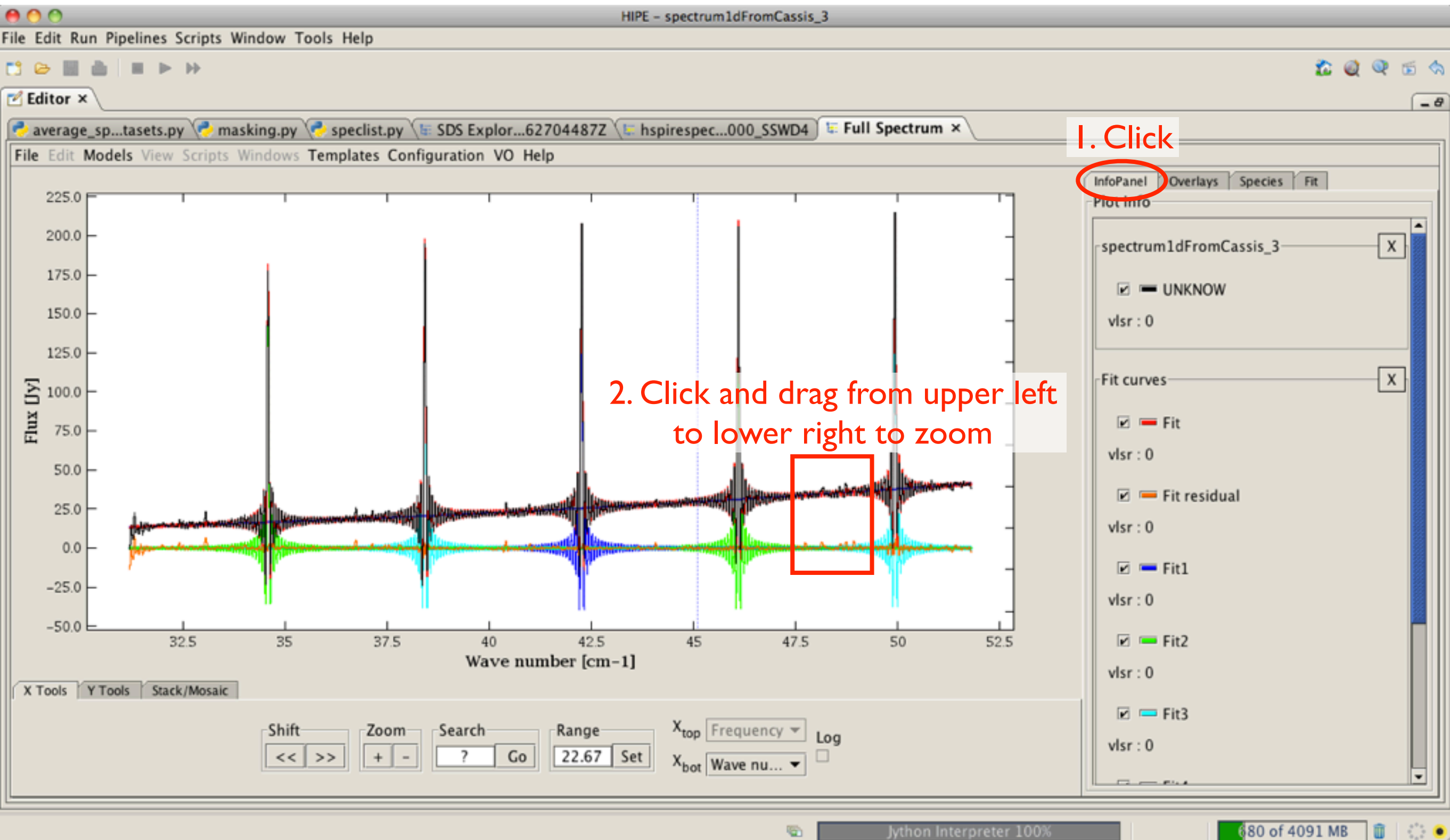
4.3. Sinc profile removal



4.3. Sinc profile removal

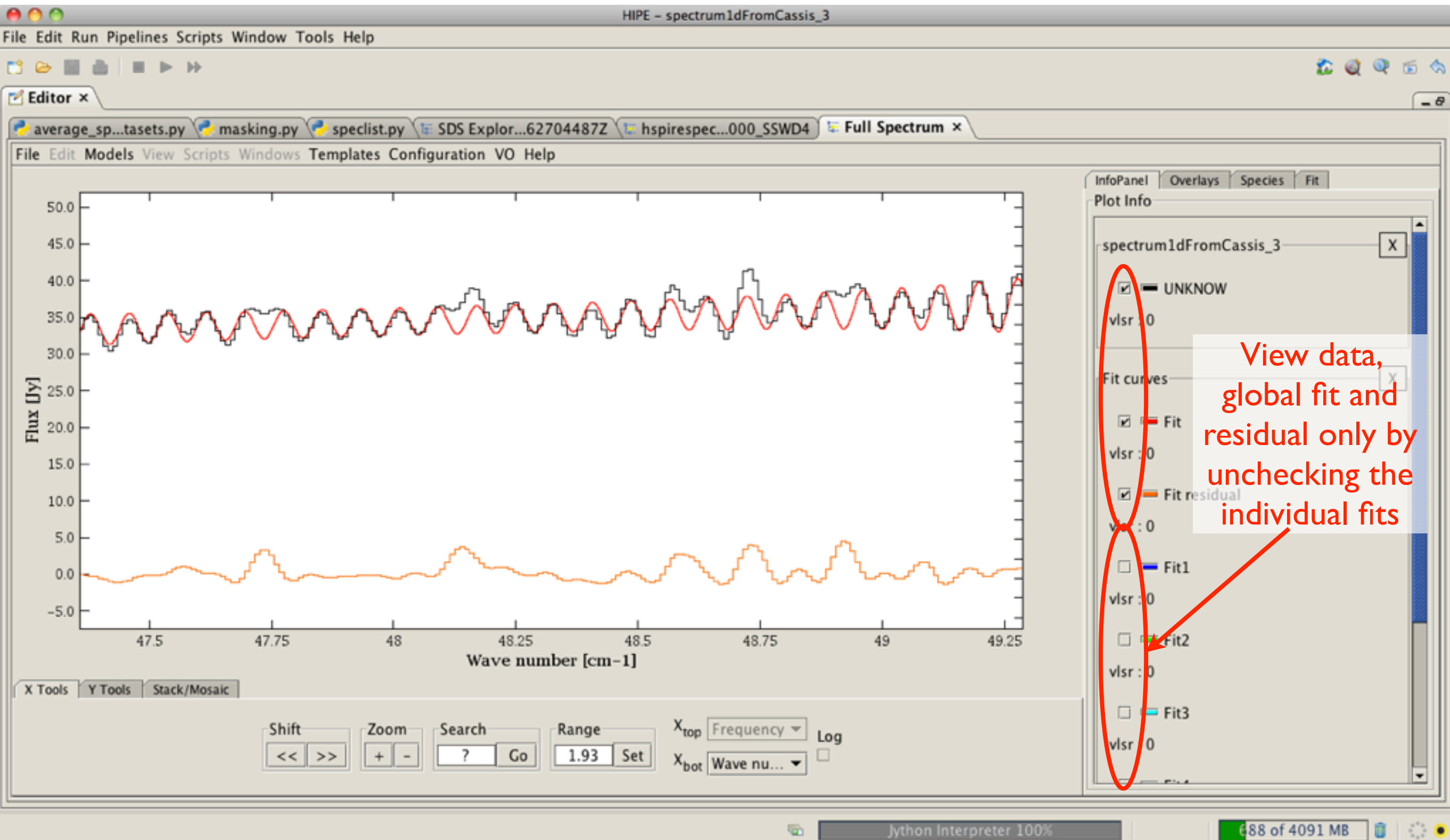


4.3. Sinc profile removal



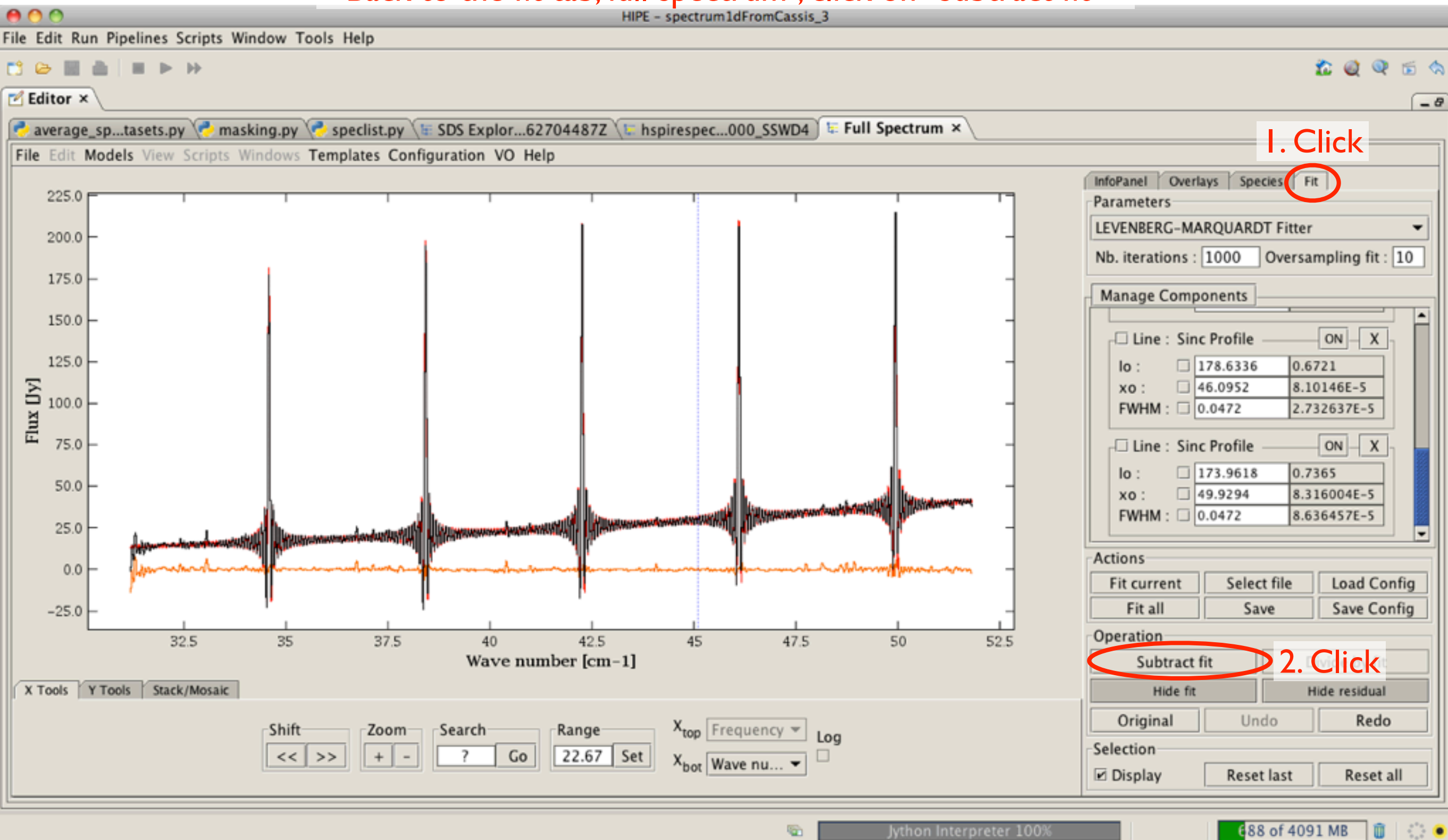
(Note: Click and drag from lower right to upper left to unzoom)

4.3. Sinc profile removal



4.3. Sinc profile removal

Back to the fit tab, full spectrum ; click on “Subtract fit”



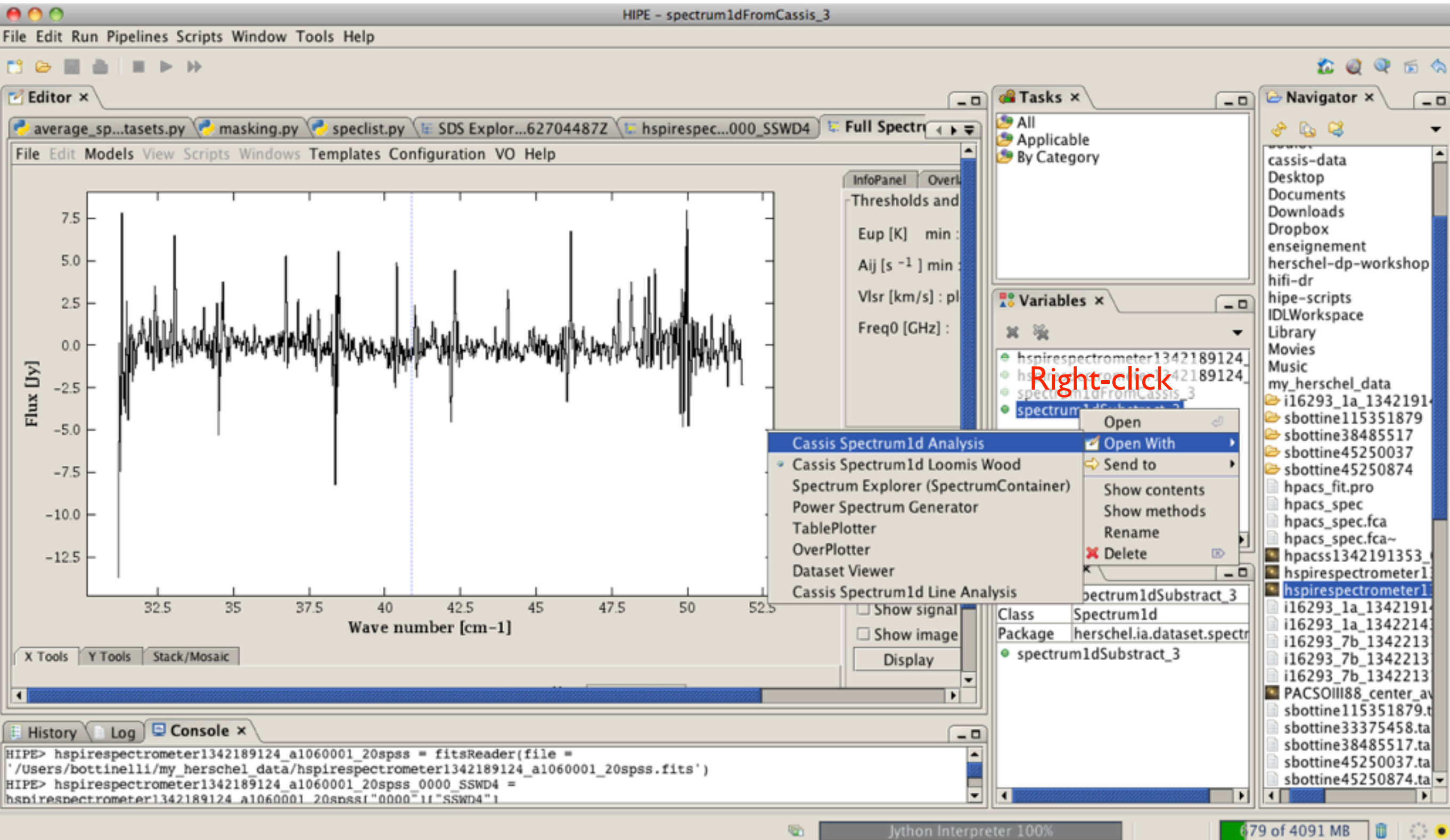
4.3. Sinc profile removal

Clicking on “Subtract fit” shows the residual only and creates a variable in HIPE

The screenshot displays the HIPE software interface. The main plot shows a spectrum with a vertical dashed line at approximately 45 cm⁻¹. The x-axis is labeled 'Wave number [cm⁻¹]'. The 'Manage Components' panel lists two 'Sinc Profile' components with their respective parameters (lo, xo, FWHM). The 'Subtract fit' button is circled in red. The 'Variables' panel on the right shows a list of variables, including 'spectrum1dSubtract_3'. The console at the bottom shows the following commands:

```
HIPE> # Added variable: spectrum1dFromCassis_2
HIPE> del(spectrum1dFromCassis_2)
HIPE> # Added variable: spectrum1dFromCassis_3
HIPE> # Added variable: spectrum1dSubtract_1
```


4.3. Sinc profile removal : line identification



4.3. Sinc profile removal : line identification

The screenshot shows the HIPE software interface with the title bar "HIPE - spectrum1dSubtract_3". The main window has a menu bar (File, Edit, Run, Pipelines, Scripts, Window, Tools, Help) and a toolbar. The "Editor" tab is active, showing the configuration for "spectrum1dSubtract_3". The "Data" section has a "Load" button and a text field containing "UNKNOWN". The "Tuning" section has a "Range Min" field set to 47, a "Max" field set to 49.5, and a "Signal Band" dropdown menu. A red circle highlights the "Range Min" and "Max" fields, with a red arrow pointing to the "Display" button. The "Display" button is also circled in red. The "Variables" panel on the right shows a list of variables, with "spectrum1dSubtract_3" selected. The "Outline" panel shows the structure of the "spectrum1dSubtract_3" object. The "Console" panel at the bottom shows the execution of the hspirespectrometer1342189124_20spss script.

1. Restrict range of x-axis

2. Click Display

```
HIPE> hspirespectrometer1342189124_a1060001_20spss = fitsReader(file =  
'/Users/bottinelli/my_herschel_data/hspirespectrometer1342189124_a1060001_20spss.fits')  
HIPE> hspirespectrometer1342189124_a1060001_20spss_0000_SSWD4 =  
hspirespectrometer1342189124_a1060001_20spss["0000"]["SSWD4"]
```


4.3. Sinc profile removal : line identification

