



NHSC Archive Workshop
26-30 August 2013



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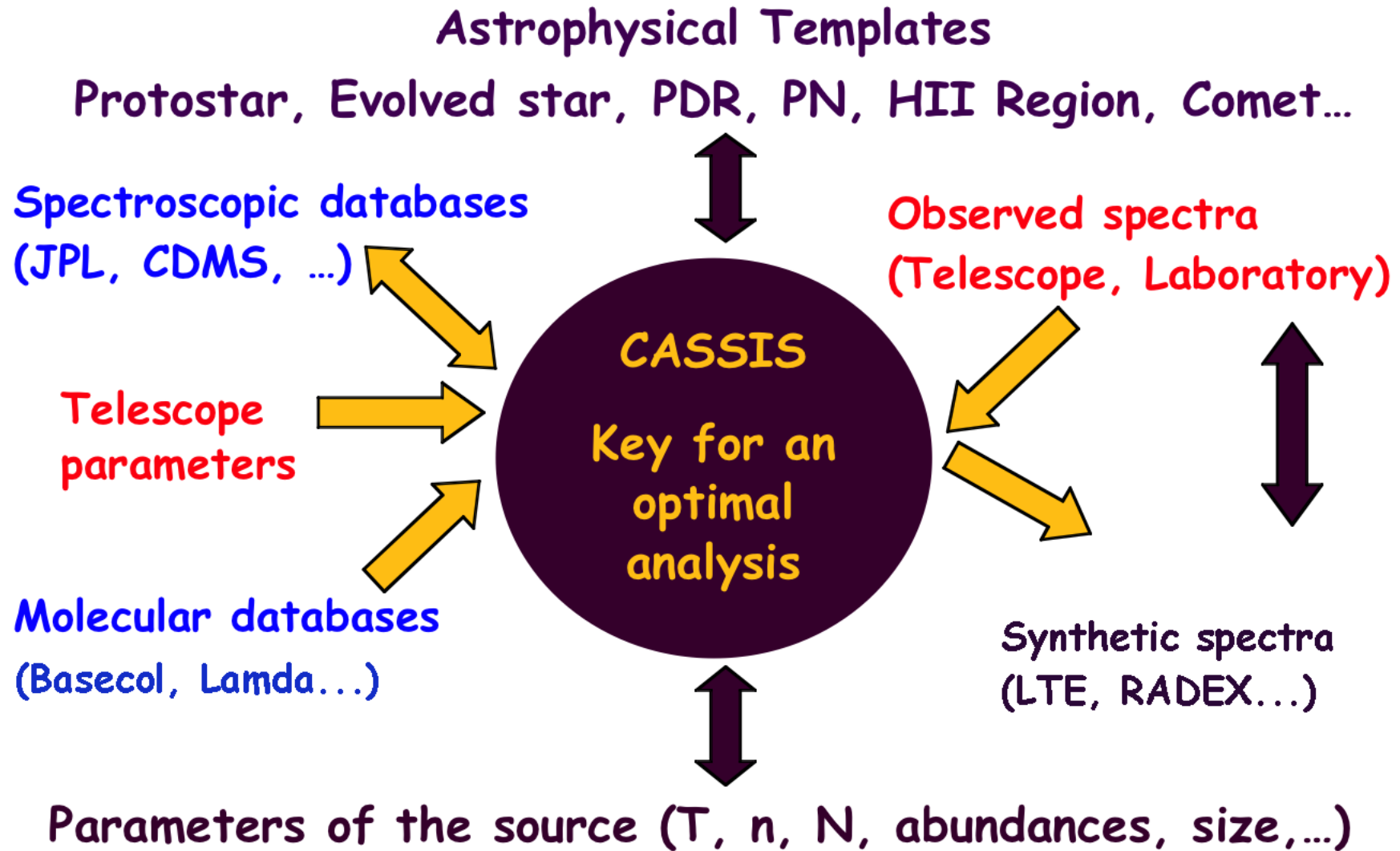
CASSIS

Centre d'Analyse Scientifique de Spectres Infrarouges et Submillimétriques

Emmanuel Caux
IRAP Toulouse, France

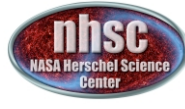
a line analysis package developed at IRAP, Toulouse (France)
by Emmanuel Caux, Sandrine Bottinelli, Charlotte Vastel,
Jean-Michel Glorian, Michael Boiziot, Damien Rabois et al.







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CASSIS Software Tool Package

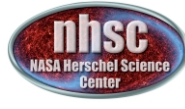
- Speeding up/simplification of the analysis of high resolution spectral data
- Modeling minimization tool (LTE, RADEX for some species)
- Observation preparation tool (line strength, line blending, DSB blending)

Full java : install on any platform

Current “stable” version : 3.4 (July 2013)

Web Site: <http://cassis.irap.omp.eu>

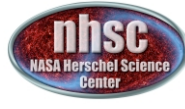




CASSIS Engine

- Full java (requires java 1.6 or above) - multi platform
 - Mac OSX (10.6 - 10.8), Linux and Windows (7 & 8)
- Standalone version and HIPE plugin
- User-friendly automatic installer and updater
- GUI based
- Jython scripting available
- Use of simple configuration files
- Frequent updates reflecting bugs correction
- Yearly updates providing new functionalities
- Bugs reporting system (CASSIS SxR)
-



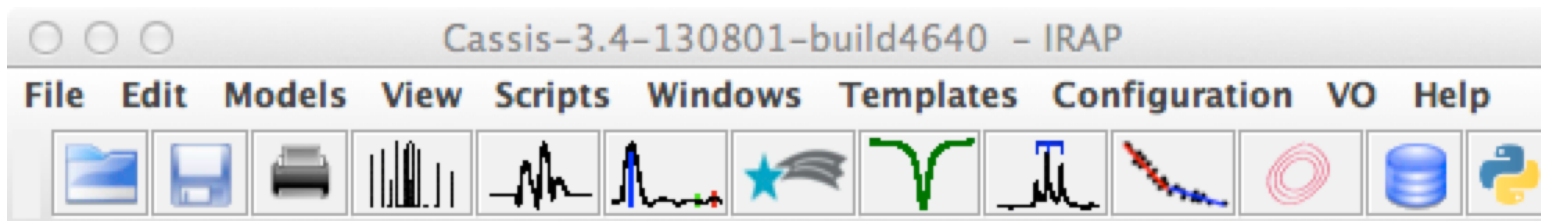


CASSIS Database

- The complete database is resident on the laptop (< 1 Gb)
- Sqlite Format (no need of any extra software)
 - Use of JPL, CDMS and NIST spectroscopic databases
 - Plus extra parameters used by CASSIS
 - Eup, Aij, ...
 - Ortho-Para separation for a few species (H₂O, H₂S...)
 - Use of LAMDA molecular database
- Allows a quick access with various sorting
- Regular updates to reflect new entries in the databases
- Can be populated separately by each user (expert mode)



CASSIS Tools



Spectrum Analysis

LTE-RADEX

Loomis-Wood

Comet

Lab-Abs

Line Analysis

Rotational Diagram

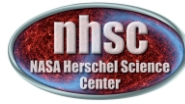
Contour Plot

Template Manager

Scripting



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CASSIS Plugin

The screenshot shows the HIPE (Herschel Interactive Pipeline Environment) software interface. The main window is titled "HIPE - [empty file]". The menu bar includes File, Edit, Run, Pipelines, Scripts, Window, Tools, and Help. The Tools menu is open, showing options like Interoperability, External Tools, Plug-ins, and pacs-cal. Under pacs-cal, the CASSIS plugin is highlighted, with a sub-menu listing files: CH3OH_MCMC.py, CO_RG.py, Inverse_PCygni.py, and models.py. The left sidebar shows "User areas" with Home Folder and File System. The right sidebar has "Tasks" (Applicable, By Category, All) and "Variab..." (Observations). The bottom console shows the following commands and output:

```

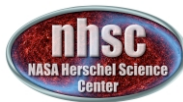
HIPE> lineAnalysisModel = LineAnalysisModel()
HIPE> lineAnalysisModel = LineAnalysisModel()
HIPE> manageTemplateModel = ManageTemplateModel()
HIPE>
  
```

The status bar at the bottom indicates "Jython Interpreter 100%" and "116 of 6223 MB".





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CASSIS Plugin

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

- Editor:** A Python script named `models.py` containing the following code:


```

1 spectrumAnalysisModel = SpectrumAnalysisModel()
2 cometModel = CometModel()
3 labAbsorptionModel = LabAbsorptionModel()
4 lineAnalysisModel = LineAnalysisModel()
5 lteRadexModel = LteRadexModel()
6 lineListProductVariable = LineListProductVariable()
7 rotationalView = RotationalView()
8 manageTemplateModel = ManageTemplateModel()
9 loomisWoodModel = LoomisWoodModel()
10 contourPlot = ContourPlotModel()
      
```
- Console:** Shows the execution of the script:


```

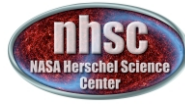
HIPE> lineAnalysisModel = LineAnalysisModel()
HIPE> manageTemplateModel = ManageTemplateModel()
HIPE> lineListProductVariable = LineListProductVariable()
HIPE>
      
```
- Variables Panel:** Lists the variables defined in the script:
 - lineAnalysisModel
 - lineListProductVariable
 - manageTemplateModel
- Outline Panel:** Shows details for the selected variable:

| | |
|---------|--------------------------|
| Name | lineListProductVariable |
| Class | LineListProductVariabl |
| Package | cassis.gui.plot.rotdiagr |
- Status Bar:** Indicates "Jython Interpreter 100%" and "112 of 6223 MB" memory usage.





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CASSIS Plugin

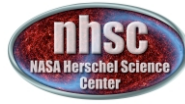
The screenshot shows the HIPE software interface with the following components:

- Navigator:** A tree view on the left showing a directory structure of IRAS16293-2422 folders and files.
- Editor:** A central window with tabs for 'manageTemplateModel', 'New-1', and 'IRAS16293_2422_1b'. It contains a 'Data' section with a 'Load' button and 'UNKNOWN' text, and a 'Tuning' section with 'Range min: 554.49' and 'max: 636.4615 GHz'.
- Tasks:** A panel on the right with 'Applicable' and 'By Category' options.
- Variables:** A panel on the right showing 'Observations' and 'Other Variables'.
- Console:** A bottom panel showing a Jython interpreter with the following commands:


```

HIPE> lineListProductVariable = LineListProductVariable()
HIPE> IRAS16293_2422_1b = fitsReader(file =
'/Users/caux/16293/HIFI_ss/IRAS16293-2422_1b/IRAS16293-2422_1b.fits')
HIPE>
      
```
- Context Menu:** A menu is open over the 'IRAS16293_2422_1b' variable, listing options like 'Open', 'Open With', 'Send To', 'Show contents', 'Show methods', 'Rename', 'Delete', 'Help in URM', and 'Help in DRM'. A secondary menu is also visible on the right side of the screen.





Manage Template

Manage Templates

Templates of CASSIS

- Full VASTEL
- Full CDMS
- Full JPL
- Full NIST
- Full Database
- ISM
- COs
- Orion_compact_ridge
- Orion_extended_ridge
- Orion_plateau_lvf
- C_rich_AGB1
- C_rich_AGB2
- Orion_hot_core
- X_gal
- Lowmass_rich_mol_outflow
- Massive_star_forming_region
- Lowmass_hot_corino**
- Highmass_SFR
- Orion_plateau_hvf

Species of the selected templates

| Species | Tag | DB | Coll | C-Dens | Abun | Beta | Tex | TKin | Fwhm | Size | V _{exp} | Selected |
|------------|-------|------|------------|---------|---------|--------|--------|-------|------|------|------------------|-------------------------------------|
| HDS | 35001 | JPL | -no- | 4.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| c-C3H | 37003 | JPL | -no- | 3.00E12 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| l-C3H2 | 38501 | CDMS | -no- | 6.00E11 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| CH3CCH | 40502 | CDMS | -no- | 2.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| CH3CN | 41001 | JPL | -no- | 3.00E15 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| HNCO | 43002 | JPL | -no- | 2.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| HN-1... | 44007 | JPL | -no- | 2.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| HNC-... | 44008 | JPL | -no- | 6.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| CS, v=... | 44501 | CDMS | cs@xp... | 1.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| SiO, v=... | 44505 | CDMS | sio.dat... | 1.50E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| C-13-... | 45501 | CDMS | 13cs@... | 3.50E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| CS-33... | 45502 | CDMS | -no- | 2.50E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |
| CH2O | 46008 | JPL | -no- | 2.00E16 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input type="checkbox"/> |

Add selected species to the new template

Species of the new template

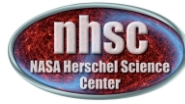
N(H₂) [cm⁻²]:

| Species | Tag | DB | Coll | C-Dens | Abun | Beta | Tex | TKin | Fwhm | Size | V _{exp} | Selected |
|----------|-------|--------|----------|---------|---------|--------|--------|-------|------|------|------------------|-------------------------------------|
| OH | 17001 | JPL | -no- | 7.00E14 | 0.001 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| H2O | 18003 | JPL | -no- | 1.00E16 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| NH2D | 18501 | CDMS | -no- | 3.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| H2O-18 | 20003 | JPL | -no- | 2.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| CCD | 26501 | CDMS | -no- | 1.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| C-13-... | 26502 | CDMS | -no- | 4.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| p-H2CO | 30581 | VASTEL | p-h2c... | 3.00E15 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| o-H2CO | 30591 | VASTEL | o-h2c... | 6.00E15 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| *C-13... | 33502 | CDMS | -no- | 2.00E14 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| H2S | 34002 | JPL | -no- | 2.00E15 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |
| HN-15... | 44007 | JPL | -no- | 2.00E13 | 9.33E-9 | 0.00E0 | 100.00 | 10.00 | 3.00 | 2.00 | 0.00E0 | <input checked="" type="checkbox"/> |

Add Clear the new template Save as

Import Export Delete





LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: apex

Threshold

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

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

LTE-RADEX

Parameters

Telescope: apex Tmb->Ta conv apex

Noise rms: 0.0 mK

Frequency Scale Rest. frequency

Component 1 Component 2

Mode: Full Radex Interacting

Molecules: Full LTE Full Radex

Geometry: Sphere

Tbg (K): 2.73 N(H₂) (cm⁻²): 7.5E22

V_{lsr}: 0.0 km/s

Continuum Continuum 0 [K]

| Species | Tag | Database | Collision | Compute | N(Sp) (cm ⁻³) | Abundance (/...) | TKin (K) | FWHM (km/s) | Size (") |
|-----------|-------|----------|------------------|-------------------------------------|---------------------------|------------------|----------|-------------|----------|
| CO, v=0 | 28503 | CDMS | co.dat&(p-H2;... | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |
| C-13-O | 29501 | CDMS | 13co.dat&(p-... | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |
| CO-17 | 29503 | CDMS | -no- | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |
| CO-18 | 30502 | CDMS | c18o.dat&(p-... | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |
| C-13-O-17 | 30503 | CDMS | -no- | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |
| C-13-O-18 | 31502 | CDMS | -no- | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 10.00 | 1.00 | 3.00 |

Buttons: Load config, Display, Save config



LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: apex

Threshold

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

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

LTE-RADEX

Parameters

Telescope: apex Tmb->Ta conv apex

Noise rms: 0.0 mK

Frequency Scale Rest. frequency

Component 1 Component 2

Mode: Full LTE Interacting

Molecules: COs Geometry: here

Tbg [K]: 2.73 N(H₂) [cm⁻²]: 7.5E22

V_{lsr}: 0.0 km/s

Continuum Continuum 0 [K]

| Species | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | FWHM (km/s) | Size (") |
|---------------------|----------|-------------------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CO, v=0 | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| Massive_star_formin | | | | | | | |

LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: apex

Threshold

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

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

LTE-RADEX

Parameters

Telescope: apex Tmb->Ta conv apex

Noise rms: 0.0 mK

Frequency Scale: est. frequency

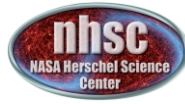
Component 1 Component 2

Mode: Full LTE Interacting Tbg [K]: 2.73 N(H₂) [cm⁻²]: 7.5E22

Molecules: COs Geometry: Sphere V_{LSR}: 0.0 km/s

Continuum: Continuum 0 [K]

| Species | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | FWHM (km/s) | Size (") |
|---------------------|----------|-------------------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CO, v=0 | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| Massive_star_formin | | | | | | | |



LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: apex

Threshold

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

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

LTE-RADEX

Parameters

Telescope: apex Tmb->Ta conv apex

Noise rms: 0.0 mK

Frequency Scale Rest. frequency

Component 1 Component 2

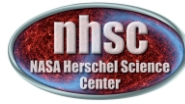
Mode: Full LTE Interacting Tbg [K]: 2.73 N(H₂) [cm⁻²]: 7.1E22

Molecules: COs Geometry: Sphere V_{LSR}: 0.0 km/s

Continuum Continuum 0 [K]

| Species | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | DWHM (km/s) | Size (") |
|---------------------|----------|-------------------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CO, v=0 | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O | CDMS | <input checked="" type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-17 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O-18 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| Massive_star_formin | | | | | | | |





LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: hifi

Threshold

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

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

LTE-RADEX

Parameters Telescope: hifi Tmb->Ta conv: hifi

Noise rms: 0.0 mK

Frequency Scale

- Sky freq. of first component
- Rest. frequency
- Sky freq. of first component

Component 1 X +

Mode: Full LTE Interacting Tbg [K]: 2.73 N(H₂) [cm⁻²]: 7.5E22

Molecules: CO-isotopes Geometry: Sphere V_{lsr}: 0.0 km/s

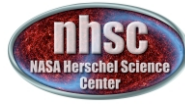
Continuum Continuum 0 [K]

| Species | Tag | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | FWHM (km/s) | Size (") |
|---------|-------|----------|--------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CO, v=0 | 28503 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O | 29501 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-17 | 29503 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-18 | 30502 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |





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LTE + RADEX

LTE + RADEX 1

Tuning

Range min: 115.0 max: 116.0 GHz dv 0.1 MHz

Line: 115.5 Bandwidth: 4.0 GHz DSB LSB LO freq: 119.5 Telescope: hifi

Threshold

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

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

LTE-RADEX

Parameters

Telescope: hifi Tmb->Ta conv hifi

Noise rms: 0.0 mK

Frequency Scale: Sky freq. of first component, Rest. frequency, Sky freq. of first component

Component 1 X +

Mode: Full LTE Interacting Tbg [K]: 2.73 N(H₂) [cm⁻²]: 7.5E22

Molecules: CO-isotopes Geometry: Sphere V_{lsr}: 0.0 km/s

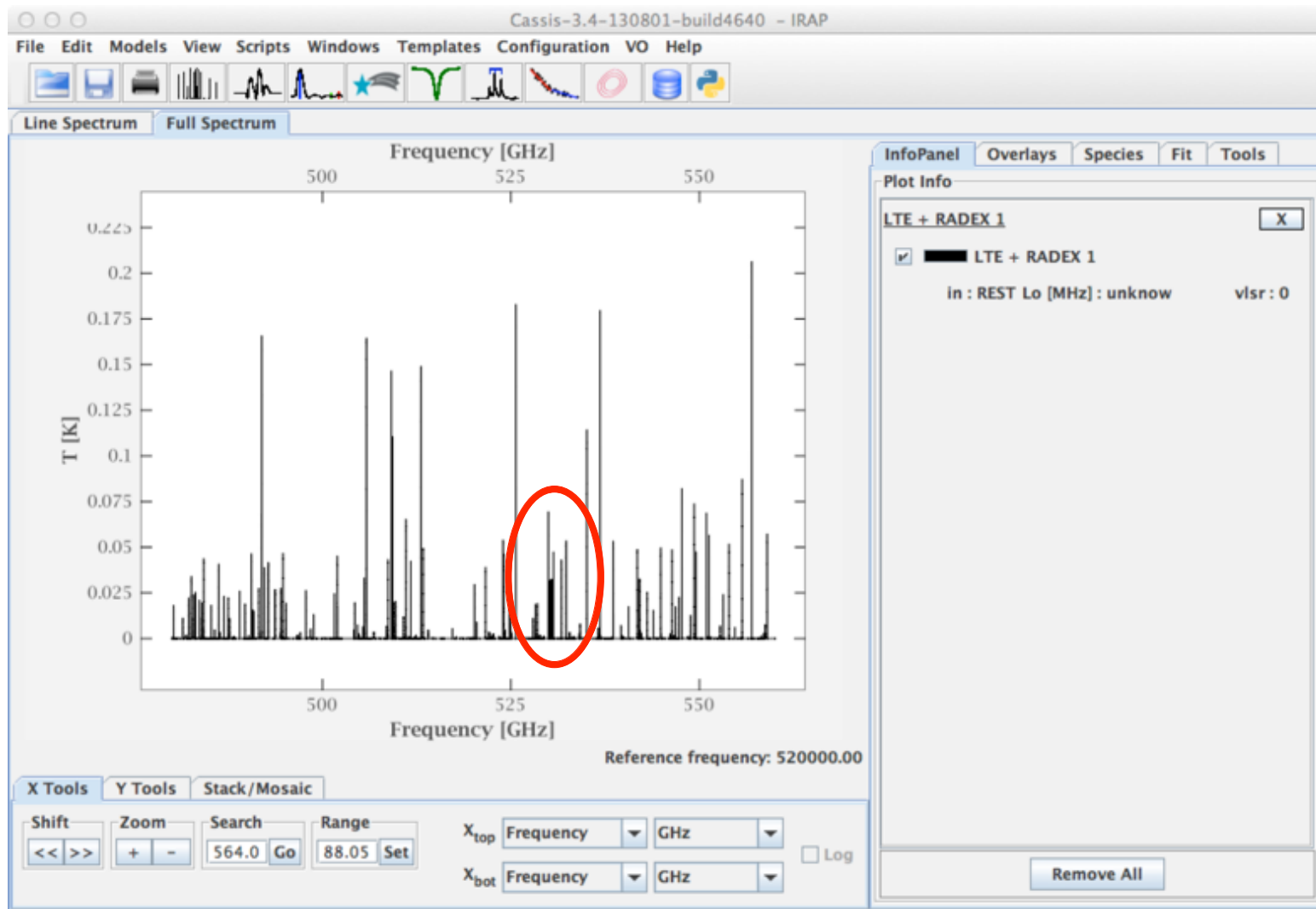
Continuum: Continuum 0 [K]

| Species | Tag | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | FWHM (km/s) | Size (") |
|---------|-------|----------|--------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CO, v=0 | 28503 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| C-13-O | 29501 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-17 | 29503 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |
| CO-18 | 30502 | CDMS | <input type="checkbox"/> | 7.00E14 | 1.00E-8 | 100.00 | 1.00 | 3.00 |

Navigation buttons: Load config, Display, Save config

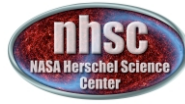


LTE
+
RADEX





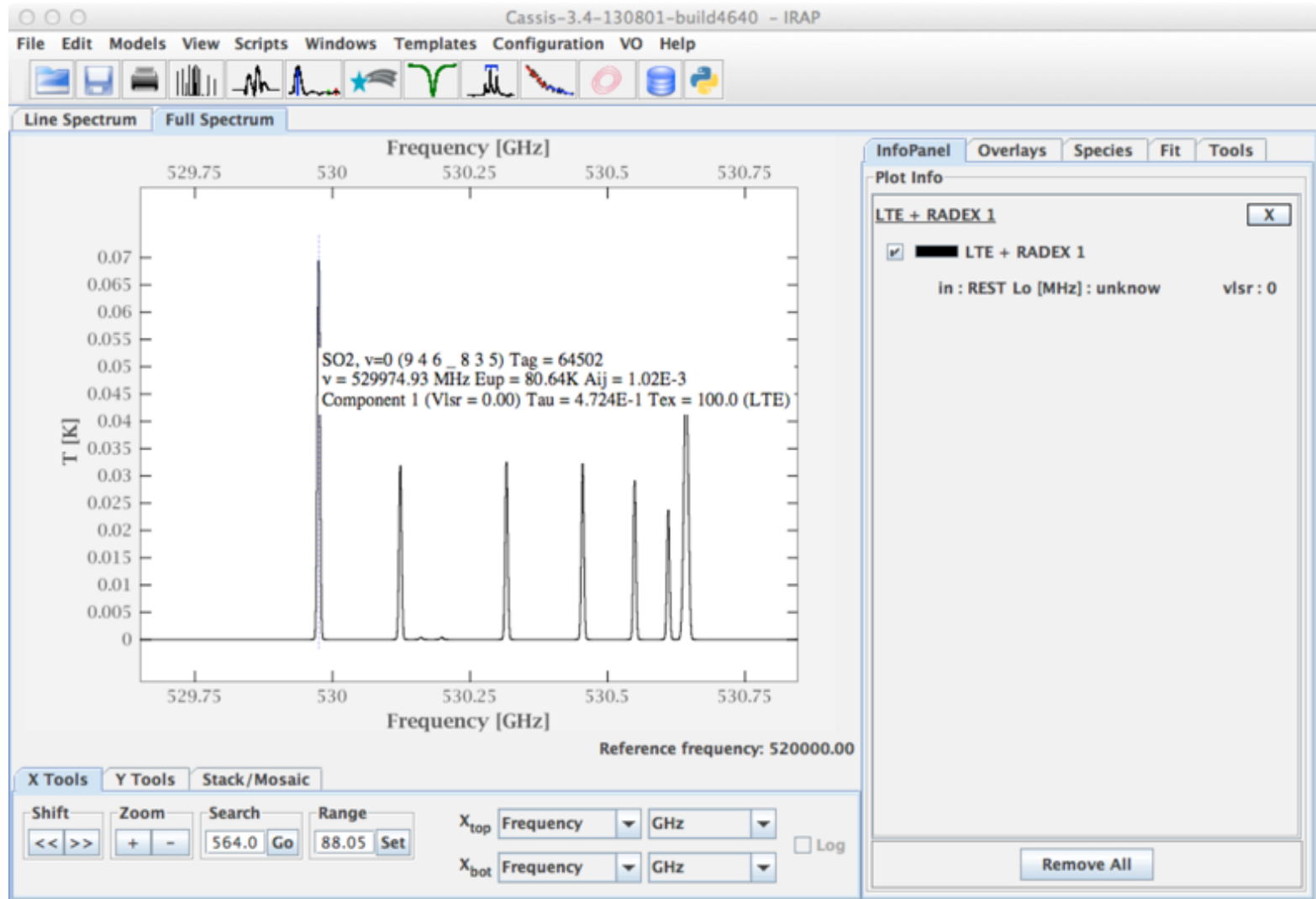
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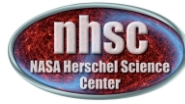


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LTE
+
RADEX





Loomis
Wood

Loomis Wood 1

Data
 Load Vlsr data: km/s in: Telescope Load config

Tuning
 Range min: max: GHz GHz Band: 115.2 GHz Display

Threshold
 Eup min: max: K Aij min: max:
 Jup min: max: Kup min: max: Lup min: max: Mup min: max: Save config

Loomis Wood

CO-isotopes Continuum Continuum 0 [K] V_{lsr} [km/s]: 0.0 Emission

| Species | Tag | Database | Compute | N(Sp) (/cm2) | Tex(K) |
|---------|-------|----------|-------------------------------------|--------------|--------|
| CO, v=0 | 28503 | CDMS | <input checked="" type="checkbox"/> | 4.00E14 | 300.00 |
| C-13-O | 29501 | CDMS | <input checked="" type="checkbox"/> | 6.00E13 | 300.00 |
| CO-17 | 29503 | CDMS | <input checked="" type="checkbox"/> | 3.00E11 | 300.00 |
| CO-18 | 30502 | CDMS | <input checked="" type="checkbox"/> | 6.00E12 | 300.00 |





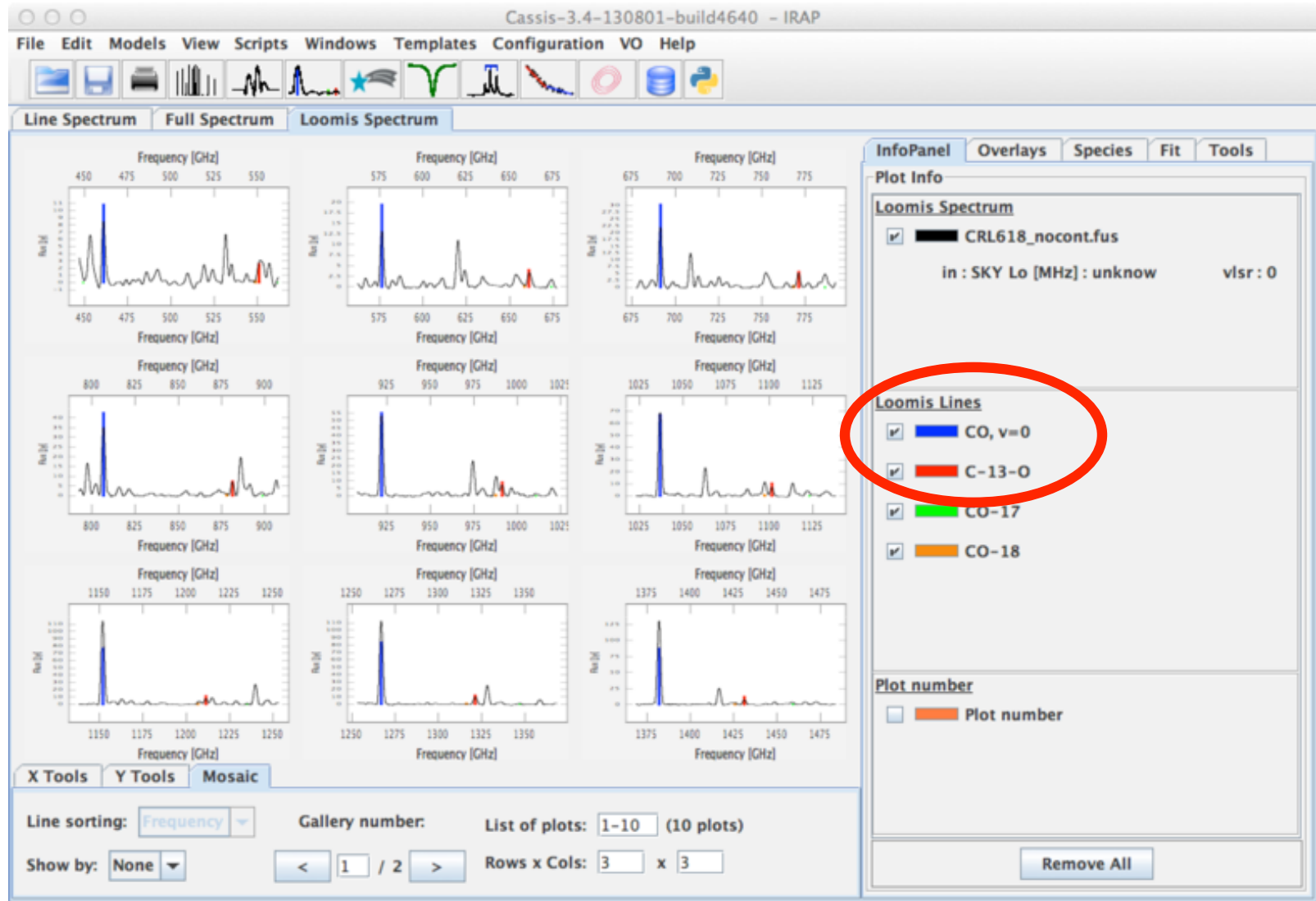
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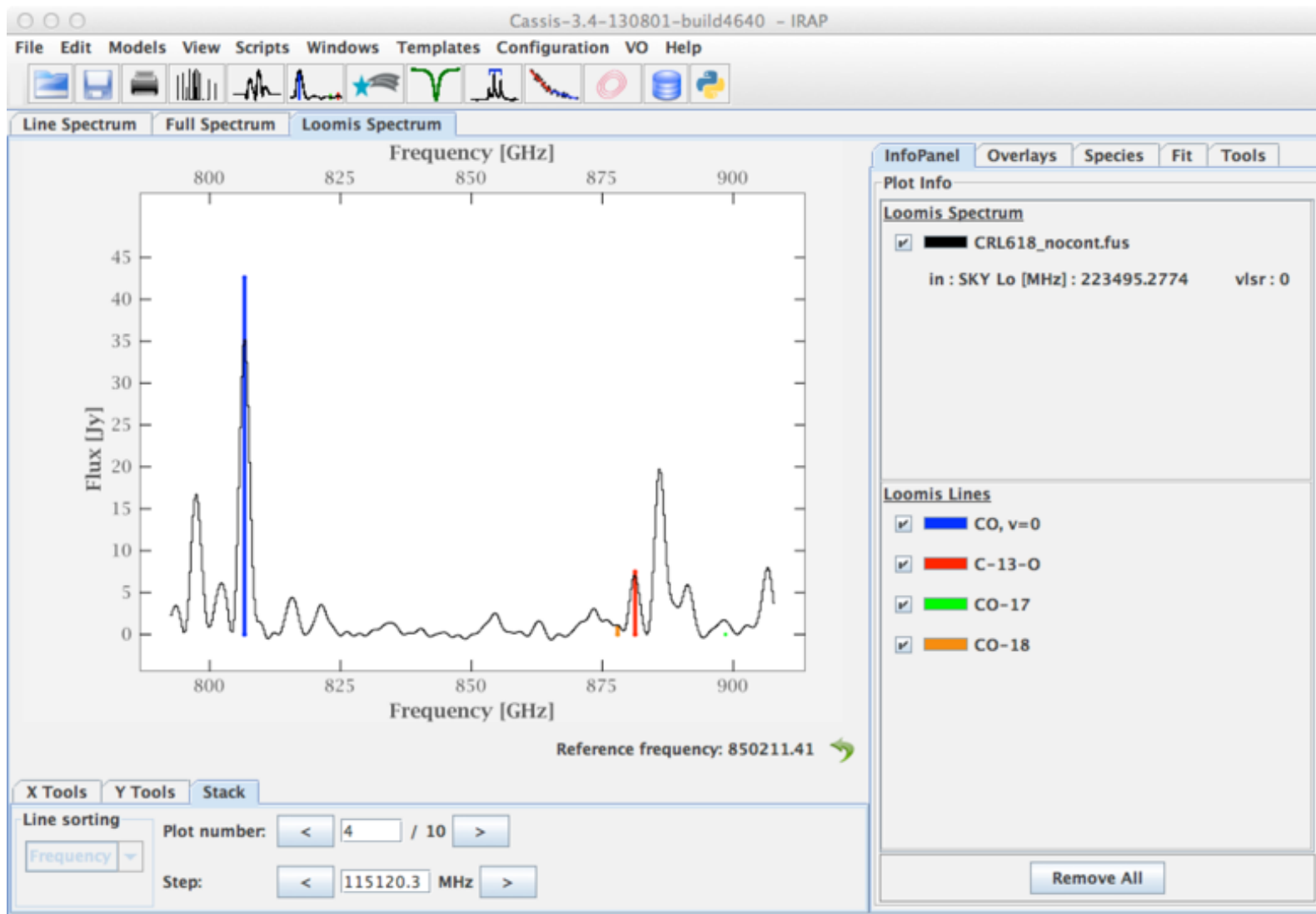
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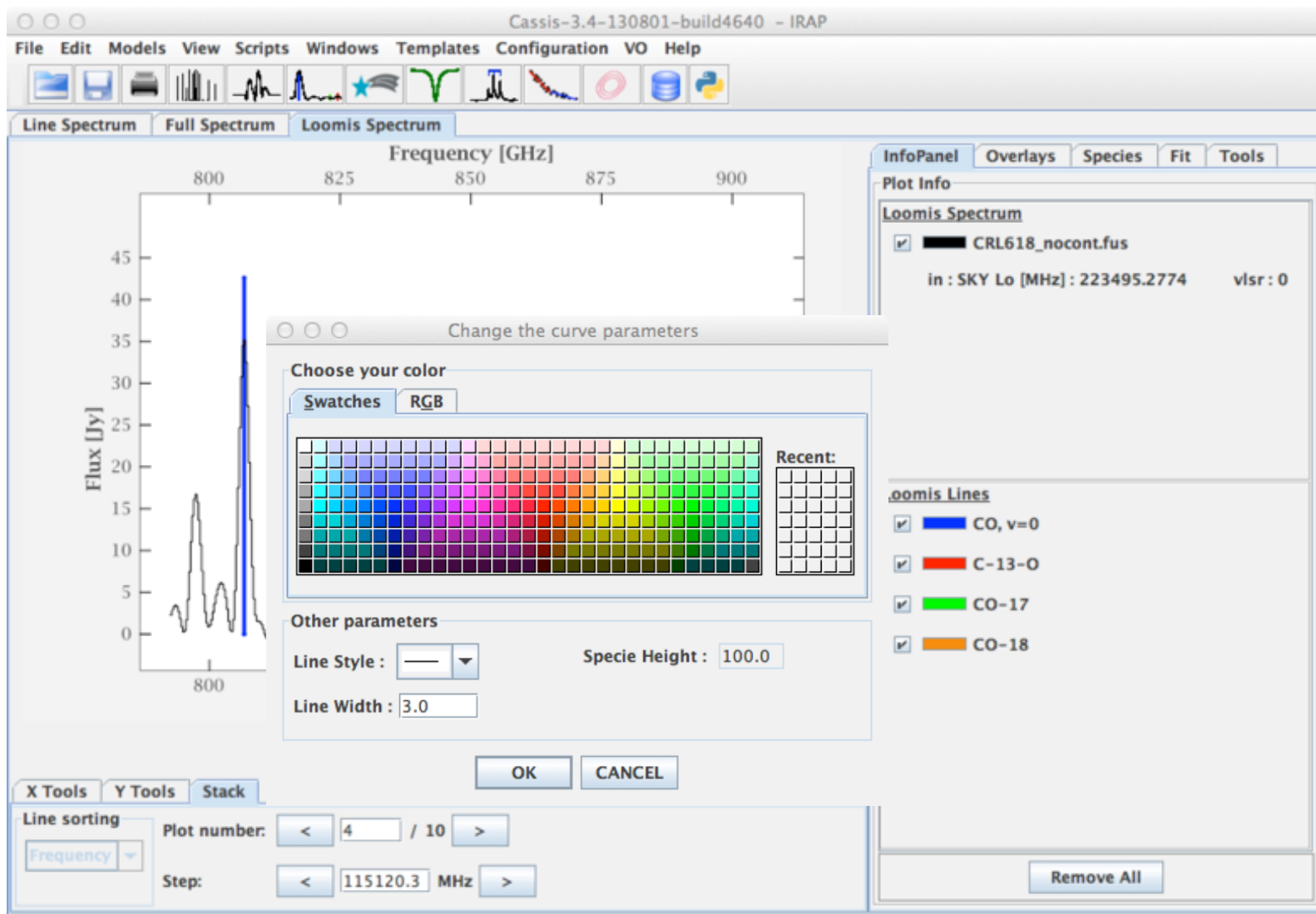
Loomis
Wood

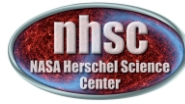


Loomis
Wood



Loomis
Wood





Line Analysis

Line Analysis

Data
 Load Vlsr data: km/s in: Telescope

Tuning
 Range min: max: GHz Band: km/s

Threshold
 Eup min: max: K Aij min: max:
 Jup min: max: Kup min: max: Lup min: max: Mup min: max:

LTE-RADEX

Parameters
 Telescope: Tmb->Ta conv

Noise
 rms: mK

Oversampling
 Oversampling:

Component 1

Mode: Interacting
 Molecules: Geometry:
 Tbg [K]: N(H₂) [cm⁻²]:
 V_{lsr}: km/s
 Continuum

| Species | Tag | Database | Compute | N(Sp) (cm ⁻²) | Abundance (/H ₂) | Tex (K) | FWHM (km/s) | Size (") |
|---------|-------|----------|-------------------------------------|---------------------------|------------------------------|---------|-------------|----------|
| CH3CCH | 40502 | CDMS | <input checked="" type="checkbox"/> | 3.00E14 | 4.00E-9 | 25.00 | 2.50 | 20.00 |

Template

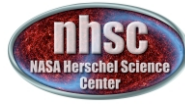
| ISM | Name | Tag | Sel. |
|-----|---------------|-------|-------------------------------------|
| | C2O | 40006 | <input type="checkbox"/> |
| | SiC, v=0 | 40501 | <input type="checkbox"/> |
| | CH3CCH | 40502 | <input checked="" type="checkbox"/> |
| | CH3CCH, v10=1 | 40504 | <input type="checkbox"/> |
| | H2CCN | 40505 | <input type="checkbox"/> |
| | CH3CCH, nu10 | 40507 | <input type="checkbox"/> |
| | CH3CCH, nu9 | 40508 | <input type="checkbox"/> |
| | CH3CN | 41001 | <input type="checkbox"/> |
| | CH3CC-13-H | 41002 | <input type="checkbox"/> |
| | CH3C-13-CH | 41003 | <input type="checkbox"/> |
| | C-13-H3CCH | 41004 | <input type="checkbox"/> |
| | CH3C | 41005 | <input type="checkbox"/> |

Load config
Display
Save config





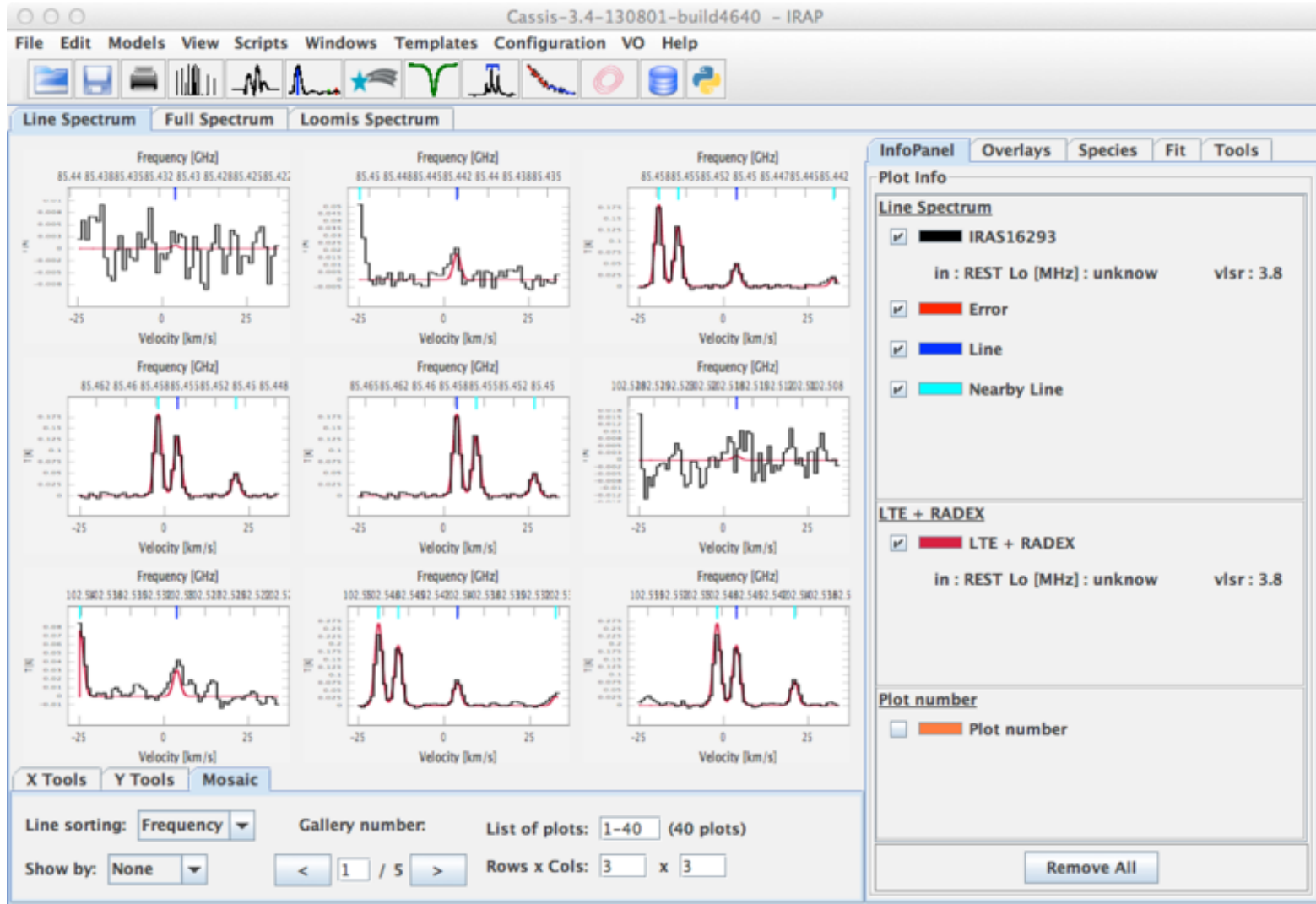
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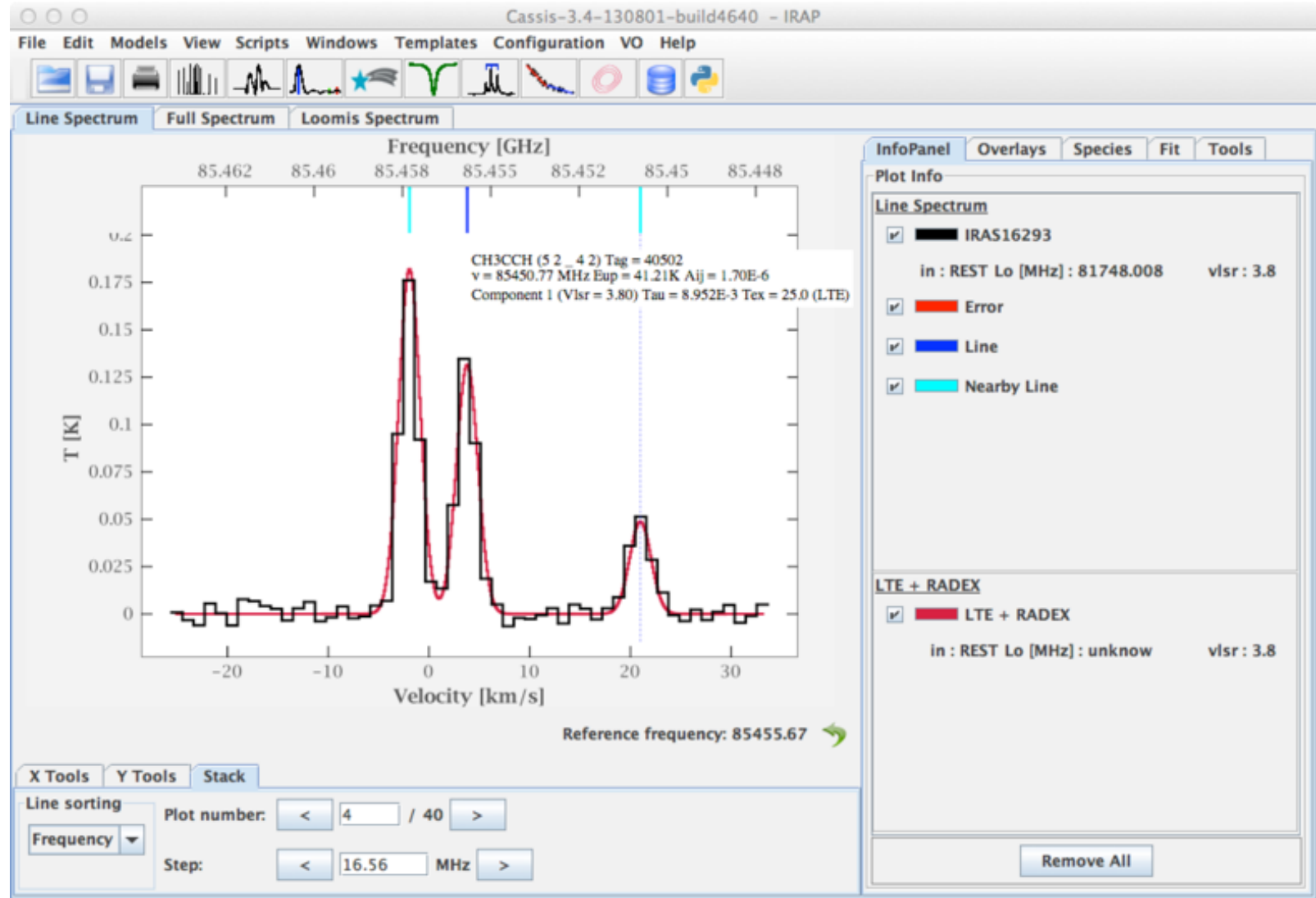
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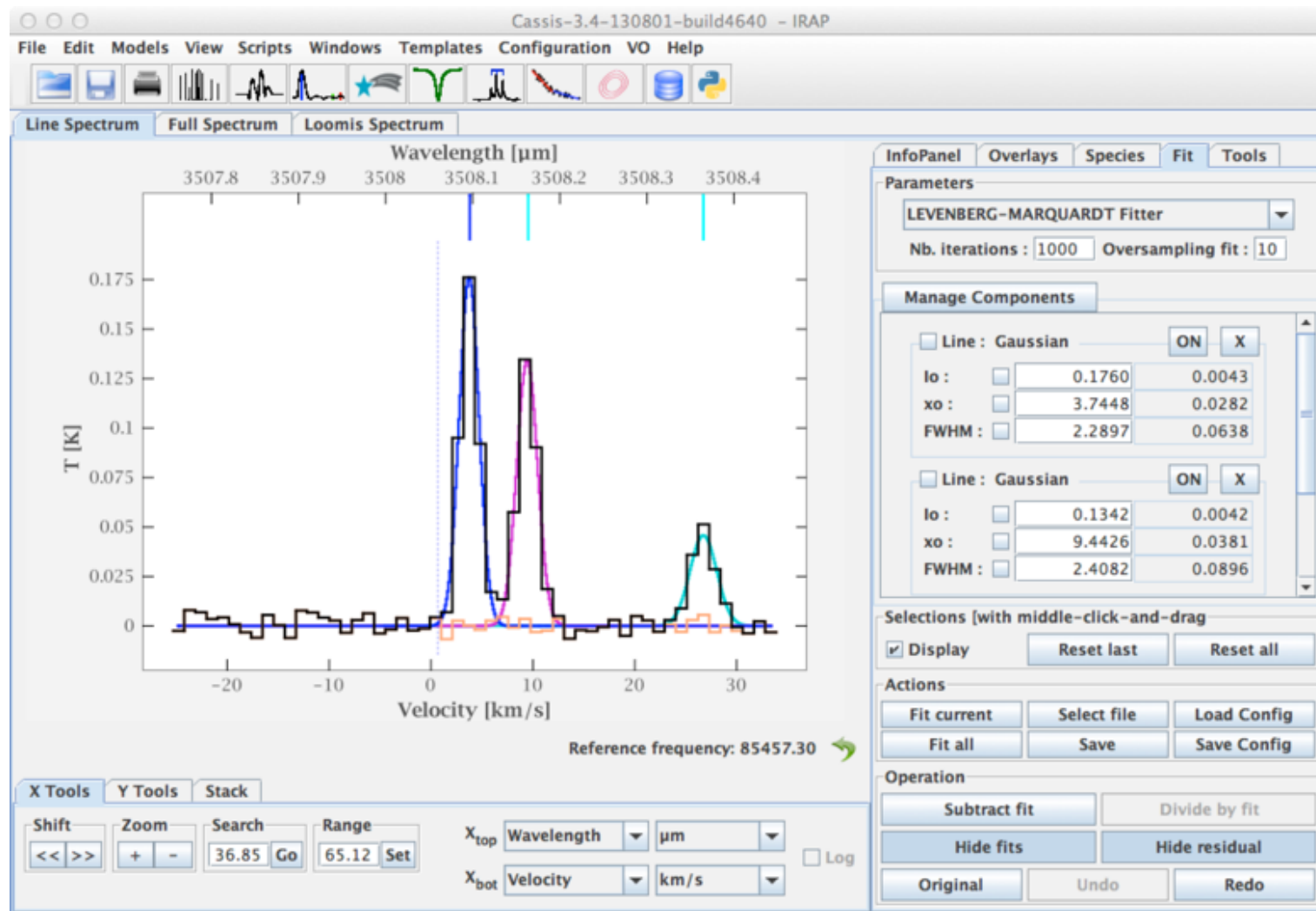
Line Analysis



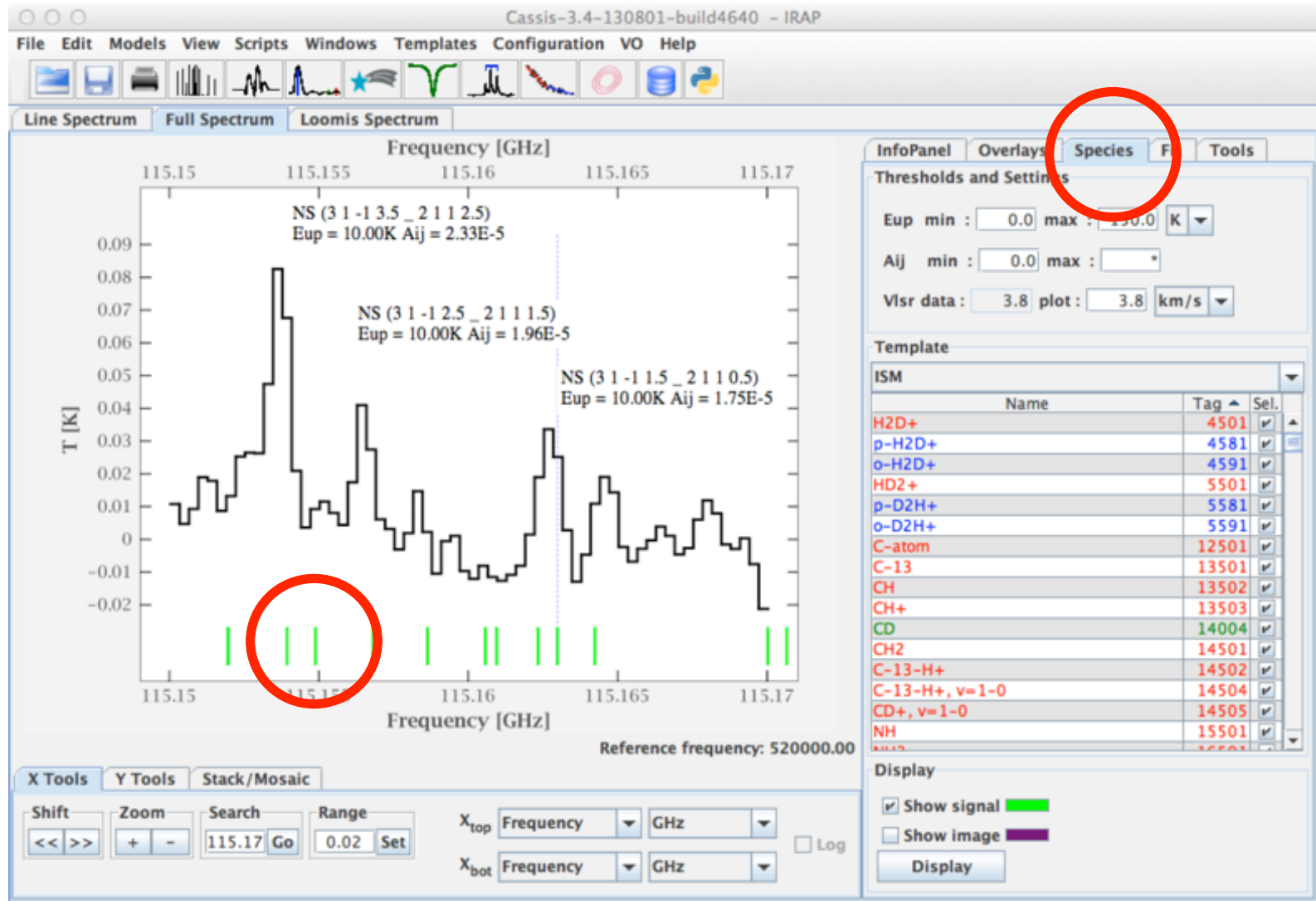
Line Analysis



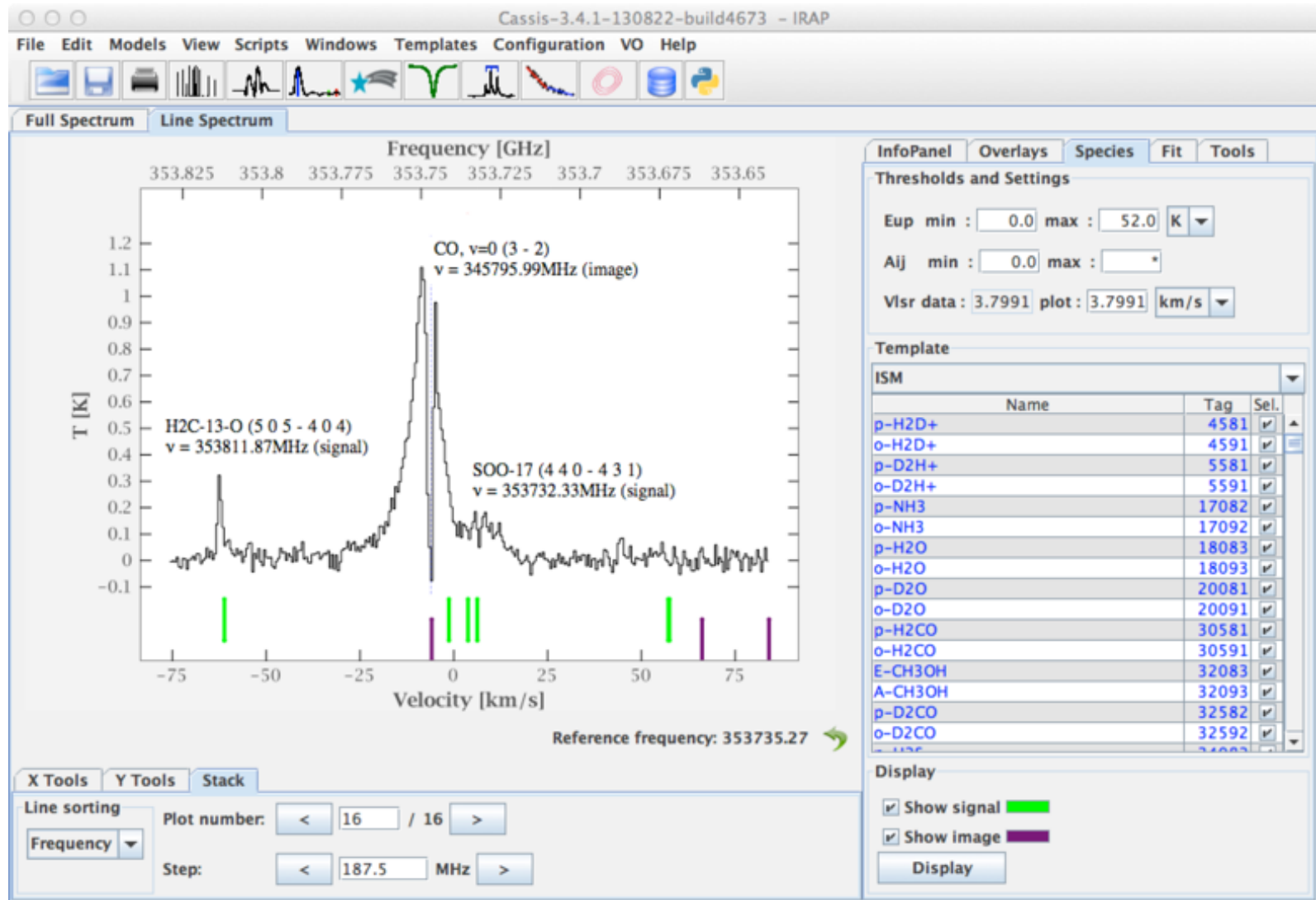
CASSIS "XTool" Panel



Line Identification

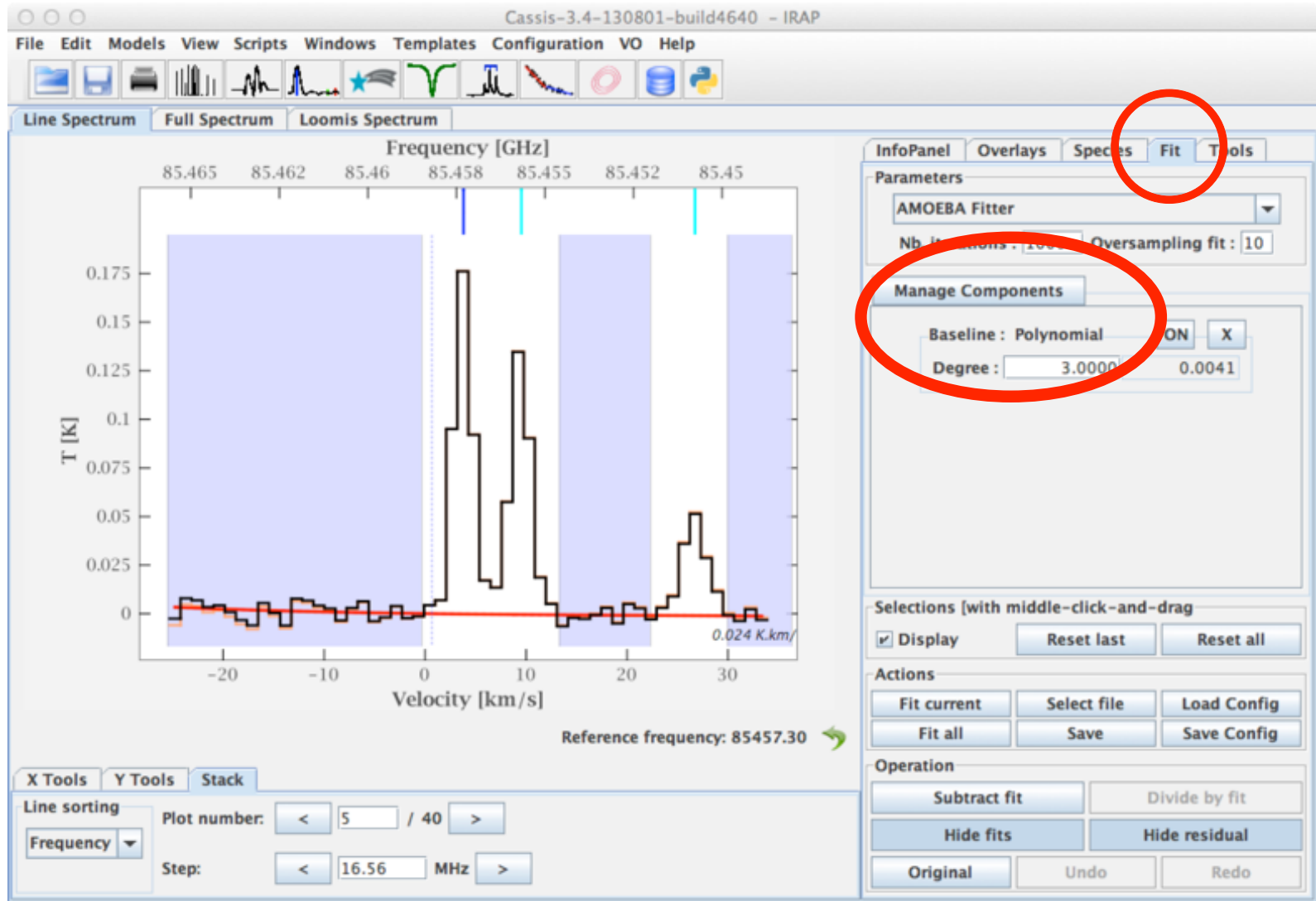


Species



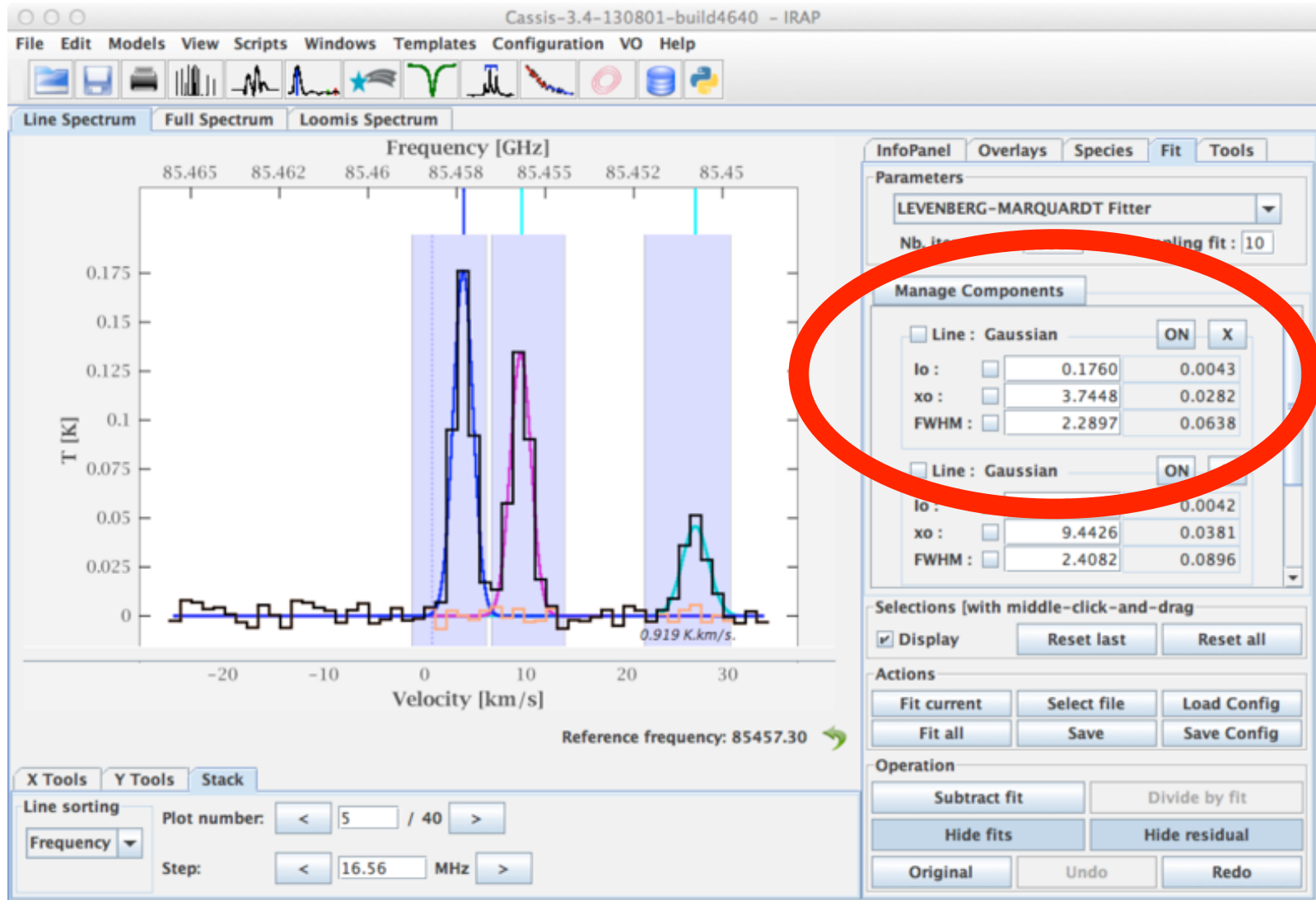
CASSIS "Fit" Panel

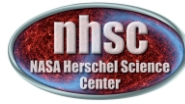
Baseline fitting



CASSIS "Fit" Panel

Baseline fitting





CASSIS Linelist

HC7N 99501

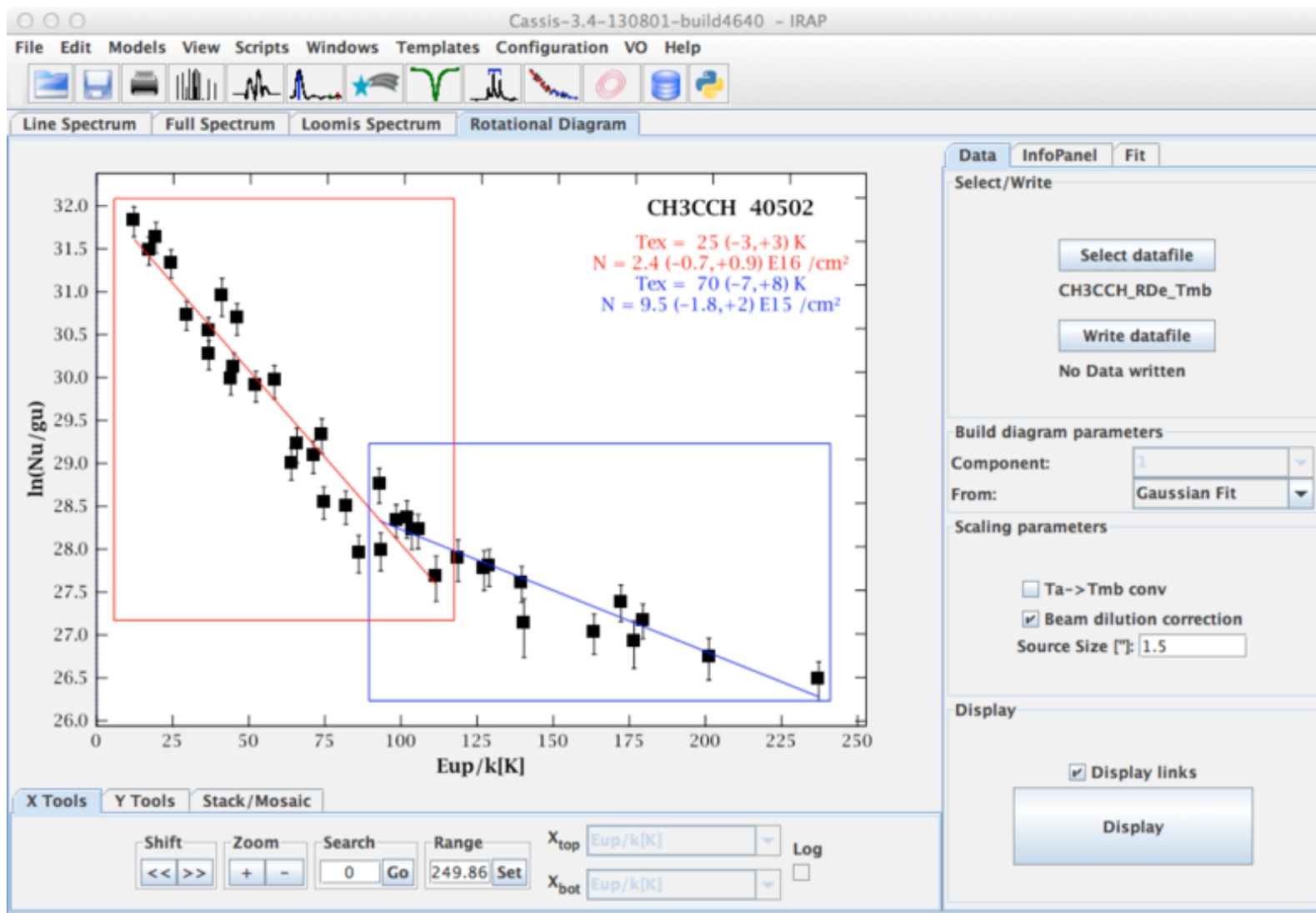
| # | Transition | Database specifics Frequency (MHz) | Eup (K) | Aij |
|---|---------------------|--|------------|---------|
| 1 | HC7N, v=0 (72 - 71) | 81210.127 | 142.3 | 7.19E-5 |
| 1 | HC7N, v=0 (73 - 72) | 82337.876 | 146.2 | 7.49E-5 |
| 1 | HC7N, v=0 (81 - 80) | 91359.595 | 179.8 | 1.02E-4 |

| Fit Freq. (MHz) | ∂Fit Freq. (MHz) | Vo (km/s) | ∂Vo (km/s) | From Gaussian/Lorentzian/Voigt Fit | | | | Int (K) | ∂Int (K) | Flux (K.km/s) | ∂Flux (K.km/s) |
|--------------------|---------------------|--------------|---------------|------------------------------------|-------------------|------------------|-------------------|------------|-------------|------------------|-------------------|
| | | | | FWHM_G (km/s) | ∂FWHM_G (km/s) | FWHM_L (km/s) | ∂FWHM_L (km/s) | | | | |
| 81210.073 | 0.973 | 4.00 | 0.30 | 2.76 | 0.30 | 0.00 | 0.00 | 0.018 | 0.0018 | 0.054 | 0.000 |
| 82338.297 | 0.473 | 2.26 | 0.06 | 3.13 | 0.20 | 0.00 | 0.00 | 0.011 | 0.0018 | 0.037 | 0.000 |
| 91359.664 | 0.073 | 3.57 | 0.04 | 2.97 | 0.34 | 0.00 | 0.00 | 0.007 | 0.0018 | 0.021 | 0.000 |

| Freq. I_Max (MHz) | V I_Max (km/s) | From 1st Moment | | Flux (K.km/s) | ∂Flux (K.km/s) | RMS (mK) | Observation specifics | | Telescope |
|----------------------|-------------------|-----------------|--------------|------------------|-------------------|-------------|-----------------------|-------------------|-----------|
| | | FWHM (km/s) | I_Max (K) | | | | ∂v (km/s) | Cal. error (%) | |
| 81210.373 | 3.76 | 2.76 | 0.018 | 0.054 | 0.000 | 5.00 | 1.153 | 30 | iram |
| 82338.597 | 3.23 | 3.13 | 0.011 | 0.037 | 0.000 | 6.00 | 1.139 | 30 | iram |
| 91359.264 | 4.55 | 2.97 | 0.007 | 0.021 | 0.000 | 5.00 | 1.027 | 30 | iram |

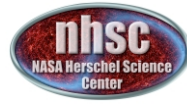


Rotational Diagram





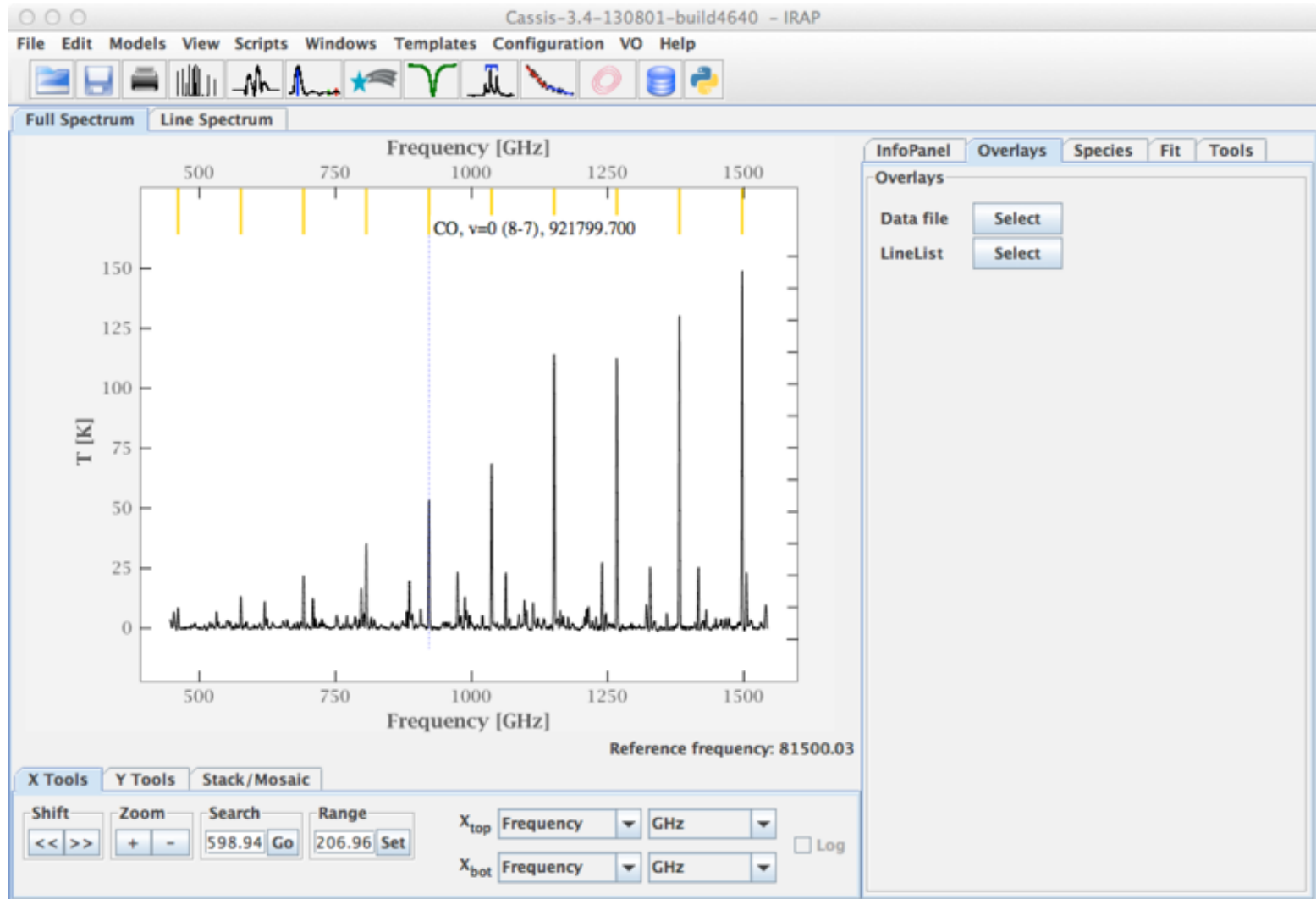
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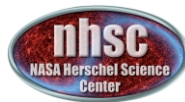


Overlay





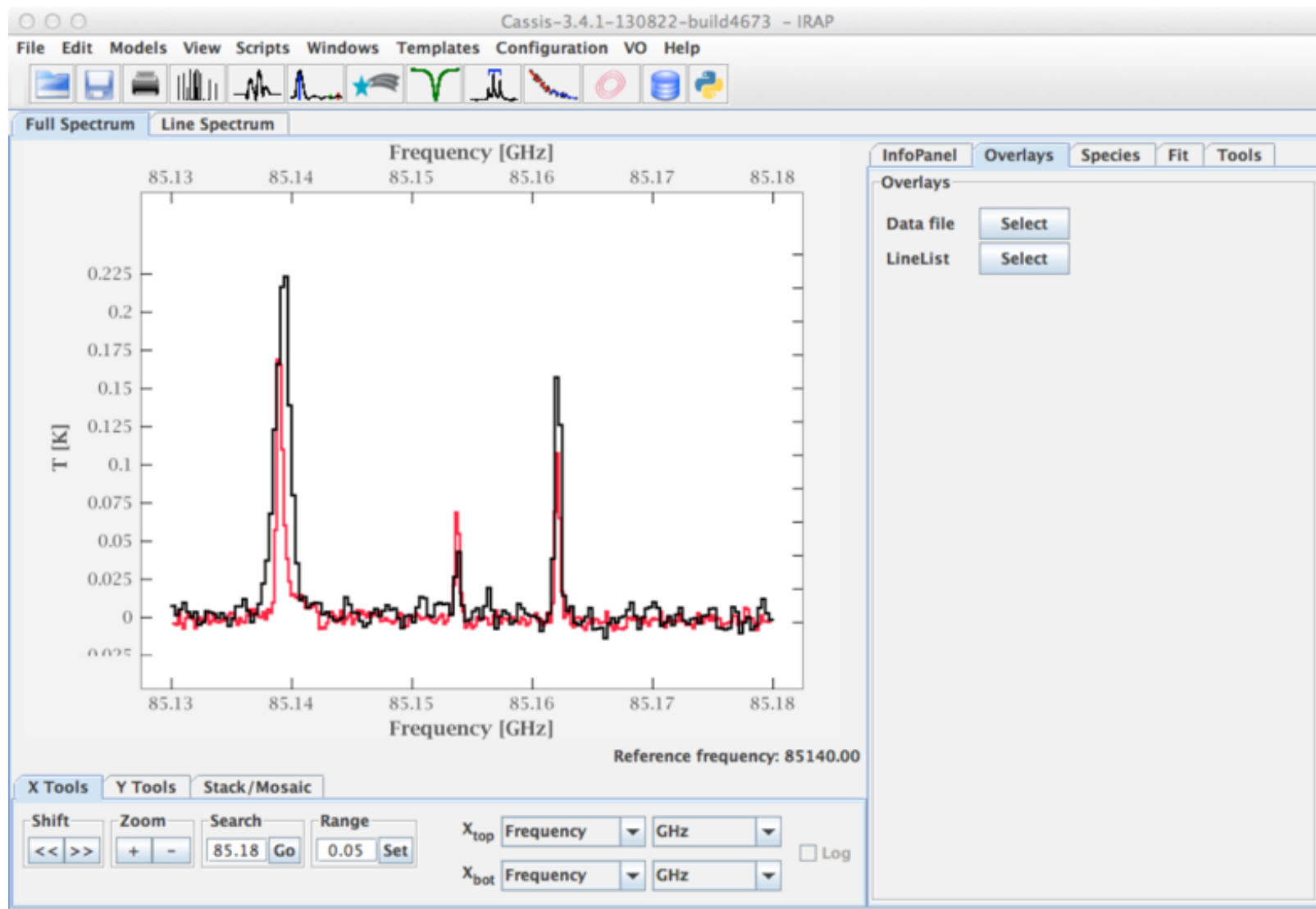
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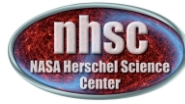


Overlay





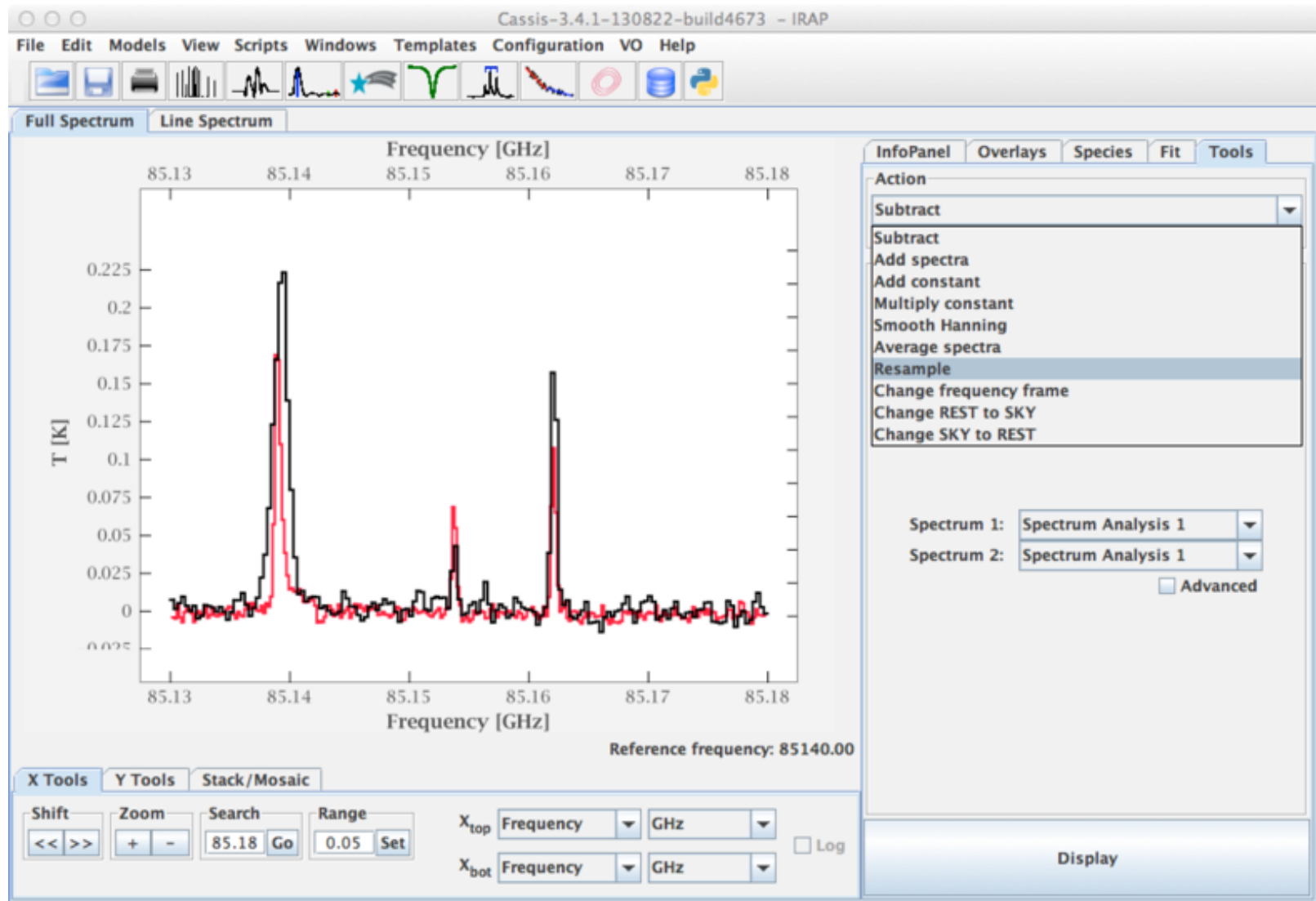
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Tools





Scripting

```

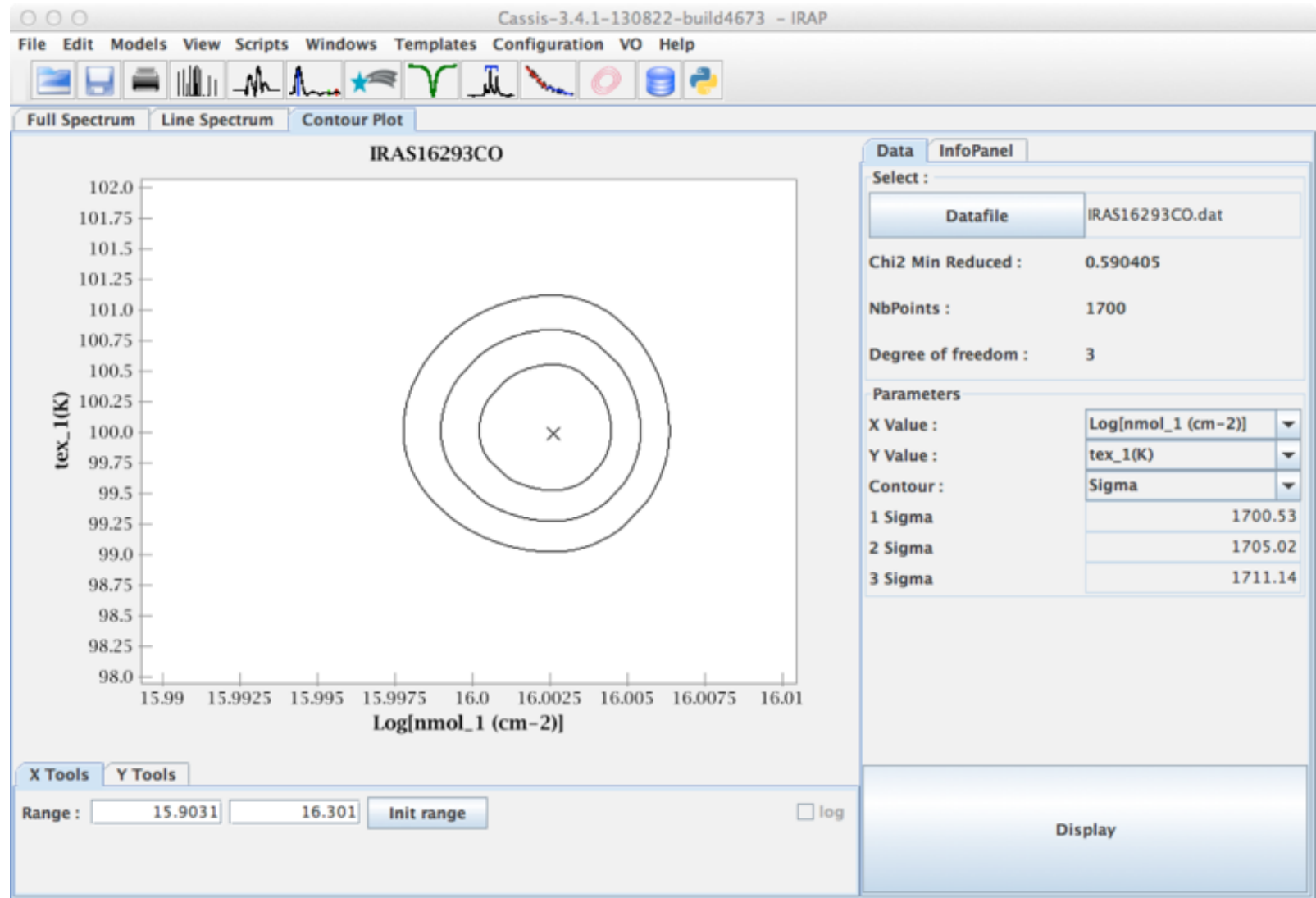
Jython Script - /Users/caux/Downloads/mycassis/CO_RG.py
Jy2K.py HCO+_MCMC.py A-CH3OH_MCMC.py 13CH3OH.py CO_Spire_MCMC.py JoinFiles.py CO_RG.py
22
23 # =====
24 # USER INPUTS
25 # =====
26 userInputs = UserInputs(
27   inputFile = myDir + speciesName + ".fus",
28   outputFile = myDir + myName + ".dat",
29   #telescope = {apex: [0, 1], hifi: [2, 3]},
30   telescope = "hifi",
31   tuningRange = [550.0, 1152.0],
32   tuningBand = 60.0,
33   aijMin = 0.0,
34   eup = [0.0, 350.0],
35   kup = ["*", "*"],
36   template = "ISM",
37   moltags = [28503, 29501],
38   tmb2ta = True,
39   isoUnique = False,
40   plotTitle = myName,
41   warning = True,
42
43   # Enter here the lines and the corresponding ranges to be taken into
44   # account in the computation
45   selectedLines = ["1": [r1] "2": [r2] "3": [r3] "4": [r4]]
46

```

Console
\$\$\$



X²
Contours
plot



CASSIS Help

From
Cassis Menu
or
website

CASSIS Web - HELP - About

cassis.irap.omp.eu/help/

Docume... HELP -... HCSS bu... Activity... Astropy home.str... SMA cor... Journée... Roadma...

1 About CASSIS

Contents

1. What's new in version 2.3?
2. How the document is organized
3. Snapshots of CASSIS
4. Copyright Notice

1.1 What's new in version 2.3?

- The emission and absorption models (LTE and RADEX) have been merged. The formalism now used produces more accurate models for both emission and absorption lines. Note that the old configuration files can still be read and used.
- The database structure has changed to make its access faster. It is up to date with the JPL and CDMS changes as of 2010/07/27.
- A number of partition function files have been added in the directory YOUR_CASSIS_DIR/sql/PartitionMole. These files include the partition functions computed at temperatures lower than 9.375 K and they override the partition functions provided by the databases. The users can add their own partition function files in this directory, using the same format and naming the file nnnn.txt where nnnn is the tag number of the species. Recall that, whatever the partition function file used, CASSIS performs a linear interpolation between the given values.
- An icon tool bar has been added to access CASSIS functionalities more rapidly.
- A Sinc model has been added to the line fitting profiles ("Fit" tab).
- Because we are changing CASSIS on a day to day basis, we tuned the update manager to check every day (at the first launch of CASSIS or HIPE with CASSIS plug-in) if a new version is available on the CASSIS web site.
- A lot of minor bugs have been corrected.

About CASSIS

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2. How the document is organized
3. Snapshots of CASSIS
4. Copyright Notice

Common functionalities

1. Interactive graphical tools
2. Manipulate the spectrum

Models

1. Spectrum Analysis
2. LTE+RADEX
3. LTE Comet
4. Line Analysis
5. Laboratory absorption lines
6. Rotational diagram

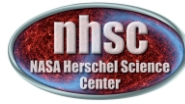
Templates

Caveats and tricks

CASSIS in HIPE



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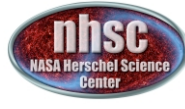
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CASSIS SxRs
System

from
[http://
cassis.irap.omp.fr](http://cassis.irap.omp.fr)



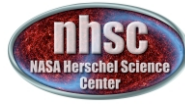


CASSIS workplan

- Cleaning, debugging and optimizing the code (a never ending task...)
- Database access via VO (VAMDC) working, will be available in CASSIS 3.5 (before end 2013)
- Use of instrumental profiles (**SPiRE**, PACS, ISO, SPITZER...)
- Datacubes handling (from HIPE or others packages)
- Upgrade to a full VO-Tool (as VO-Spec)
 - **with all CASSIS specificities !**
- Automatic multi-line fitting (all lines of the same species, same line of \neq isotopes, hyperfine structure...)
- Coupling with external physical models
- Plotting engine for these external model
- ...



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CASSIS Demo

