

Short introduction to the hands-on tutorial on

CARTA

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EUROPEAN ARC
ALMA Regional Centre





HOME FEATURES GALLERY ROADMAP INSTALLATION TEAM ABOUT



<https://cartavis.org/>

CARTA

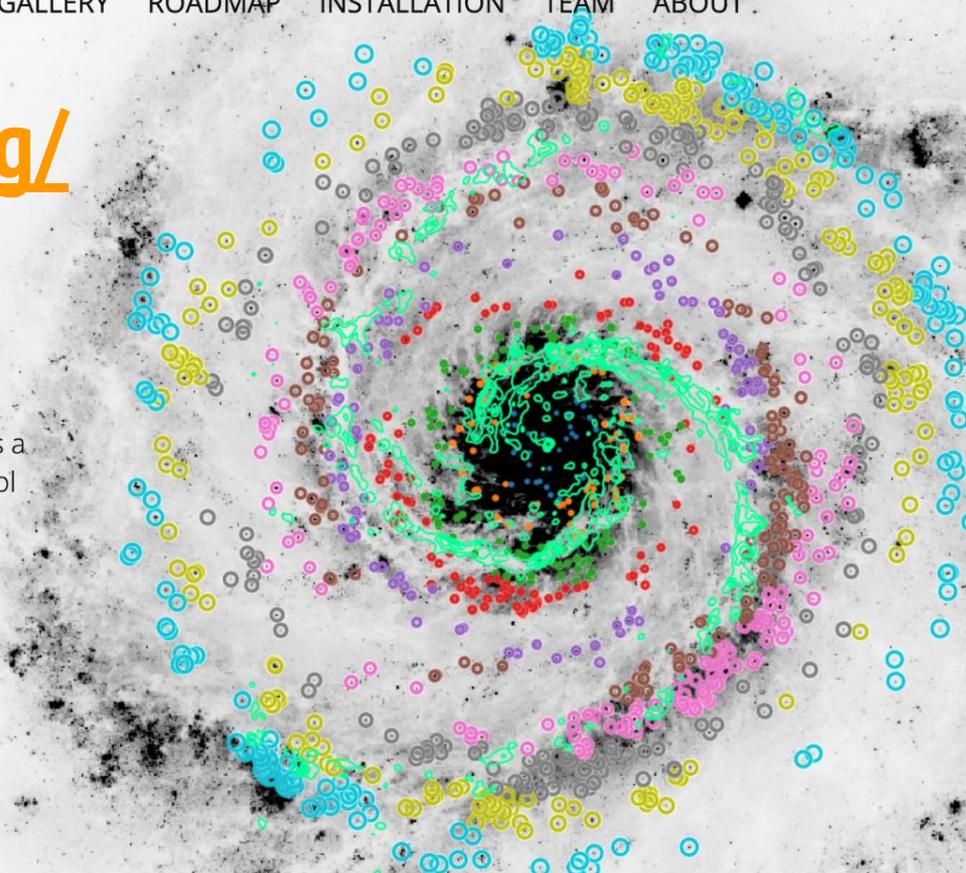
Cube Analysis and Rendering Tool for Astronomy, is a next generation image visualization and analysis tool designed for ALMA, VLA, and SKA pathfinders.

Installation

User Manual

Helpdesk

The CARTA v3.0 release is now available!



CARTA

Why?

Analyse, inspect and make plots of large FITS images and spectral cubes

How?

Using a client-server architecture you can process large FITS files

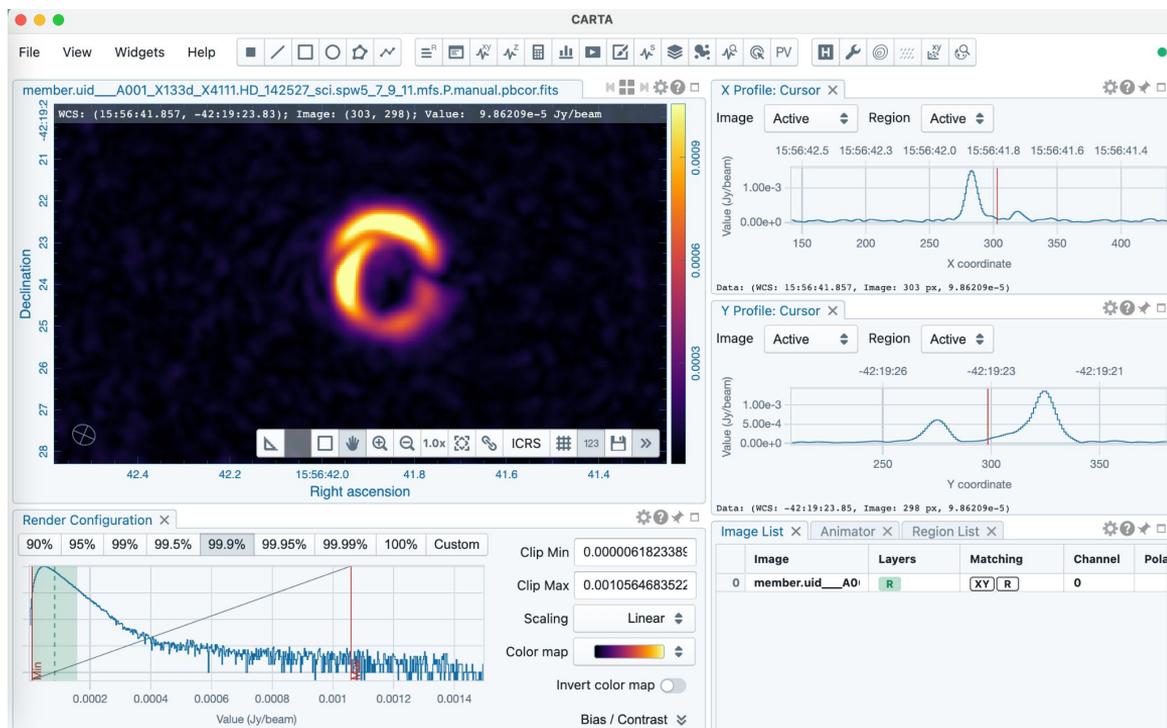
Where?

Directly from ASA or install CARTA locally on your machine

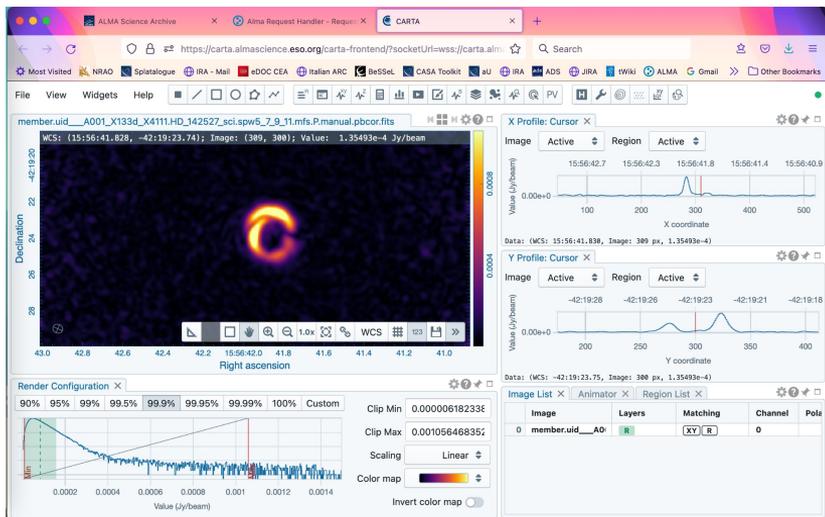
CARTA version 3 - released this August

CARTA v3 used in this school

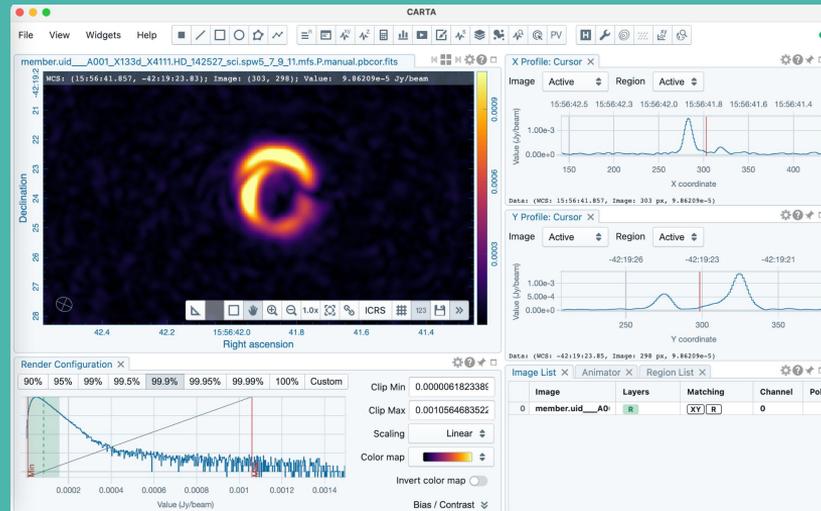
Available through the ASA and for local installation



Working with CARTA in the ASA



Working with CARTA on your device



Working with CARTA in the ASA

- No need to download data
- No need to install CARTA
- Save png but not FITS to disk
- Can open multiple ASA images and overlay these

Working with CARTA on your device

- Allows to customize all panels
 - Slightly bigger interface
 - Save FITS/png to disk
 - Can load locally stored data and overlay these
-

Using CARTA in ASA: 1- find and select dataset

Search
Explore and download

16 13 17.166 -60 45 1.88 FoV: 14.79'
Cells Footprints Sky objects Sky layers

Molecules
Lines
Redshift

Observations (8)
Projects (2)
Publications (1)

	Project code	ALMA source name	RA	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
			h:m:s	d:m:s		mJy/beam				arcsec	km/s		
<input checked="" type="checkbox"/>	2015.1.01520.S	eso137-001	16:13:16.550	-60:45:01.583	6	0.2180	226.067..243.913 GHz	2017-05-11	1	0.750	1.284	12m	mosaic
<input type="checkbox"/>	2015.1.01520.S	eso137-001	16:13:21.687	-60:45:21.917	7	0.0940	325.729..341.427 GHz	2017-06-18	1	0.525	0.862	12m	mosaic
<input type="checkbox"/>	2015.1.01520.S	eso137-001	16:13:16.597	-60:45:01.881	6	1.3200	226.004..243.913 GHz	2020-10-27	1	4.517	1.284	7m	mosaic
<input type="checkbox"/>	2019.1.01666.S	eso137-001_-_centra...	16:13:17.555	-60:45:10.659	7	0.0779	337.231..352.158 GHz	2021-03-23	0	0.884	0.242	12m	mosaic
<input type="checkbox"/>	2019.1.01666.S	eso137-001_-_inner_...	16:13:24.758	-60:45:33.264	7	0.0769	337.292..352.218 GHz	2021-07-02	0	0.920	0.243	12m	mosaic
<input type="checkbox"/>	2019.1.01666.S	eso137-001_-_south_...	16:13:22.466	-60:45:42.711	7	0.0796	337.231..352.158 GHz	2021-07-06	0	0.894	0.242	12m	mosaic
<input type="checkbox"/>	2019.1.01666.S	eso137-001_-_centra...	16:13:17.555	-60:45:10.659	7	0.0545	337.24..352.21 GHz	2022-05-18	0	0.198	0.242	12m	mosaic

Using CARTA in the ASA: 2- explore and download data

Download **Explore and download in legacy system**

Selected Sources (28) MOUS (105) GOUS (421)

File name Sort by Display only Quick select

Project: 2015.1.01520.S **Science Goal:** uid://A001/X2fb/X44a **Group OUS:** uid://A001/X2fb/X44b **Member OUS:** uid://A001/X2fb/X44c
[member.uid_A001_X2fb_X44c.eso137-0.continuum.image_pbcor.fits](#) 4.0 MB
Band: 6
Array: 12m
preview not available

Project: 2015.1.01520.S **Science Goal:** uid://A001/X2fb/X44a **Group OUS:** uid://A001/X2fb/X44b **Member OUS:** uid://A001/X2fb/X44c
[member.uid_A001_X2fb_X44c.eso137-0.continuum.flux.fits.gz](#)

Project: 2015.1.01520.S **Science Goal:** uid://A001/X2fb/X44a **Group OUS:** uid://A001/X2fb/X44b **Member OUS:** uid://A001/X2fb/X44c

Observations (8)

Project code	Array	Mosaic
2015.1.015	12m	mosaic
2015.1.015	12m	mosaic
2015.1.015	7m	mosaic
2019.1.016	12m	mosaic

Spectral Plot: Redshift 0.01556520 (estimated). Frequency range 320 GHz to 340 GHz. Lines labeled: CH₃OH v=0-0(1,1)-0(2,2), H₂O v=0-0(1,1)-0(2,2), CO v=0-0(3,2), CS v=0-0(7,6), N₂⁺ J=4-3, HDO J=3,1-2(2,2), 13CO v=0-0(3,2).

ALMA Handler: go to selected SB and open product tar

ALMA Request Handler

[Login](#)

Anonymous User: Request #2162640760821 ✓

Request Title: [click to edit](#)

Download Selected

readme product auxiliary raw raw (semipass) external

Project / OUSet / Executionblock	Updated	File	Size	Accessible	Actions
Request 2162640760821			5 GB		
Project 2015.1.01520.S					
Science Goal OUS uid://A001/X2fb/X44a					
Group OUS uid://A001/X2fb/X44b					
Member OUS uid://A001/X2fb/X44c	2020-07-11				
SB eso137-0_a_06_TE					
readme		member.uid_A001_X2fb_X44c.README.txt	16 kB	✓	
product		2015.1.01520.S.uid_A001_X2fb_X44c_001_of_001.tar	72 MB	✓	
auxiliary		2015.1.01520.S.uid_A001_X2fb_X44c_auxiliary.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xaf5c32_X19c8.asdm.sdm.tar	27 GB	✓	
raw		2015.1.01520.S.uid_A002_Xaf6995_X16c3.asdm.sdm.tar	34 GB	✓	
raw		2015.1.01520.S.uid_A002_Xaf9ce7_X1c97.asdm.sdm.tar	44 GB	✓	
raw		2015.1.01520.S.uid_A002_Xaf9ce7_X49ea.asdm.sdm.tar	41 GB	✓	
raw		2015.1.01520.S.uid_A002_Xaf9ce7_X4dd5.asdm.sdm.tar	29 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb08ef9_X1c69.asdm.sdm.tar	29 GB	✓	
external		2015.1.01520.S.uid_A001_X2fb_X44c_external_ari_l_001_of_001.tar	33 GB	✓	
Member OUS uid://A001/X2fb/X44e	2020-10-28				
SB eso137-0_a_06_7M					
readme		member.uid_A001_X2fb_X44e.README.txt	4 kB	✓	
product		2015.1.01520.S.uid_A001_X2fb_X44e_001_of_001.tar	2 GB	✓	
auxiliary		2015.1.01520.S.uid_A001_X2fb_X44e_auxiliary.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb03fa0_X3524.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb12f3b_X2d1f.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb12f3b_X3456.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb12f3b_Xbbdf.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb1a414_X1781.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb1a414_X2a48.asdm.sdm.tar	1 GB	✓	
raw		2015.1.01520.S.uid_A002_Xb10b-3_X8ac.asdm.sdm.tar	880 MB	✓	

Request Handler: find your image and click CARTA icon

ALMA Request Handler

Login

Anonymous User: Request #2162640760821 ✓

Request Title: [click to edit](#)

Download Selected

readme product auxiliary raw raw (semipass) external

Project / OUSet / Executionblock	Updated	File	Size	Accessible	Actions
Request 2162640760821			5 GB		
Project 2015.1.01520.S					
Science Goal OUS uid://A001/X2fb/X44a					
Group OUS uid://A001/X2fb/X44b					
Member OUS uid://A001/X2fb/X44c	2020-07-11				
SB eso137-0_a_06_TE					
<input checked="" type="checkbox"/> readme		member.uid_A001_X2fb_X44c.README.txt	16 kB	✓	
<input checked="" type="checkbox"/> product		2015.1.01520.S uid_A001_X2fb_X44c_001 of 001.tar	72 MB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw19.mfs.l.pbcor.fits.gz	143 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw21.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw21.mfs.l.pbcor.fits.gz	143 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw23.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw23.mfs.l.pbcor.fits.gz	176 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw25.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw25.mfs.l.pbcor.fits.gz	143 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1427-4206_bp.spw25.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw19.mfs.l.pbcor.fits.gz	146 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw19.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw21.mfs.l.pbcor.fits.gz	146 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw21.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw23.mfs.l.pbcor.fits.gz	180 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw23.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw25.mfs.l.pbcor.fits.gz	146 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.J1617-5848_ph.spw25.mfs.l.pbcor.fits.gz	369 kB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.eso137-0.CO21_flux.fits.gz	16 MB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.eso137-0.CO21_image.pbcor.fits	46 MB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.eso137-0.continuum_image.pbcor.fits	1 MB	✓	
<input type="checkbox"/> product		member.uid_A001_X2fb_X44c.eso137-0.continuum_image.pbcor.fits	4 MB	✓	

CARTA icon



Using CARTA in ASA (shortcut): open CARTA in new tab

The screenshot displays the CARTA software interface. At the top, a dark blue header contains the 'CARTA' logo and a close button. Below the header is a menu bar with 'File', 'View', 'Widgets', and 'Help'. A toolbar with various icons is positioned below the menu. The main workspace is divided into several panels:

- Top Left:** A plot titled 'member.uid__A001_X2fb_X44c.eso137-0.CO21.image.pbcor.fits'. It shows a 2D image of a radio source with a color scale from -0.03 to 0.03. The axes are 'Right ascension' (14:00 to 12:40) and 'Declination' (43:00 to 47:00). A text box provides metadata: 'WCS: (16:13:16.66, -60:45:01.5); Image: (512, 512); NaN*; Frequency (BARYCENT): 227.0425 GHz; Velocity: -50.0000 km/s; Polarization: Stokes I'.
- Top Right:** Two profile plots, 'X Profile: Cursor' and 'Y Profile: Cursor', both showing 'Value' vs 'coordinate' from 0 to 1. Each has 'Image' and 'Region' dropdowns set to 'Active'.
- Bottom Left:** A 'Render Configuration' panel with a histogram of 'Value (Jy/beam)' ranging from -0.06 to 0.06. It includes percentage selection buttons (90%, 95%, 99%, 99.5%, 99.9%, 99.95%, 99.99%, 100%, Custom) and 'Clip Min' (-0.03358621461) and 'Clip Max' (0.03474590320€) settings.
- Bottom Right:** An 'Image List' panel with a table showing the loaded image and its properties.

A red box highlights a button labeled 'Open in a new tab' in the top right corner of the interface.

Image	Layers	Matching	Channe
0 member.uid__A001_X2fb_X44c.eso137-0.CO21.image.pbcor.fits	R	XY Z R	0

Opening CARTA version 3.0.0

File View Widgets Help



 **CARTA Usage Data**



CARTA would like to collect anonymous usage data, in order to help the development team prioritize additional features and platforms. No personal or scientific information will be collected. Please see our [data collection policy](#) for more details.

Yes, send usage data

Metrics include session duration, number and size of images opened.

No, do not send usage data

Only an anonymous opt-out message will be submitted.

Opening and appending images

member.uid__A001_X133d_X4111.HD_142527_sci.spw5_7_9_11.mfs.IQUV.manual.pbcor.fits

WCS: (15:56:42.580, -42:19:30.34); Image: (143, 168); Value: -4.30326e-5
Jy/beam ; Polarization: Stokes I

Image	Layers	Matching	Channel	Polarization
0 member.uid__A001_X133d_X4111.HD_142527_sci.spw7.cube.IQUV.manual.pbcor.fits	R	XY Z R	24	Stokes I
1 member.uid__A001_X133d_X4111.HD_142527_sci.spw5_7_9_11.mfs.IQUV.mar	R	XY R	0	Stokes I

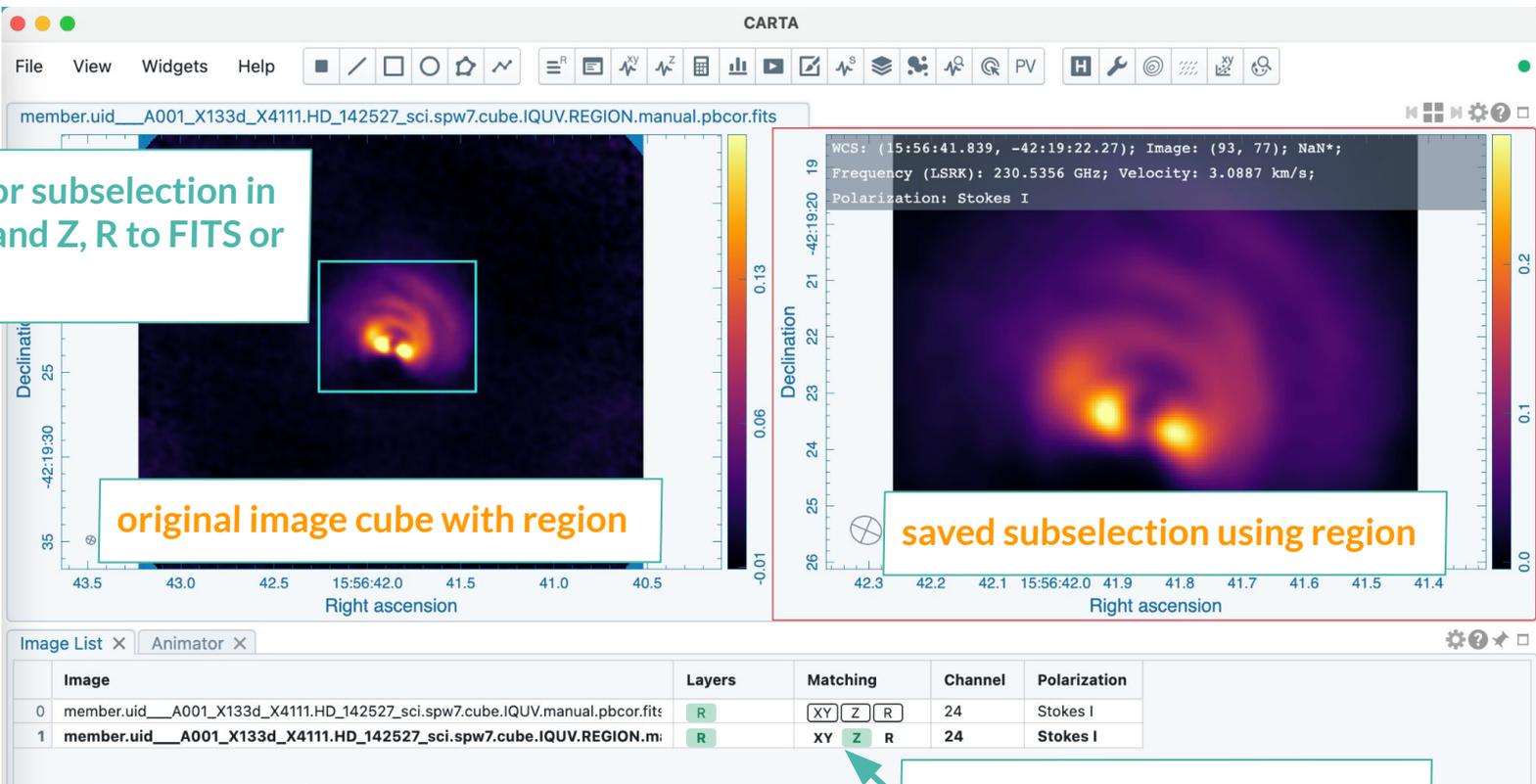
0: opened image

1: appended image

click to match image 1 to image 0 in XY [or Z or R]

Spectral line Stokes I cube and Stokes I continuum, HD 142527

Save images and region files and exporting to png

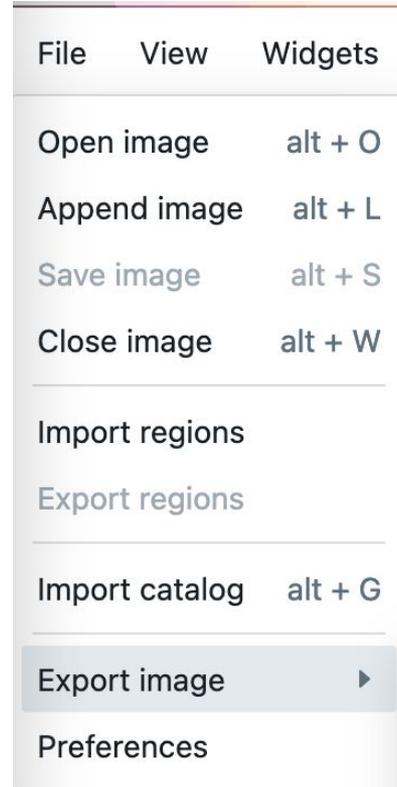


Export to png image

Spectral line Stokes I cube, HD 142527

Saving and exporting images using CARTA in the ASA

- Fits and CASA images are saved in the CARTA session but cannot be saved as FITS or CASA images to local disk
- PNG images can be exported to local disk.



Customise your CARTA

- ▶ Enlarge widget panels
 - ▶ Select only the widgets panels you want
 - ▶ Put the widgets panels at a convenient location and resize
 - ▶ Use your preferred colour map and scaling function
 - ▶ Zoom and recenter the map
 - ▶ Show or hide toolbar
 - ▶ Customize CARTA settings in Preferences

Working Window - Loaded Image

File View Widgets Help

remove widget

pin widget

member.uid__A001_X2fb_X44c.eso137-0.CO21.image.pbcor.fits

WCS: (16:13:01.33, -60:43:58.2); Image: (961, 765); NaN; Frequency (BARYCENT): 227.0425 GHz; Velocity: -50.0000 km/s; Polarization: Stokes I

Declination

Right ascension

X Profile: Cursor

Image Active Region Active

Value (Jy/beam)

X coordinate

Data: (WCS: 16:13:01.33, Image: 961 px, NaN)

Y Profile: Cursor

Image Active Region Active

Value (Jy/beam)

Y coordinate

Data: (WCS: -60:43:58.1, Image: 765 px, NaN)

Render Configuration

90% 95% 99% 99.5% 99.9% 99.95% 99.99% 100% Custom

Histogram Per-Channel

Clip Min -0.033586214611

Clip Max 0.034745903206

Scaling Linear

Color map

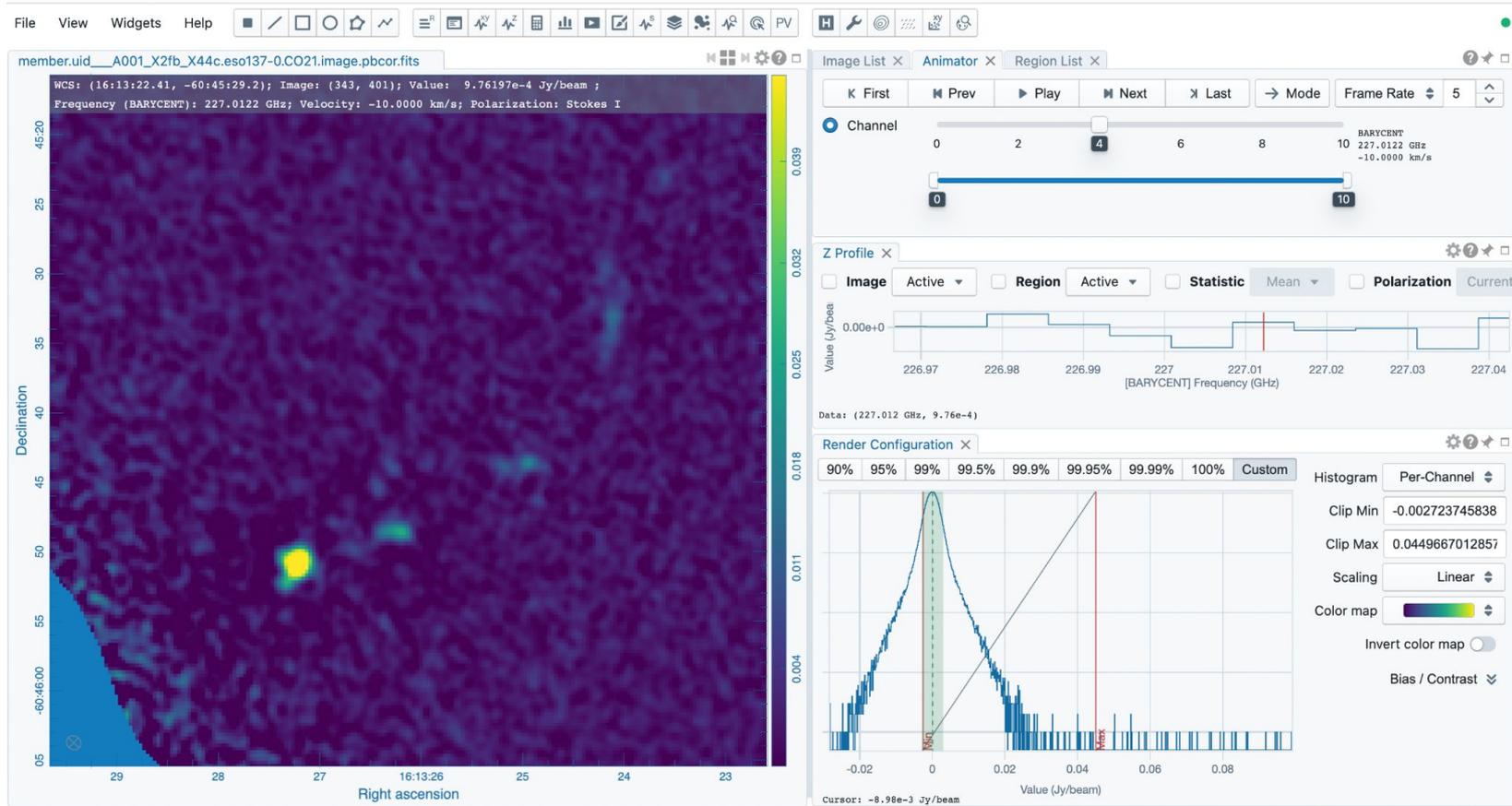
Invert color map

change color map

Image	Layers	Matching	Channel	Polarization
0 member.uid__A0	R	XY Z R	0	Stokes I

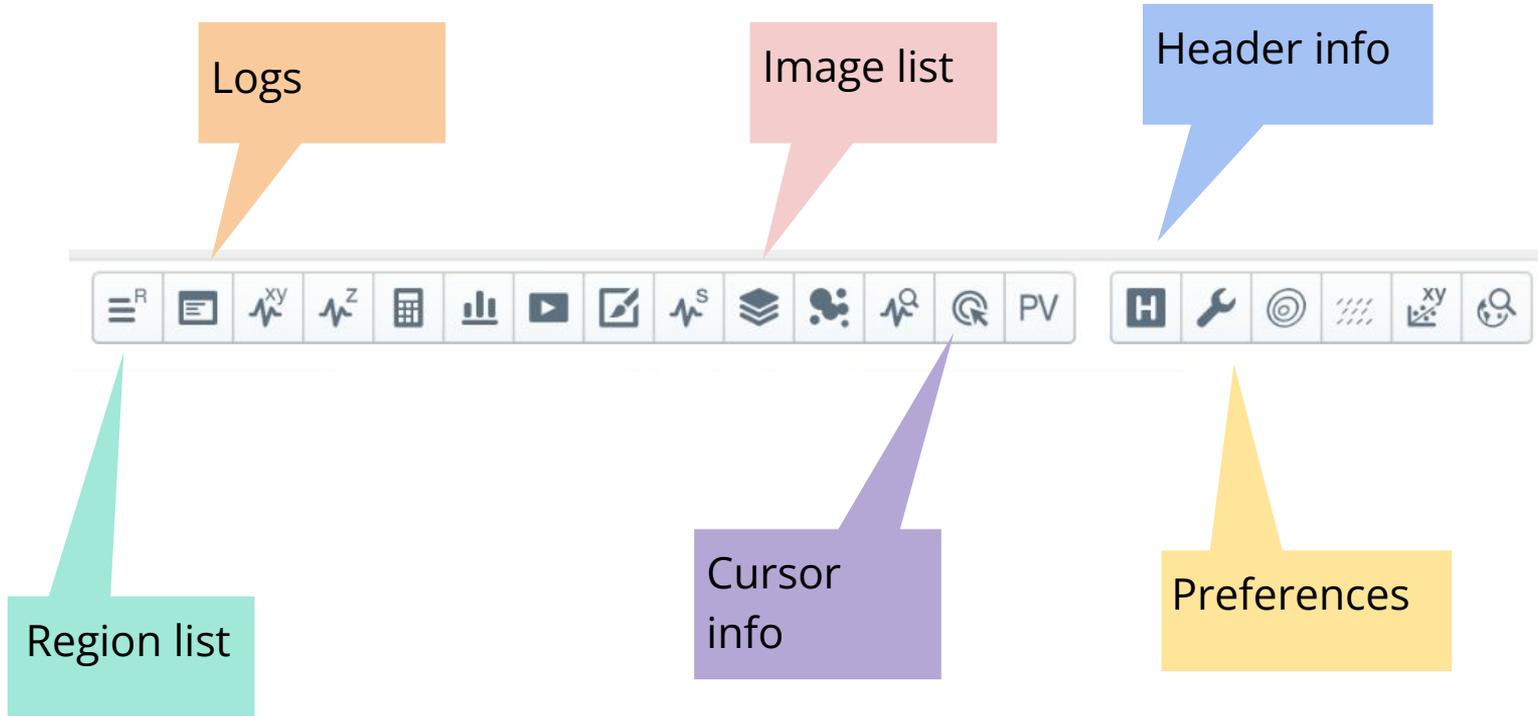
Spectral line cube (QA2), ESO 137-001

Adapted working window - example

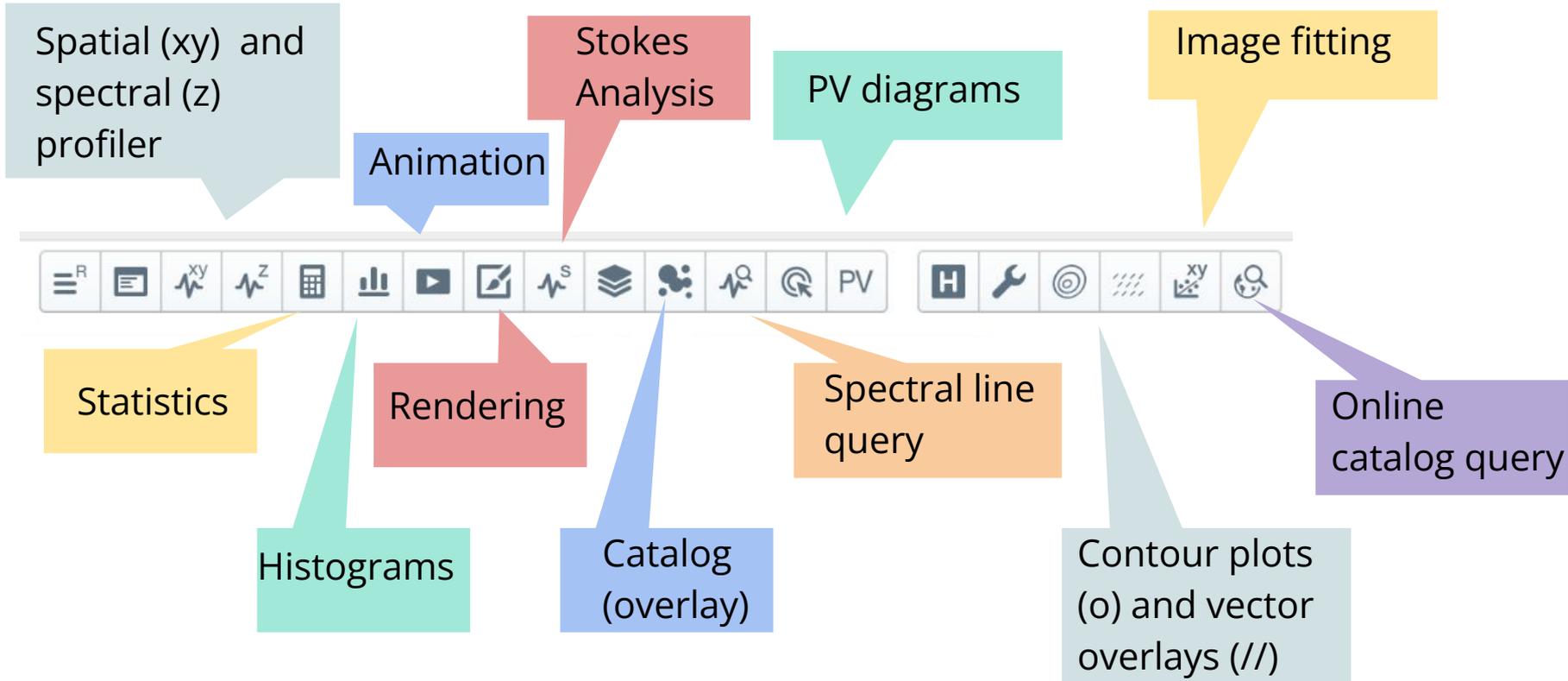


Spectral line cube (QA2), ESO 137-001

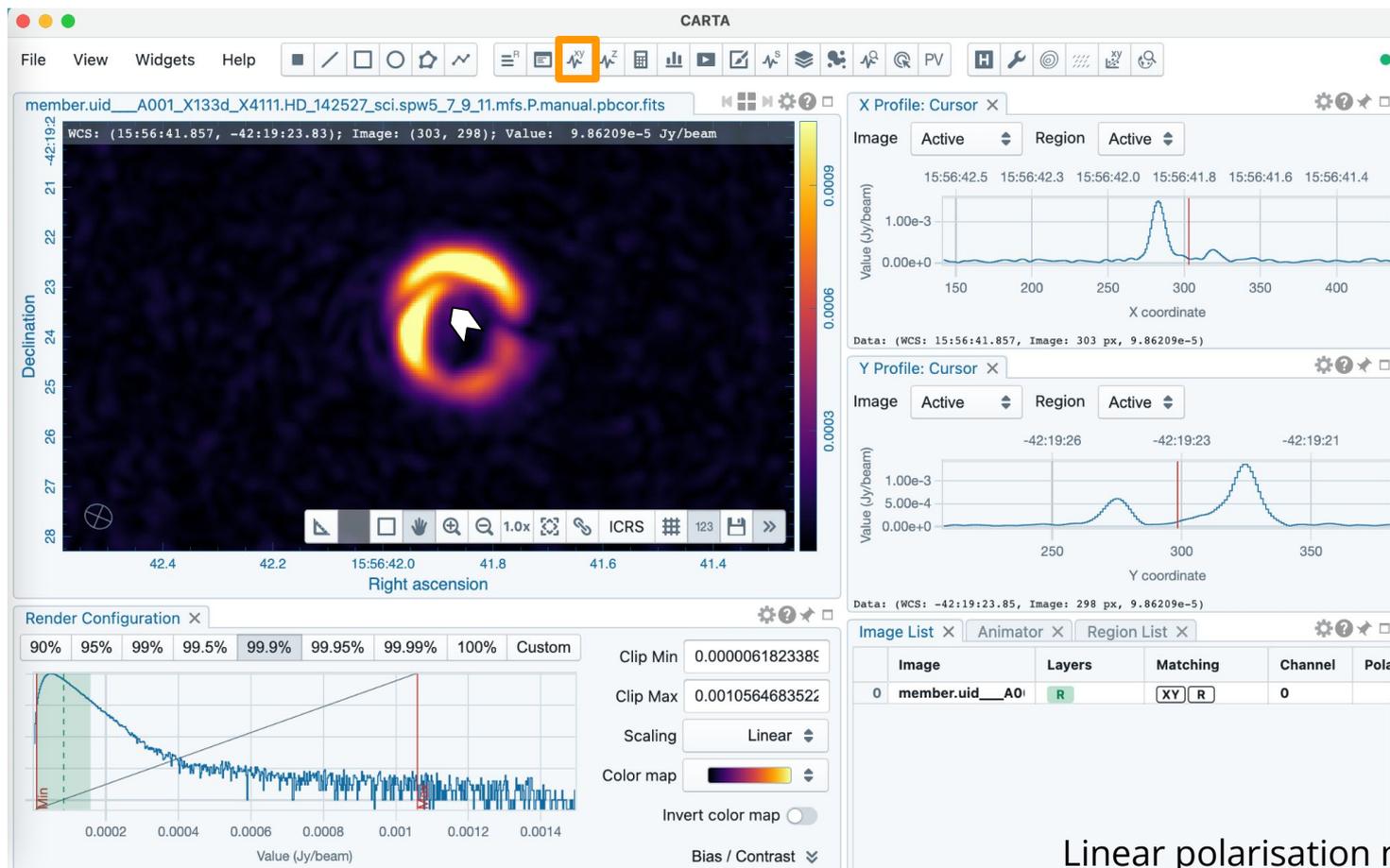
Auxiliary Widgets



Analysis Widgets

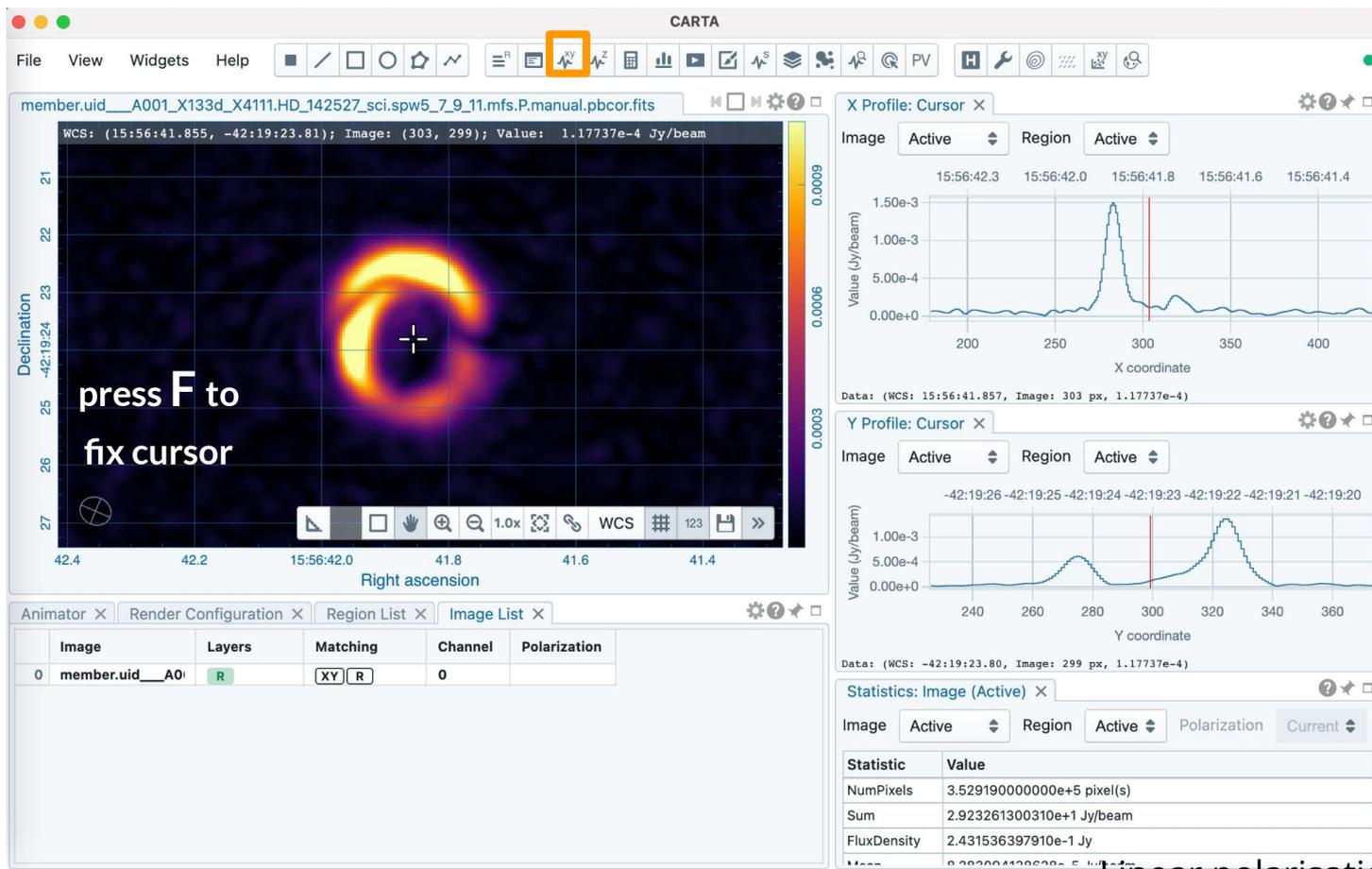


Spatial profiler



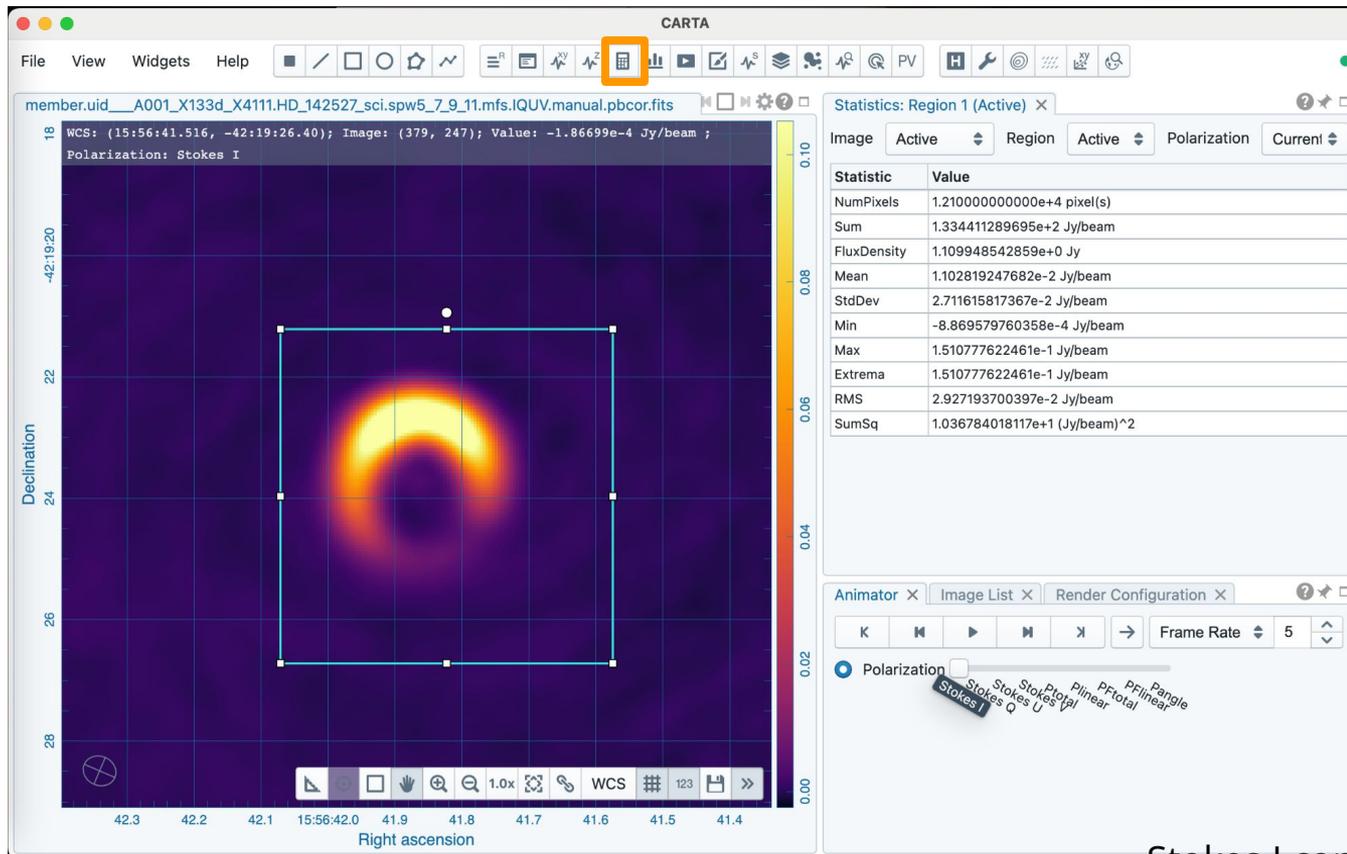
Linear polarisation map, HD 142527

Spatial profiler - fix position with "F"



Linear polarisation map, HD 142527

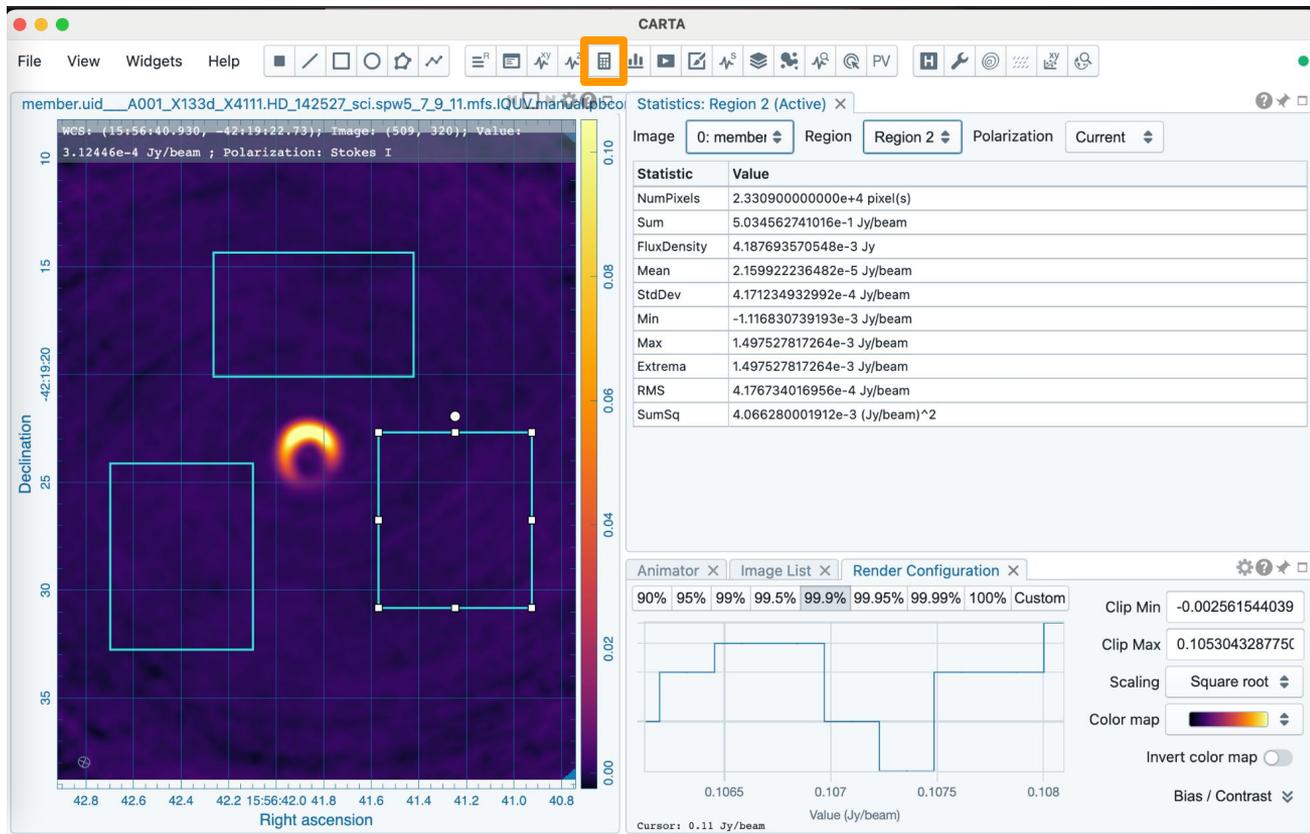
Statistics widget



For getting the peak Target emission, use a Region on the Target.

Stokes I continuum map, HD 142527

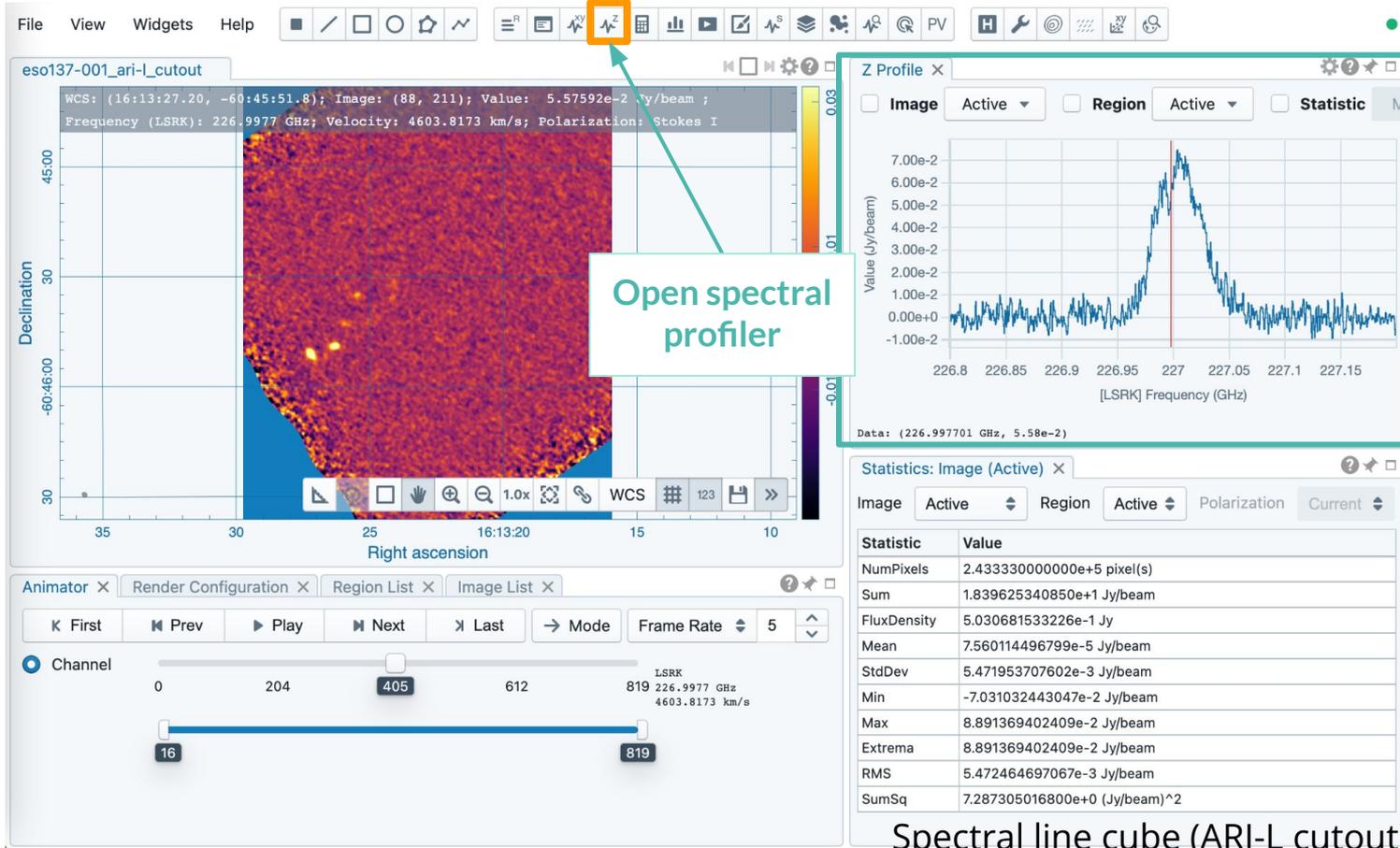
Statistics widget



For getting the RMS noise of the map, use a few Regions excluding the Target and image edges (higher noise) and get the mean RMS.

Stokes I continuum map, HD 142527

Spectral profiler



Spectral line cube (ARI-L cutout), ESO 137-001

Animator - Browsing Data Cube

File View Widgets Help

WCS: (16:13:27.20, -60:45:51.8); Image: (88, 211); Value: 5.57592e-2 Jy/beam ;
Frequency (LSRK): 226.9977 GHz; Velocity: 4603.8173 km/s; Polarization: Stokes I

Declination

Right ascension

Move through the channels or click on spectrum

Z Profile

Image Active Region Active Statistic

Value (Jy/beam)

[LSRK] Frequency (GHz)

Data: (226.997701 GHz, 5.58e-2)

Statistics: Image (Active)

Image Active Region Active Polarization Current

Statistic	Value
NumPixels	2.433330000000e+5 pixel(s)
Sum	1.839625340850e+1 Jy/beam
FluxDensity	5.030681533226e-1 Jy
Mean	7.560114496799e-5 Jy/beam
StdDev	5.471953707602e-3 Jy/beam
Min	-7.031032443047e-2 Jy/beam
Max	8.891369402409e-2 Jy/beam
Extrema	8.891369402409e-2 Jy/beam
RMS	5.472464697067e-3 Jy/beam
SumSq	7.287305016800e+0 (Jy/beam)^2

Animator

Render Configuration Region List Image List

First Prev Play Next Last Mode Frame Rate 5

Channel

0 204 405 612 819

LSRK 226.9977 GHz 4603.8173 km/s

16 819

Spectral Profiler: various analysis tools in Settings

Settings

The screenshot displays the Spectral Profiler software interface. The main window shows a spectral image of a region, with axes labeled 'Right ascension' (10 to 35) and 'Declination' (30 to 45.00). A color bar on the right indicates intensity values from -0.01 to 0.03. The 'Z Profile' window shows a plot of 'Value (Jy/beam)' versus frequency, with a peak around 226.9 GHz. The 'Z Profile Settings: Cursor (Active)' dialog box is open, showing settings for 'Conversion' (Frequency (GHz)), 'System' (BARYCENT), and 'Intensity unit' (Jy/beam). A green callout bubble highlights the 'Moments, smoothing, velocity conversion, line fitting' options in the settings.

WCS: (16:13:27.20, -60:45:51.8); Image: (88, 211); Value: 5.57592e-2 Jy/beam ;
Frequency (LSRK): 226.9977 GHz; Velocity: 4603.8173 km/s; Polarization: Stokes I

Decination

Right ascension

Z Profile

Image Active Region Active Statistic M

Value (Jy/beam)

226.8 226.85 226.9 227.0

Data: (226.997701 GHz, 5.58e-2)

Statistics: Image (Active)

Image Active Region

Statistic Value

NumPixels 2.433330000000e+5

Sum 1.839625340850e+1 Jy/beam

Z Profile Settings: Cursor (Active)

Conversion Styling Smoothing Moments Fitting

Coordinate Frequency (GHz)

System BARYCENT

Intensity unit Jy/beam

Moments, smoothing, velocity conversion, line fitting

Animator Render Configuration Region List Image List

K First Prev Play Next Last Mode Frame Rate

Channel

0 204 405 612

16

Spectral profile: Moments available

Available moments

- 1: Mean value of the spectrum
- ✓ 0: Integrated value of the spectrum
- 1: Intensity weighted coordinate
- 2: Intensity weighted dispersion of the coordinate
- 3: Median value of the spectrum
- 4: Median coordinate
- 5: Standard deviation about the mean of the spectrum
- 6: Root mean square of the spectrum
- 7: Absolute mean deviation of the spectrum
- ✓ 8: Maximum value of the spectrum
- 9: Coordinate of the maximum value of the spectrum
- 10: Minimum value of the spectrum
- 11: Coordinate of the minimum value of the spectrum

Z Profile Settings: Region #1 (Active)

Conversion Styling Smoothing **Moments** Fitting

Image (0: eso13...) Active

Region (Region 1) Region 1

Coordinate Frequency (GHz)

System BARYCENT

Range (GHz) From 226.8000 To 227.1998

Mask Include

Range (Jy/beam) From 0.015 To 1

Moments 1 x 2 x

Generate

Choose Region

Choose frequency range

Choose Mask

Choose Moments
0 & 8

Contour overlay and image matching

File View Widgets Help

eso137-001_ari-l_cutout_restfreq

WCS: (16:13:25.48, -60:45:34.6);
Image: (148, 293); Value: 1.46981e-2
Jy/beam ;
Frequency (BARYCENT): 227.0051 GHz;
Velocity: -0.5357 km/s;
Polarization: Stokes I

WCS: (16:13:25.48, -60:45:34.6);
Image: (148, 293); Value: 3.04025e-2
Jy/beam ; Polarization: Stokes I

Declination

Right ascension

Z Profile

Image Active Region Active Sta

Value (Jy/beam)

[BARYCENT] Radio velocity (km/s)

Data: (-0.536 km/s, 1.47e-2)

Statistics: Image (Active)

Statistic	Value
NumPixels	2.433220000000e+5 pixel(s)
Sum	1.772903905385e+1 Jy/beam
FluxDensity	4.848223569744e-1 Jy
Mean	7.286245819882e-5 Jy/beam
StdDev	5.441734415739e-3 Jy/beam
Min	-4.785482585430e-2 Jy/beam
Max	1.187653988600e-1 Jy/beam
Extrema	1.187653988600e-1 Jy/beam
RMS	5.442211011022e-3 Jy/beam
SumSq	7.206628434045e+0 (Jy/beam)^2

Image	Layers	Matching	Channel	Polarization
0	eso137-001_ari-l_	R	420	Stokes I
1	eso137-001_ari-l_ct	R C	0	

Animator X Render Configuration X Region List X Image List X

Matching: XY Z R

Spatially (xy) matched

Contour Configuration

Data Source: eso137-001_ari-l_cutout_restfreq.moment.maximum

Levels Configuration Styling

Generator: mean-sigma-list

Parameters: Mean 1.456e-2 Sigma 1.300e-3

Levels: 8.06e-3 2.11e-2 3.41e-2 5.36e-2 7.31e-2 9.26e-2

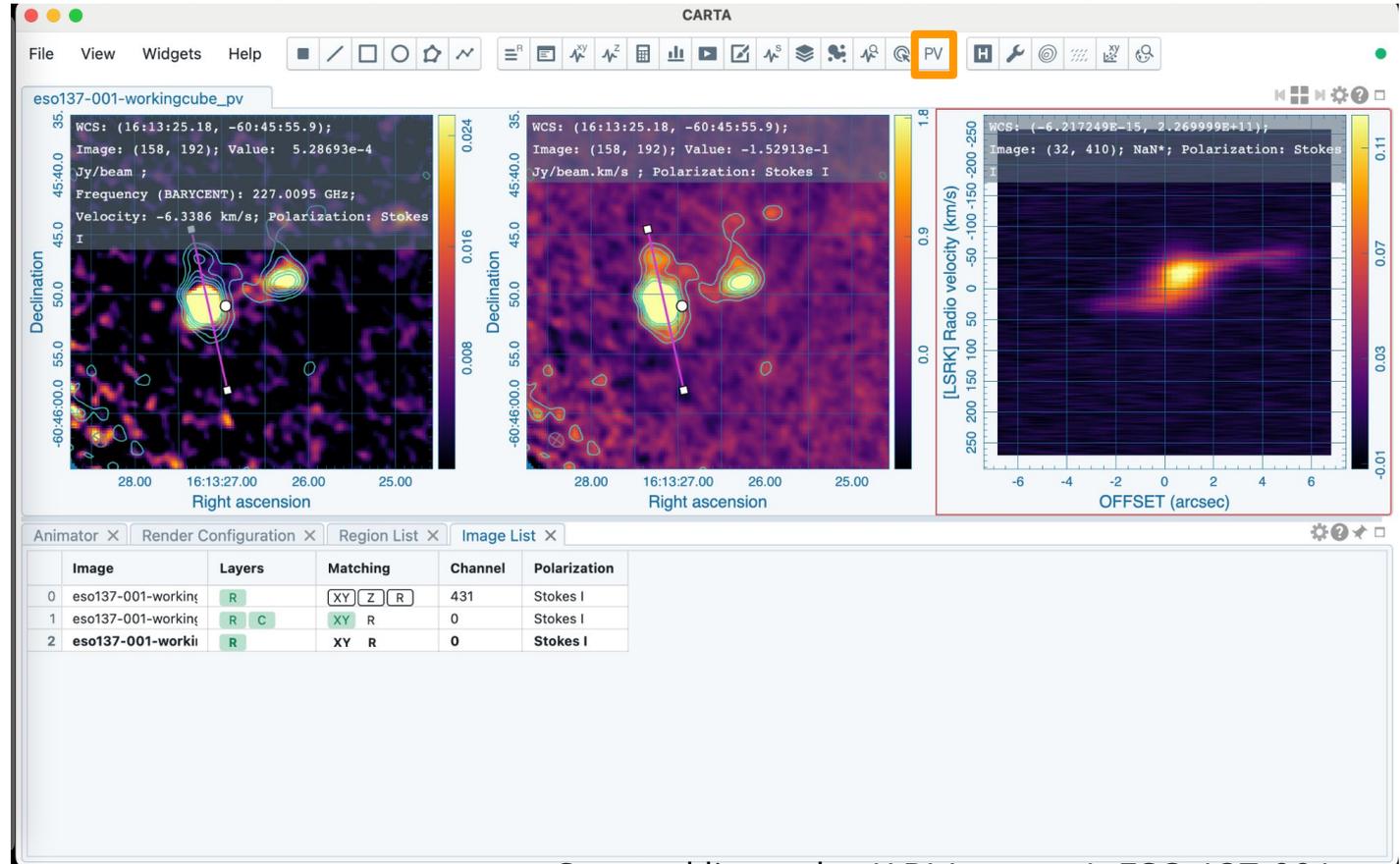
Clear Apply Close

Various contour Generators available

Position Velocity diagrams

Make a Region across the disk on the cube using contours of moment 0.

PV diagram is computed along the Region



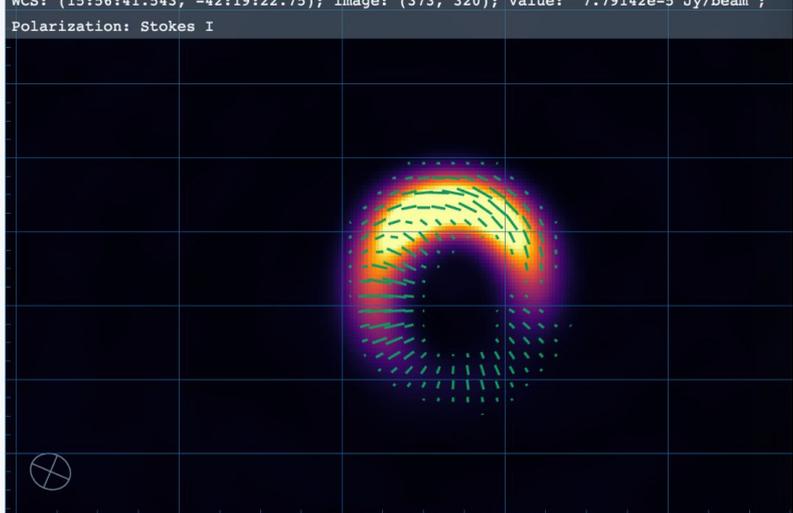
Spectral line cube (ARI-L cutout), ESO 137-001

Stokes Analysis - overplotting polarisation vectors

File View Widgets Help

member.uid__A001_X133d_X4111.HD_142527_sci.spw5_7_9_11.mfs.IQUV.manual.pbcor.fits

WCS: (15:56:41.543, -42:19:22.75); Image: (373, 320); Value: 7.79142e-5 Jy/beam ;
Polarization: Stokes I



Declination

Right ascension

Animator × Render Configuration × Region List × Image List ×

K First ◀ Prev ▶ Play ▶ Next ▶▶ Last → Mode Frame

● Polarization

Stokes I Stokes Q Stokes U Stokes V Ptotal Plinear Pftotal Pflinear Pangle

Vector Overlay Configuration

Data member.uid__A001_X133d_X4111.HD_142527_sci.spw5_7_9

Source

Configuration Styling

Line Thickness (px) 1

Intensity (Jy/beam) Min 2.000e-4 Max 1.375e-3

Line Length (px) Min 0 Max 20

Rotation offset (deg) 0

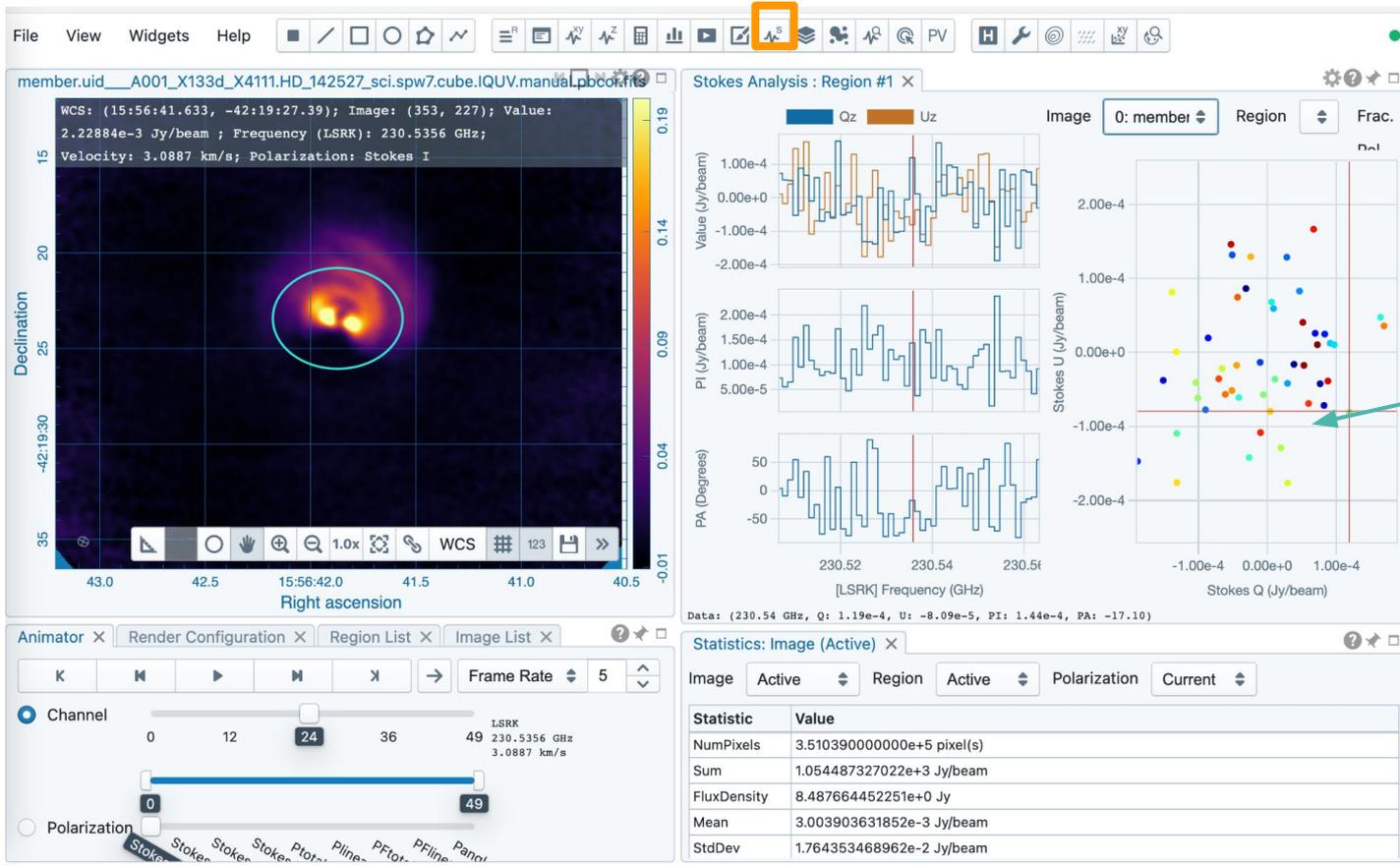
Color Mode Constant Color

Color

Clear Apply Close

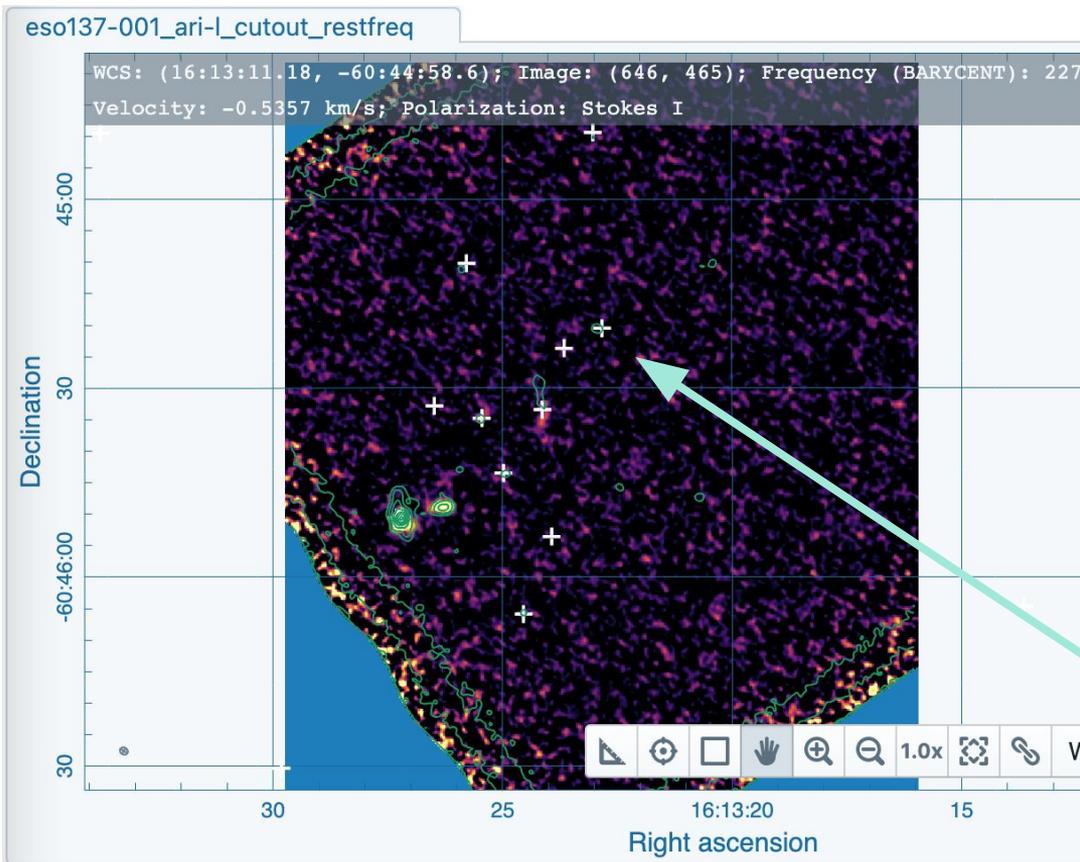
Min and Max are from linear polarisation map

Stokes Analysis - line polarisation and Faraday rotation



Colour coding by frequency (ordered if sign of Faraday rotation - not in this data)

Catalog overlay (SIMBAD or upload your own catalog)



Online Catalog Query

Database: SIMBAD

Object: Resolve

Search Radius: 0.06018525566947932 deg Set to viewer

Center Coordinates: AUTO 16:13:20.1944658557 -60:45:35.4408444087

Max Number of Objects: 1000

Query Cancel

Catalog : SIMBAD_ICRS_243.3341_-60.7598_0.06018525566947932deg

File 1 System ICRS Size Color Orientation

Name	Unit	Type	Display	Description
1 coo_bibcode		string	<input checked="" type="checkbox"/>	Coordinate reference
2 coo_err_angle	deg	short	<input type="checkbox"/>	Coordinate error angle

coo_bibcode	main_id	otype_txt	ra	dec
Click to filter	Click to filter	Click to filter	Click to filter	Click to filter
8 2010ApJ...717.147S	[SRR2010] 3	IR	243.36033333333333	-60.759125
9 2010ApJ...717.147S	[SRR2010] 9	IR	243.35741666666666	-60.752836
10 2010ApJ...717.147S	[SRR2010] 12	IR	243.34595833333333	-60.747069
11 2010ApJ...717.147S	[SRR2010] 1	IR	243.36329166666667	-60.764011
12 2006AJ...131.1163S	ESO 137-1	G	243.36377083333332	-60.764052

Showing 1 to 32 of total 32 entries

Image Overlay RA ra DEC dec Max Rows 32

Filter Reset Close Plot

CARTA help and citation

For ALMA-related CARTA questions:
contact the EU ARC nodes through the ALMA Helpdesk

For technical CARTA questions:
CARTA Helpdesk support@carta.freshdesk.com

CARTA citation:

Comrie, Wang, Hsu, et al., 2018
<https://ui.adsabs.harvard.edu/abs/2021zndo...3377984C/abstract>

CARTA tutorials available

I-TRAINS involving CARTA and polarization analysis
<https://almascience.eso.org/tools/eu-arc-network/i-train>

I-TRAIN #7: Polarization observations with ALMA

I-TRAIN #12: CARTA tutorial

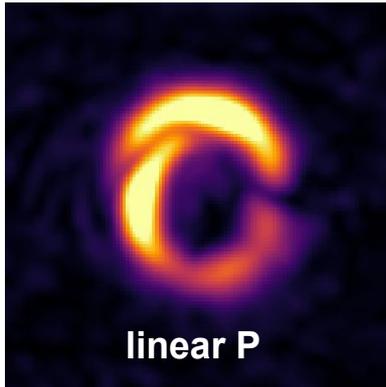


Hands-on

Exercise data sets

Spectral polarisation data

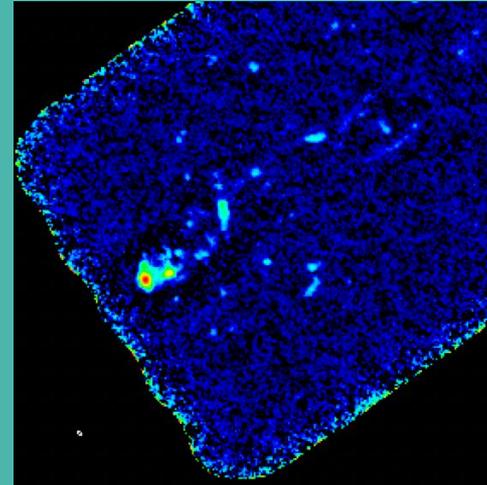
Protoplanetary disk HD 142527



Band 6 continuum and 12CO(2-1) polarisation data published in [Stephens et al. \(2020\)](#)

Spectral line mosaic data

Jellyfish Galaxy ESO 137-001



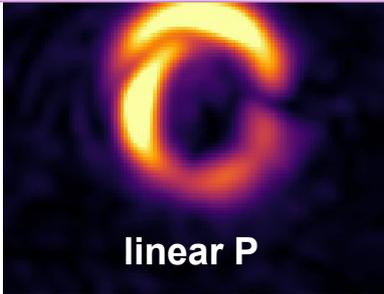
Band 6 continuum and 12CO(2-1) mosaic data published in [Ja'chym et al. \(2019\)](#)

Exercise data sets

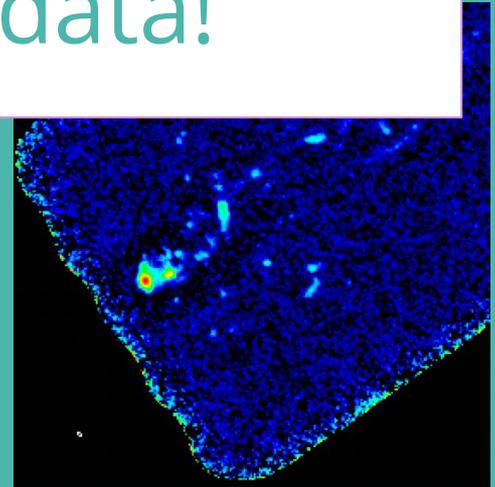
Spectral polarisation data

Spectral line mosaic data

Or use your own data!



Band 6 continuum and 12CO(2-1) polarisation data published in [Stephens et al. \(2020\)](#)



Band 6 continuum and 12CO(2-1) mosaic data published in [Ja'chym et al. \(2019\)](#)

Band 6 Full Pol HD142527

Project 2018.1.01172.S, SB: IM_Lup_a_06_TM1

Request 2162217175457		1 GB
Project 2018.1.01172.S		
Science Goal OUS uid://A001/X133d/X410f		
Group OUS uid://A001/X133d/X4110		
Member OUS uid://A001/X133d/X4111 2019-09-12		
SB IM_Lup_a_06_TM1		
<input checked="" type="checkbox"/>	readme	member.uid A001 X133d X4111.README.txt 4 kB ✓
<input checked="" type="checkbox"/>	product	2018.1.01172.S.uid A001 X133d X4111_001_of_001.tar 651 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw5 7 9 11.mfs.A.manual.pbcor.fits 1 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw5 7 9 11.mfs.IQUV.manual.mask.tgz 9 kB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw5 7 9 11.mfs.IQUV.manual.pb.fits.gz 2 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw5 7 9 11.mfs.IQUV.manual.pbcor.fits 6 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw5 7 9 11.mfs.P.manual.pbcor.fits 1 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw7.cube.IQUV.manual.mask.tgz 285 kB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw7.cube.IQUV.manual.pb.fits.gz 123 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.HD 142527 sci.spw7.cube.IQUV.manual.pbcor.fits 288 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.IM_Lup_sci.spw5 7 9 11.mfs.A.manual.pbcor.fits 1 MB ✓
<input type="checkbox"/>	product	member.uid A001 X133d X4111.IM_Lup_sci.spw5 7 9 11.mfs.IQUV.manual.mask.tgz 9 kB ✓

pol angle map

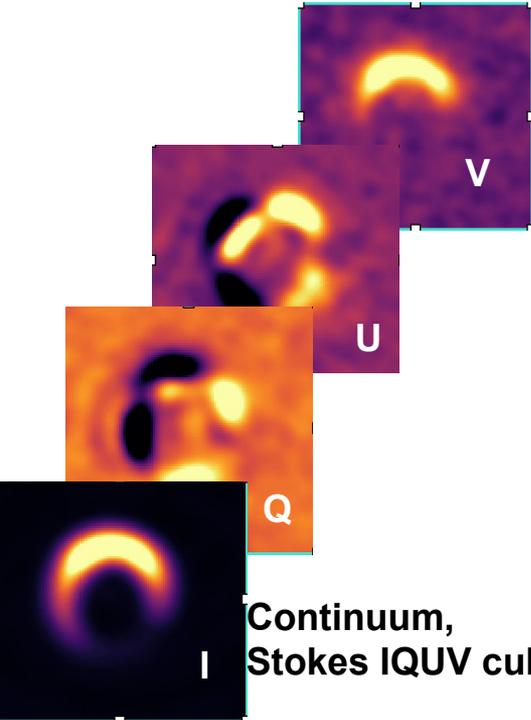
cont IQUV cube

linear pol map

spectral IQUV cube

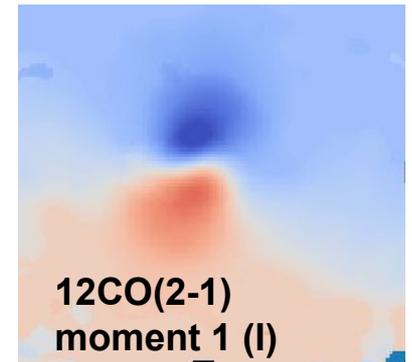
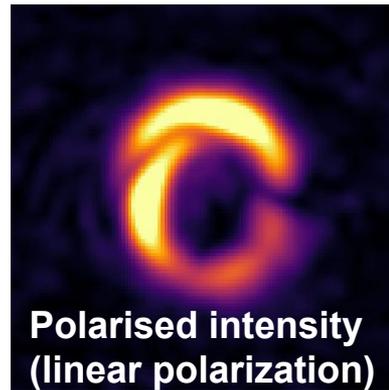
Band 6 Full Polarization data for HD142527

Project 2018.1.01172.S, SB: IM_Lup_a_06_TM1



$$PI = \sqrt{Q^2 + U^2}$$

$$\tan 2\chi = \frac{U}{Q}$$



Spectral line
Stokes IQUV cube

Band 6 mosaic of ESO 137-001

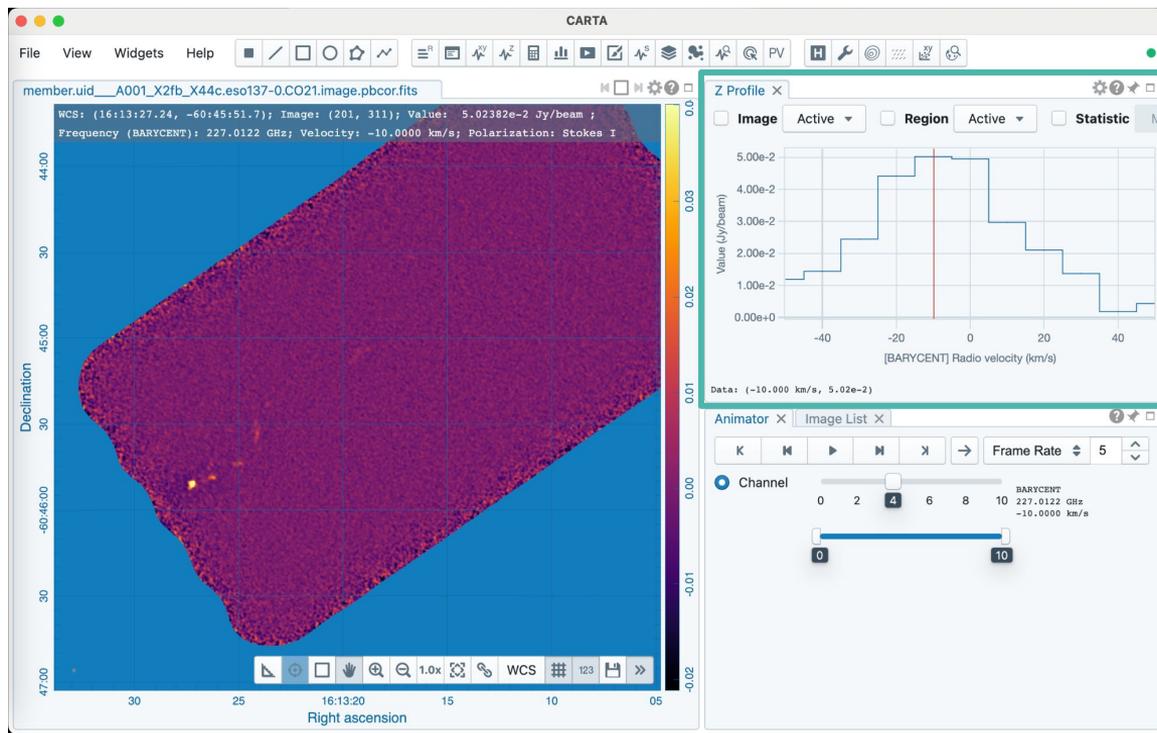
Project 2015.1.01520.S,
SB: ESO137-0_a_06_TE

- $^{12}\text{CO}(2-1)$ cube
- continuum map

File Name	Size	Status
member.uid_A001_X2fb_X44c.README.txt	16 kB	✓
2015.1.01520.S_uid_A001_X2fb_X44c_001_of_001.tar	72 MB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw19.mfs.l.pb.fits.gz	143 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw19.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw21.mfs.l.pb.fits.gz	143 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw21.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw23.mfs.l.pb.fits.gz	176 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw23.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw25.mfs.l.pb.fits.gz	143 kB	✓
member.uid_A001_X2fb_X44c.J1427-4206_bp.spw25.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw19.mfs.l.pb.fits.gz	146 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw19.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw21.mfs.l.pb.fits.gz	146 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw21.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw23.mfs.l.pb.fits.gz	180 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw23.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw25.mfs.l.pb.fits.gz	146 kB	✓
member.uid_A001_X2fb_X44c.J1617-5848_ph.spw25.mfs.l.pbcor.fits	369 kB	✓
member.uid_A001_X2fb_X44c.eso137-0.CO21.flux.ms.gz	16 MB	✓
member.uid_A001_X2fb_X44c.eso137-0.CO21.image.pbcor.fits	46 MB	✓
member.uid_A001_X2fb_X44c.eso137-0.continuum.flux.fits.gz	1 MB	✓
member.uid_A001_X2fb_X44c.eso137-0.continuum.image.pbcor.fits	4 MB	✓
2015.1.01520.S_uid_A001_X2fb_X44c.auxiliary	1 GB	✓

Band 6 mosaic of ESO 137-001

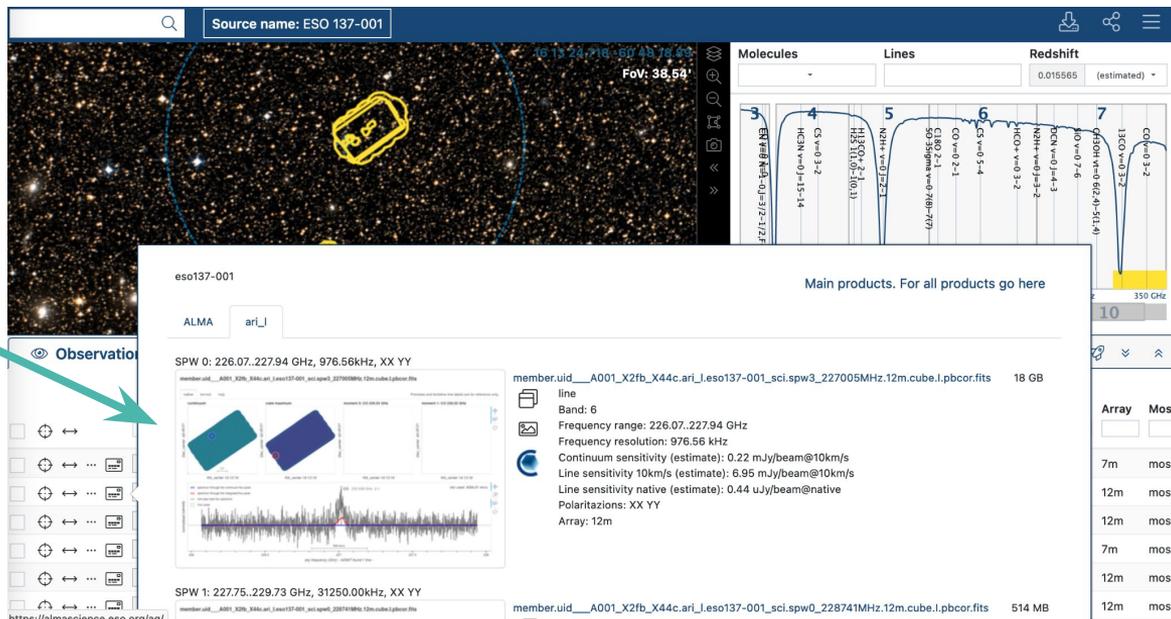
$^{12}\text{CO}(2-1)$ cube has limited frequency range and highly smoothed spectral channels of 10 km/s (manual QA2)



Band 6 Dual Pol ESO 137-001

Project 2015.1.01520.S, ARI-L data available

- spw 3 cube with 12CO(1-0) line at 1.3 km/s resolution ... but 19 GB!
- full continuum
- all spw mfs and cubes



Band 6 Dual Pol ESO 137-001

In the Request Handler these are located under external products

external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_1_2_3_234885MHz_12m.cont.l.pb.fits.gz	2 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_1_2_3_234885MHz_12m.cont.l.pbcor.fits	5 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_228733MHz_12m.mfs.l.mask.fits.gz	7 kB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_228733MHz_12m.mfs.l.pb.fits.gz	2 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_228733MHz_12m.mfs.l.pbcor.fits	5 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_228741MHz_12m.cube.l.pb.fits.gz	216 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw0_228741MHz_12m.cube.l.pbcor.fits	539 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw1_241254MHz_12m.mfs.l.mask.fits.gz	7 kB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw1_241254MHz_12m.mfs.l.pb.fits.gz	2 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw1_241254MHz_12m.mfs.l.pbcor.fits	5 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw1_241262MHz_12m.cube.l.pb.fits.gz	212 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw1_241262MHz_12m.cube.l.pbcor.fits	539 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw2_242920MHz_12m.mfs.l.mask.fits.gz	7 kB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw2_242920MHz_12m.mfs.l.pb.fits.gz	2 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw2_242920MHz_12m.mfs.l.pbcor.fits	5 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw2_242928MHz_12m.cube.l.pb.fits.gz	210 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw2_242928MHz_12m.cube.l.pbcor.fits	533 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227004MHz_12m.mfs.l.mask.fits.gz	7 kB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227004MHz_12m.mfs.l.pb.fits.gz	2 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227004MHz_12m.mfs.l.pbcor.fits	5 MB	✓	🇪🇺
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227005MHz_12m.cube.l.mask.fits.gz	19 MB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227005MHz_12m.cube.l.pb.fits.gz	8 GB	✓	
external	member.uid_A001_X2fb_X44c.ari_leso137-001_sci.spw3_227005MHz_12m.cube.l.pbcor.fits	19 GB	✓	🇪🇺

continuum map

12CO(2-1) cube

Making the cutout from ARI-L data

Do this with CARTA using a region

Select velocity range

The image shows the CARTA software interface with a File Browser window open. The File Browser window displays the following information:

- Path: Users > kazi > ALMA > Archive > school2022 > CARTA
- Filename: eso137-001_ari-l_cutout
- Save Image dialog:
 - Source: member.uid__A001_X2fb_X44c.ari_l.eso137-001_sci.spw3_2270051
 - Region: 1 (RECTANGLE)
 - Range unit: Frequency (GHz)
 - Rest frequency: 230.538 GHz
 - Drop degenerate axes:

The main CARTA window shows a spectral line plot with the following parameters:

- WCS: (1613327.21, -6045451.3); Images (219, 303); Values: 1.14777e-1 Jy/beam
- Frequency (LSRK): 227.0055 GHz; Velocity: 4593.6585 km/s; Polarization: Stokes I

The spectral line plot shows a peak at approximately 227 GHz. The region selection tool is shown as a blue rectangle on the plot, with a corresponding Z Profile plot showing the intensity of the line. The Z Profile plot has the following parameters:

- Image: 0: me...
- Region: Cursor
- Statistic: Mean
- Value (Jy/beam): 1.20e-1
- LSRK frequency (GHz): 227

The Z Profile plot also shows the following parameters:

- Data: (227.005513 GHz, 1.15e-1)
- Animator: Image List
- Frame Rate: 5
- Channel: 0, 958, 1919, 274, 3834
- LSRK: 3834227.0055 GHz, 4593.6585 km/s