

Image viewers for ALMA data

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A Tale of Two Viewers

“It was the best of times, it was the worst of times.”

At some point in the near future the CASA Viewer will be replaced by a new “Viewer” known as CARTA.

The bad news: CARTA does not yet have all the same functionality as Viewer. The Viewer is not actively being developed so is a bit buggy nowadays.

The good news: The baseline requirement for CARTA to replace Viewer is that it offer the same functionality*. The CASA team recommend using CARTA in all cases where it has the same functions as Viewer.

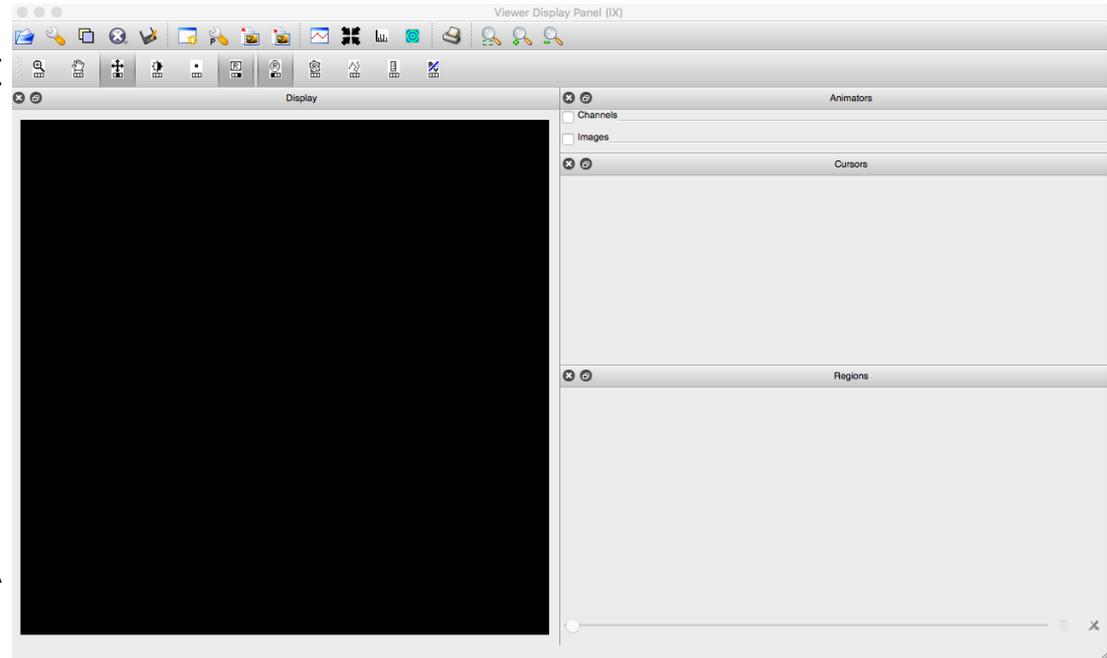
The very good news: CARTA is quick, light, intuitive, handles massive data sets easily and crashes a lot, *lot*, **LOT** less than Viewer.

So... Right now is a time where we need to know a bit of both.

***Caveat:** it is still under debate if CARTA will provide interactive cleaning capability or if a new tool will be developed for this.

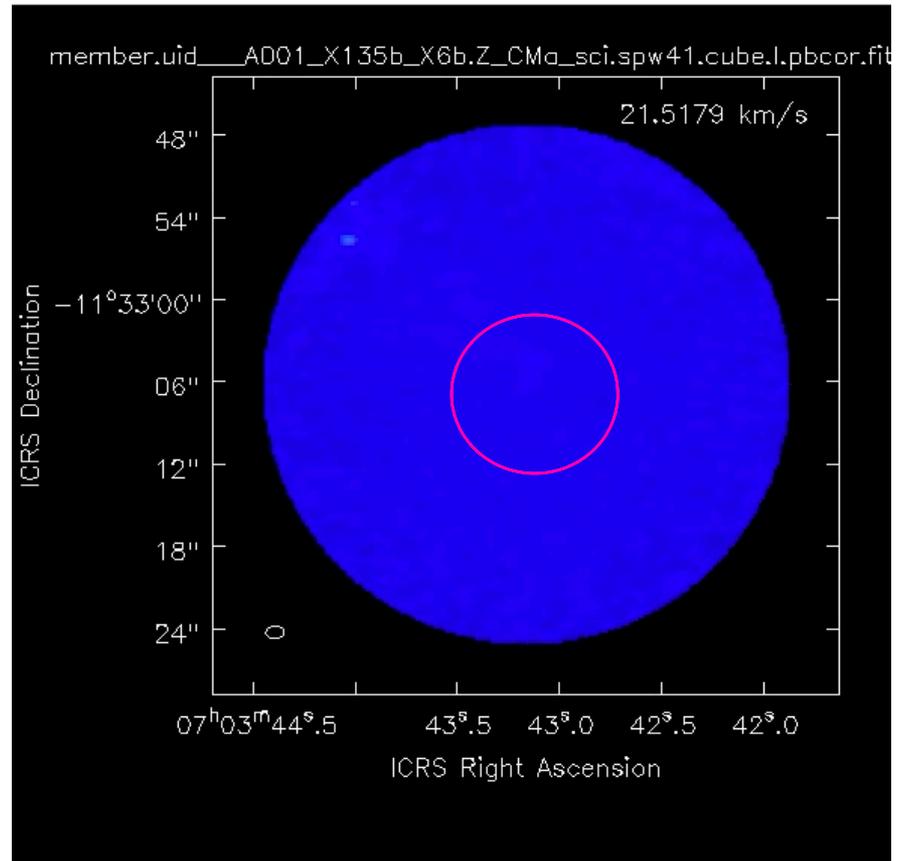
The CASA viewer

- This is the original, all purpose image viewer built into CASA
- Beyond simply allowing us to view images it can be used to preform image analysis.
- Can be started within CASA with the call `viewer()` or outside of CASA with `casaviewer` on the command line.



Spectral line fit

- We can inspect a spectral line seen in the example data using the spectrum viewer.
- Highlight the area of emission with a circular region.
- Then click the spectrum viewer button

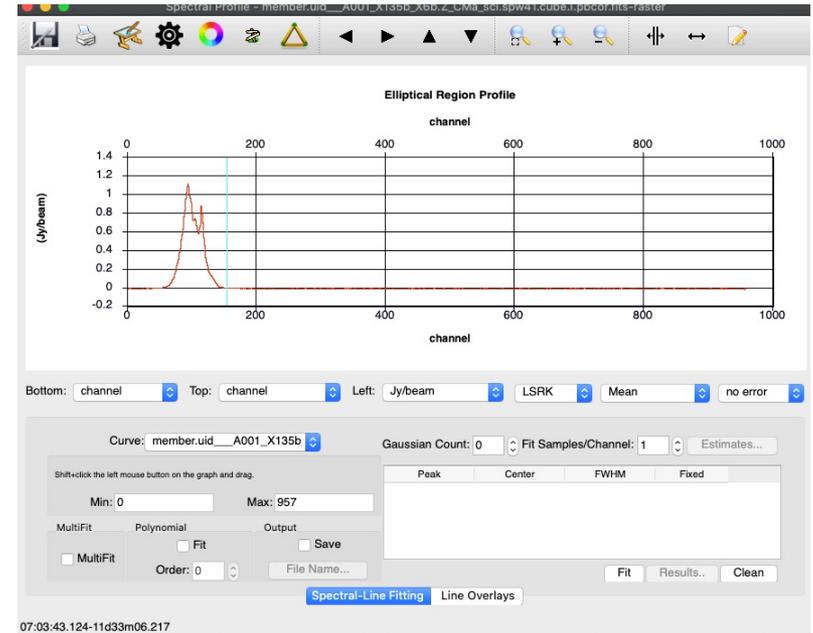


Spectral line fitting

- We can highlight the line with the  button.



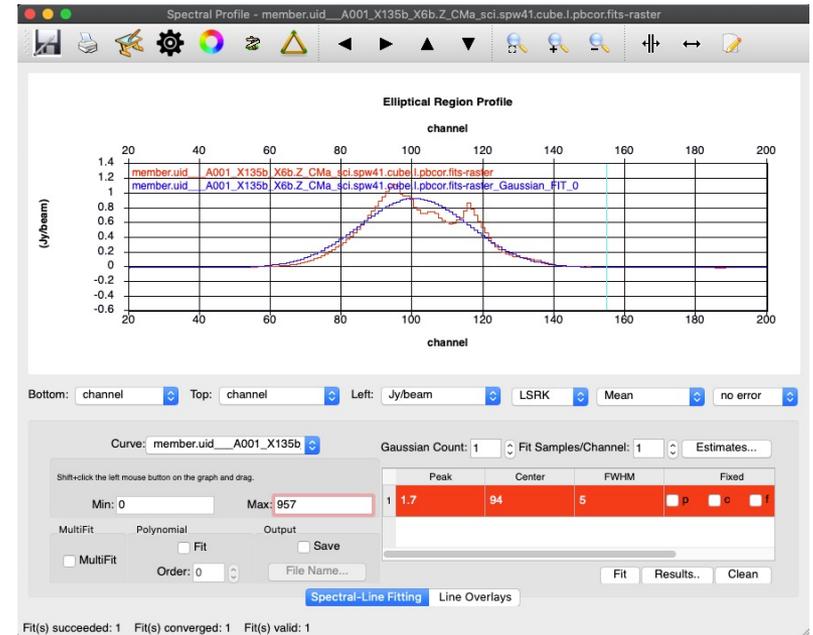
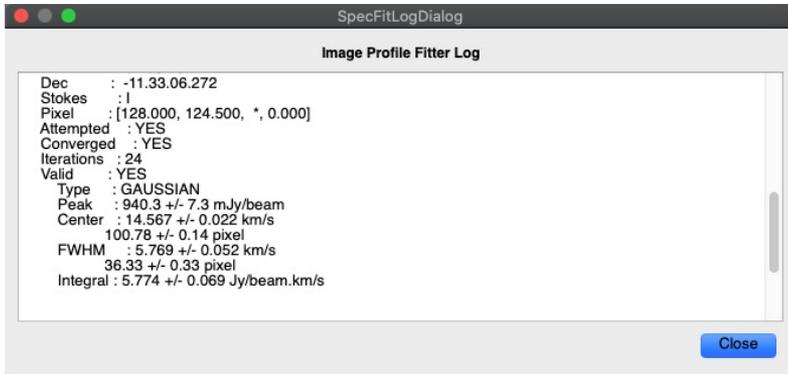
- Set Gaussian Count to 1
- Put some estimate peak, centre and FWHM values
- Then hit the Fit button



{Note this is not a scientifically valid fit, just a demo to show how the system works}

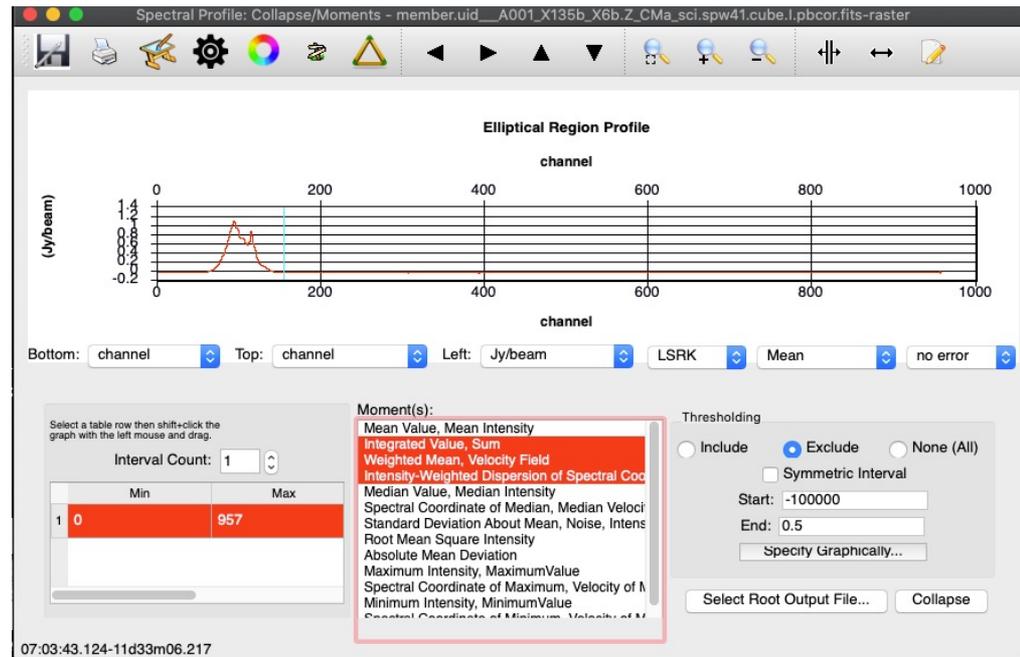
Spectral line fitting

- This will plot the fitted line over the data and pop-up a Spectral Fit dialogue box with the fit parameters in it.

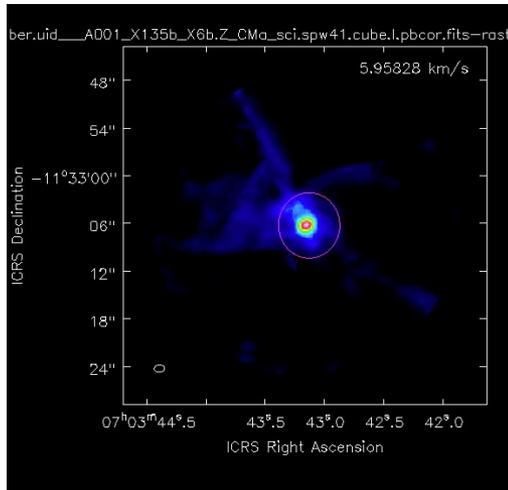


Collapse (image moments)

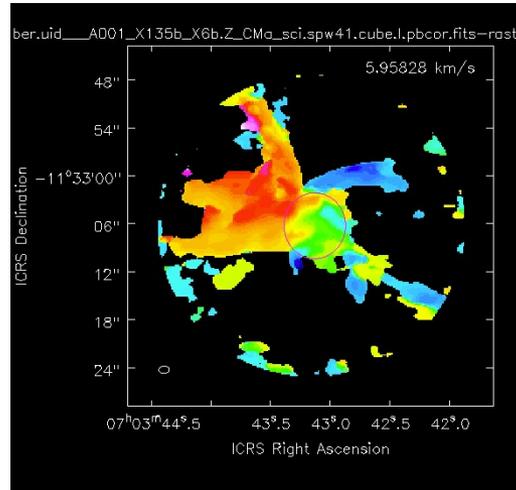
- GUI version of the CASA `immoments()` task used in the imaging tutorial.
- Again highlight region of emission but we can access the collapse functionality with the  button.
- Highlight desired moments
- Set include/excludepix values and hit Collapse.



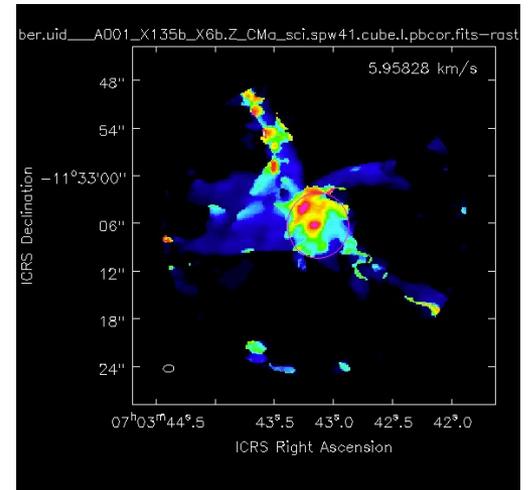
Integrated intensity,
mom = 0



Velocity field,
mom = 1

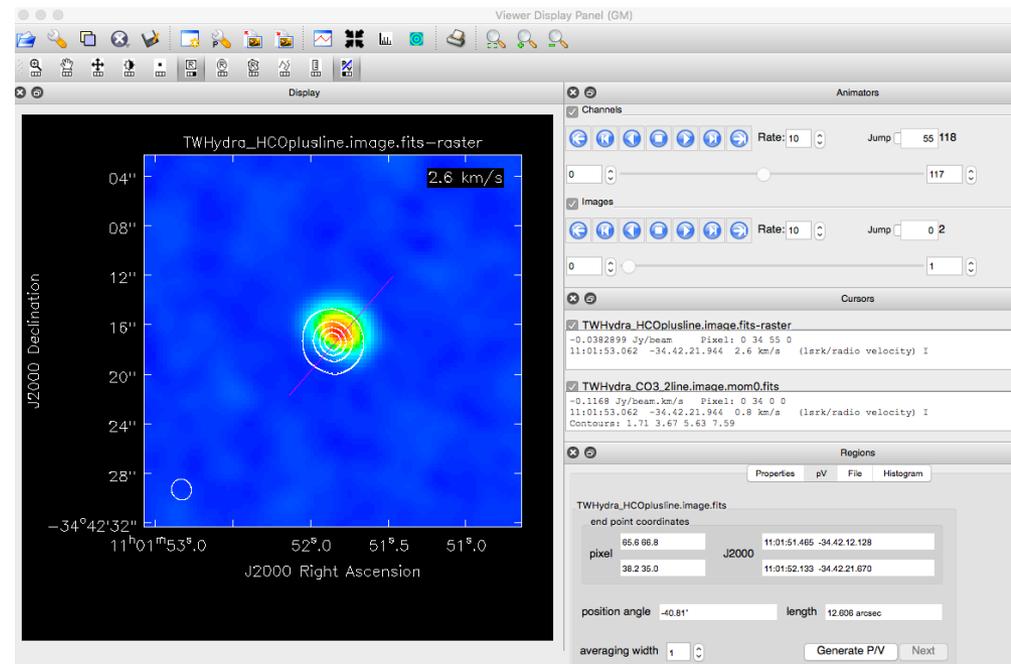


Velocity dispersion,
mom = 2

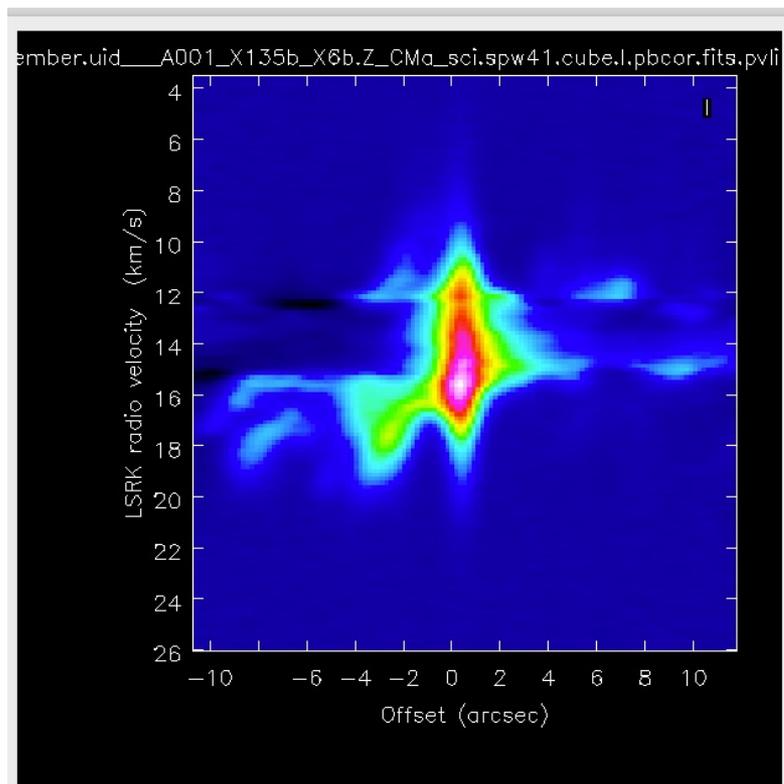


Position/Velocity analysis

- To investigate velocity structure we can use the PV analysis too.
- Select this using the button and draw a line along the direction you wish to inspect.
- Then press 'Generate P/V'.



Position/Velocity analysis

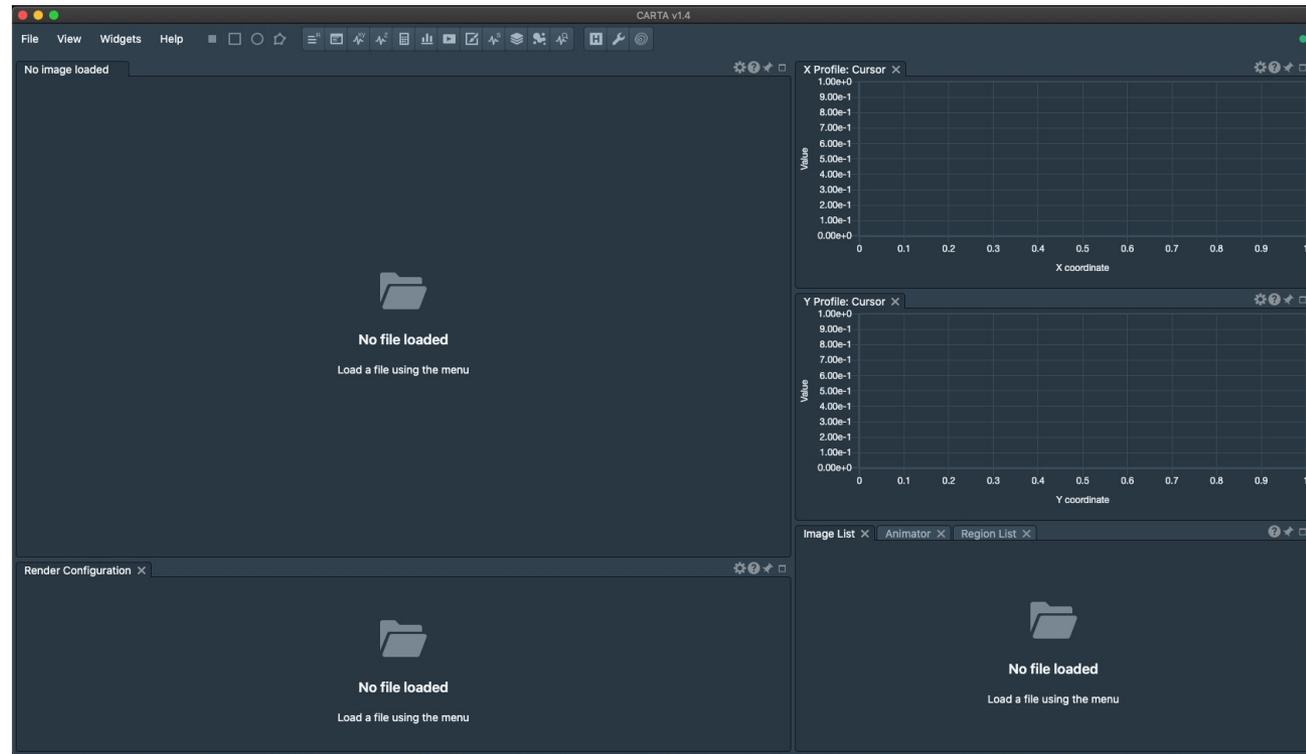


CARTA

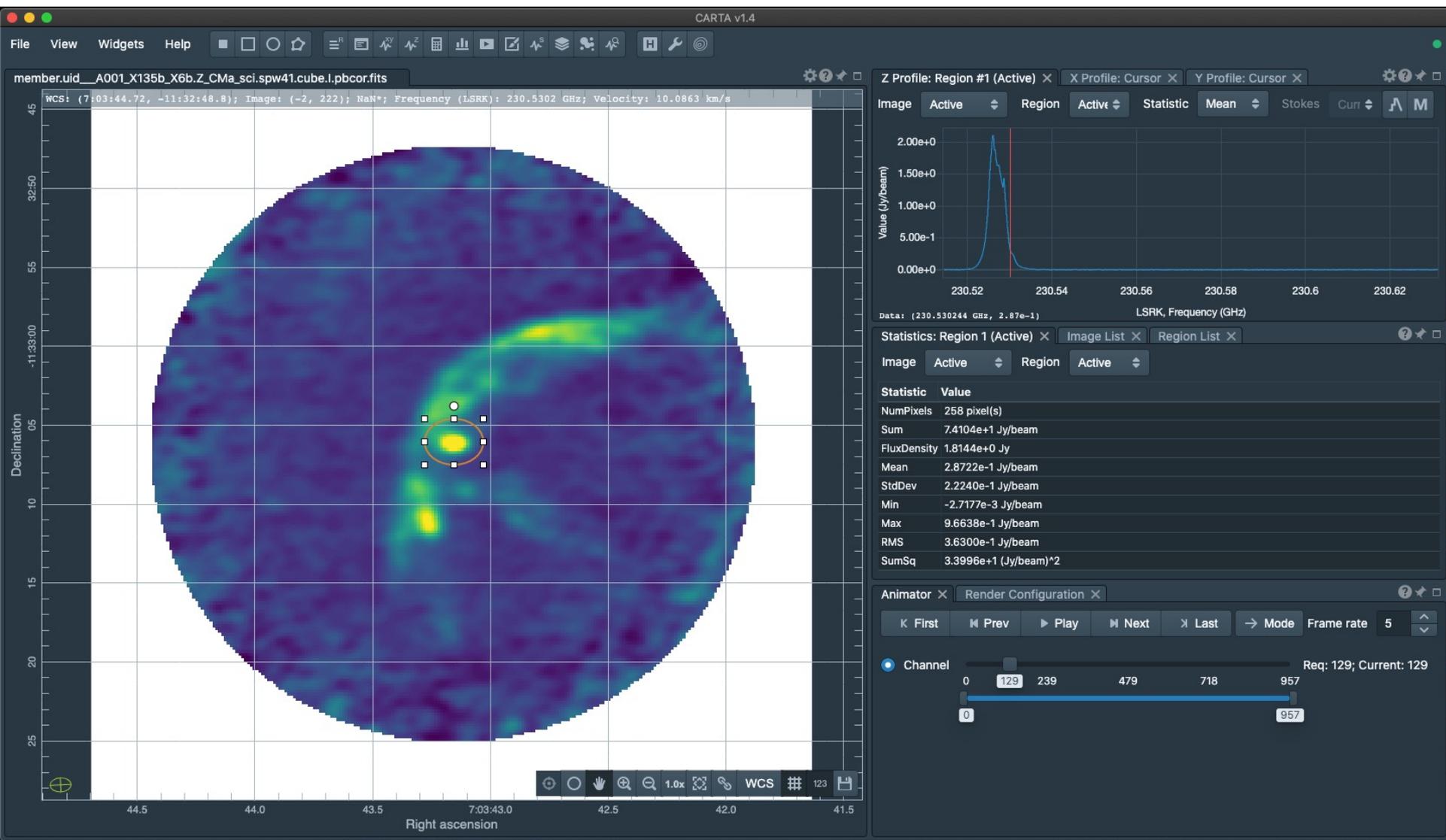
Cube Analysis and Rendering Tool for Astronomy

CARTA

- The new recommended viewer for your ALMA image analysis
- A separate package to CASA to be downloaded from: <https://cartavis.github.io/>



*I run in Dark Mode so yours might look different



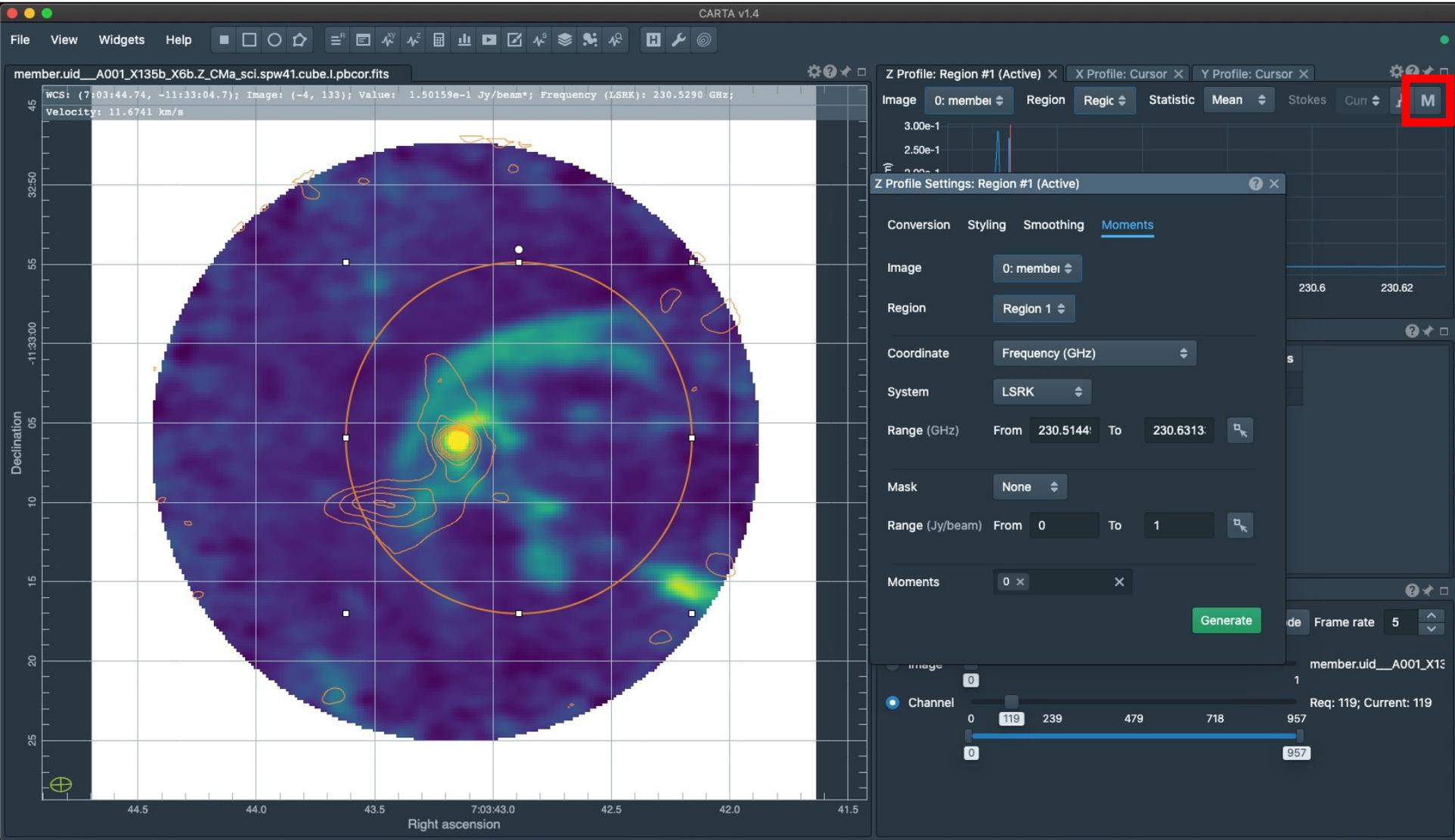
User definable layouts (which can be saved and set to your default)

data1 (channel: 119) 01970 2)

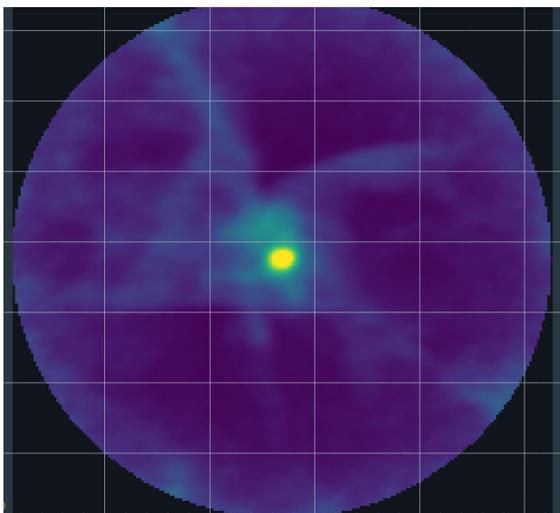
Statistics: Region 1 (Active) X Image List X Region List X ? ↗ □

	Image	Layers	Matching	Channel	Stokes
0	member.uid__A001_X1	R	XY Z	119	0
1	member.uid__A001_X1	R C	XY	0	0
2	member.uid__A001_)	R	XY	0	0
3	member.uid__A001_X1	R	XY	0	0
4	member.uid__A001_X1	R	XY	0	0

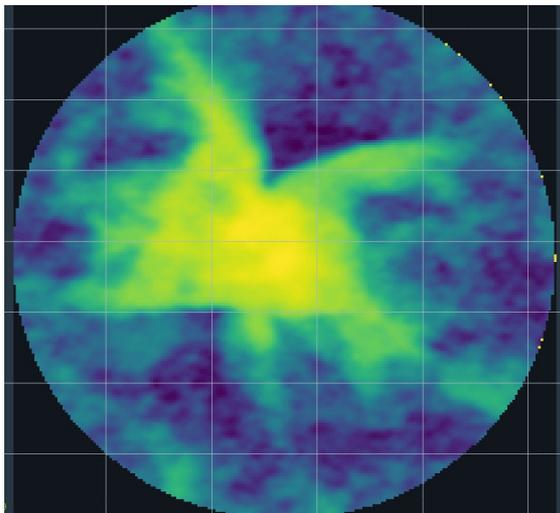
Image moments



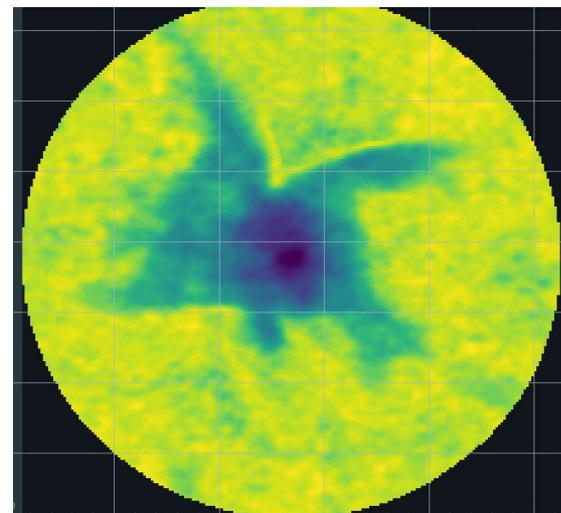
Integrated intensity,
mom = 0



Velocity field,
mom = 1



Velocity dispersion,
mom = 2



Three other things about CARTA

1. PV analysis and Gaussian fitting to line profiles are coming soon!
2. CARTA also has a “Server” version where you can log in and view images held at e.g. an ALMA regional centre node and view ~1TB size images remotely*.
3. It does a lot of amazing World Coordinate system matching which we haven't discussed but make analysis a lot smoother than Viewer which is incapable of doing this.