

# An Introduction to the Cycle 7 ALMA Observing Tool

How to turn that great idea into an ALMA proposal...



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Atacama Large Millimeter/submillimeter Array  
Expanded Very Large Array  
Very Long Baseline Array



# Proposal Checklist

- Read relevant documentation (CfP, Guide, Primer, etc.)
- Create an ALMA account by registering at the Science Portal ([almascience.org](http://almascience.org))
- Download the Observing Tool (OT) & related guides
- Prepare the Science Case
  - Note the new capabilities for this cycle!
- Prepare Science Goals (sources, frequency & correlator setup, integration times) within the OT
- Make use of the Helpdesk & the Knowledgebase

# Documentation

- Call for Proposals (CfP)
- ALMA Primer
- OT Guide
- ALMA Tech Handbook
- Helpdesk Knowledgebase



Observing with *ALMA*  
*A Primer for Early Science*



# Downloading the ALMA OT



Atacama Large Millimeter/submillimeter Array  
In search of our Cosmic Origins



Log in

About Science **Proposing** Observing Data Processing Tools **Documentation** Help

Search Site

## Observing Tool

The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase 1 (observing proposal) and Phase 2 (telescope runfiles for accepted proposals) materials. It is also used for preparing and submitting Director's Discretionary Time (DDT) proposals. The current [Cycle 7](#) release of the OT is configured for the present capabilities of ALMA as described in the [Cycle 7 Call For Proposals](#). Note that in order to submit proposals you will have to register with the ALMA Science Portal beforehand.

## Download & Installation

The OT will run on most common operating systems, as long as a **64-bit version of Oracle Java 8** is installed (see the [troubleshooting page](#) if you are experiencing Java problems) and **is unlikely to work with higher versions of Java**. The tool is available in two flavours: Web Start and tarball.

The **Web Start** application is the recommended way of using the OT. It has the advantage that the OT is automatically downloaded and installed on your computer and it will also automatically detect and install updates. However, Web Start has been removed from Java 11 and bugs were present in Java 9 (and maybe 10). If problems are encountered with the Web Start version, then the tarball installation is available.

The **tarball** version must be installed manually and will not automatically update itself, although it will indicate if an OT update is available for download. It is in general though less prone to installation problems than Web Start.

Webstart

Tarball

**Using webstart is easier and has the advantage that it checks for and will download a newer version at startup**

## Documentation

Extensive documentation is available to help you get started.

- If you are a novice OT user you should start with the [Getting Started](#) documentation.
- Audio-visual illustrations of different aspects of the OT can be found in the [OT video tutorials](#). These are recommended for novices and advanced users alike.
- More in-depth information on the OT can be found in the [User Manual](#), while concise explanations of all fields and menu items in the OT are given in the [Reference Manual](#). These two documents are also available within the OT under the Help menu.

## Troubleshooting

If you have problems with the installation and/or startup of the OT, please see the [troubleshooting page](#). A list of currently known bugs, their status and possible workarounds can be found on the regularly updated [known OT Issues](#) page. A further source of information is the [OT section of the ALMA Helpdesk Knowledgebase](#) - this contains a number of articles that deal with frequently-asked questions. After exploring these resources, if confusion over some aspect of the OT remains, or if a previously unidentified bug has been uncovered, please file a [Helpdesk ticket](#).

# When the ALMA OT starts

First you see this

Make sure it's Cycle 7 OT

Cycle7

Then you see this

Startup Options

What would you like to do?

- Create a new proposal
- Create a new DDT proposal
- Open an existing project from disk
- Retrieve a project from the ALMA science archive

Do not show this message again

OK

ALMA Observing Tool

ESO/C.Malin

Initialising Gui...

File Edit View Tool Search Help



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project
- Proposal

## Editors

Spectral Spatial Project

Principal Investigator

Main Project Information

Project

Assigned Priority

Project Code

## Feedback

Validation Validation History Log

Description

Suggestion

- A clean slate. From here, you can:
- Start a new proposal
  - Add blank Science Goals (SG)
  - Load templates with example SG

Grab and move stiped bars up/down to resize

 ^ v ?

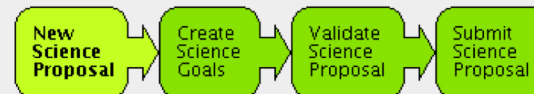
## Overview

arrowheads  
minimize,  
maximize  
panes

## Contextual Help

1. Please ensure you and your co-Is are registered with the [ALMA Science Portal](#)
2. Create a new proposal by either:
  - Selecting *File > New Proposal*
  - Clicking on the icon in the toolbar
  - Or clicking on this [link](#)
3. Click on the [proposal](#) tree node and complete the relevant fields.

## Phase I: Science Proposal

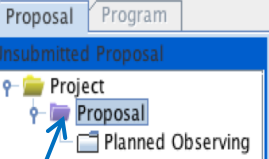


Click on the overview steps to view the contextual help

Importing  
And  
ExportingTemplate  
LibraryNeed  
More  
Help?View  
Phase 2  
Steps



Project Structure



Editors

Spectral Spatial Proposal

Proposal Title

Proposal Cycle 2018.1

Abstract (max. 1200 characters)

Proposal Type

Regular  Target Of Opportunity

VLBI  Large Program

Scientific Category

Cosmology and the High Redshift Universe  Galaxies and Galactic Nuclei  ISM, star formation and astrochemistry

Circumstellar disks, exoplanets and the solar system  Stellar Evolution and the Sun

Please select one or two keywords

Study

Relationship

Previous

Investigator

This is your meta information, proposal title, abstract, proposal type, scientific category (for the review panels) etcetera

**New in Cycle 7**

You can search the J-tree for names of nodes, details are in the help (?)

**This is the J-tree and the proposal node is where you provide a broad description**

**We'll move down the nodes of the J-tree in the course of these slides**



File Edit View Tool Search Help



## Project Structure

Unsubmitted Proposal

- Really catchy title here
  - Proposal
    - Planned Observing

## Editors

Spectral Spatial Proposal

- Cosmology and the High Redshift Universe
  Galaxies and Galactic Nuclei
  ISM, star formation and astrochemistry  
 Circumstellar disks, exoplanets and the solar system
  Stellar Evolution and the Sun

Keywords (max. 2 keywords)

- Lyman Alpha Emitters/Blobs (LAE/LAB)
- Lyman Break Galaxies (LBG)
- Starburst galaxies
- Sub-mm Galaxies (SMG)
- High-z Active Galactic Nuclei (AGN)

Further down, select PI/Co-I's from a search of **registered ALMA users** and attach the Science Case from a .pdf on disk

Science Case is a .pdf, max 4 pages including figures  
**New!**

In Cycle 7 the .pdf may not contain more than 10% of its text in a font below 12pt

Type	Full name	Email	Affiliation
PI	Not set	Not set	Not set

Investigator search constraints

ALMA ID is hlszt

Find Investigators

Full name	Email	Affiliation	ALMA ID
Harvey Liszt	hlszt@nrao.edu	North American ALMA ...	hlszt

Select PI Cancel

Select PI...

Add Col...

Remove Col

Add from Proposal...

Science Case (Mandatory, PDF, 4 pages max.)

Attach...

Detach

View...



## Science Case

- Must include:
  - Astronomical Importance
  - Estimated intensity, S/N
- May include:
  - Figures
  - Tables
  - References
- Free-form PDF document
  - 12+ font, English only
    - 10% of text or less in font below 12pt
  - 20 MB file size
  - 4 pages total (6 for Large Projects)



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing

## Editors

Spectral Spatial Proposal

Related Proposals

Previous Proposals

Investigators

Type	Full name	Email	Affiliation	ALMA ID	Executive
PI	Not set	Not set	Not set	Not set	Non-ALMA

Add CoPI

Add Col

Remove Collaborator

Add from Proposal

Science Case

Science Case (Mandatory, PDF, 4 pages max.)

Attach...

Detach

View...

Duplicate observations

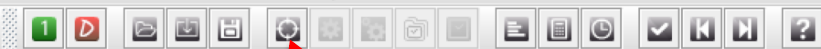
Briefly justify any new observations that duplicate archival data or accepted programs.

Information regarding the ALMA Duplication Policy and how to search archival data and accepted programs can be found at: <http://almascience.org/proposing/duplications>.

Observatory Use Only

Concise justification when asking to duplicate *previous* observations or *previously accepted* proposals. Not for use when resubmitting a rejected proposal

File Edit View Tool Search Help



Project Structure

Proposal Program

Unsubmitted Proposal

Project  
Proposal

To add a Science Goal you may

- (1) Left-click the "New Science Goal" button
- (2) Right-click and add blank Science Goals, or
- (3) Use options in the File menu as shown on the next slide

Editors

Spectral Spatial Proposal

Proposal Information

Proposal Title

Proposal Cycle 2019.1

Abstract

Log

Description

Cut ⌘-X  
Copy ⌘-C  
Paste ⌘-V

**New Science Goal**  
Clone node  
Show Printable Summary of Proposal  
Generate a PDF of Whole Proposal  
**Display Project Time Summary**

Expand all ⌘-Z

Collapse all



Find previous ⌘-↑

Find next ⌘-↓

Delete ⌘-⌫

Overview

## Contextual Help

1. Please ensure you and your co-Is are registered with the [ALMA Science Portal](#)
2. Create a new proposal by either:
  - Selecting *File > New Proposal*
  - Clicking on the  icon in the toolbar
  - Or clicking on this [link](#)
3. Click on the  [proposal](#) tree node and complete the relevant fields.

## Phase I: Science Proposal



Click on the overview steps to view the contextual help

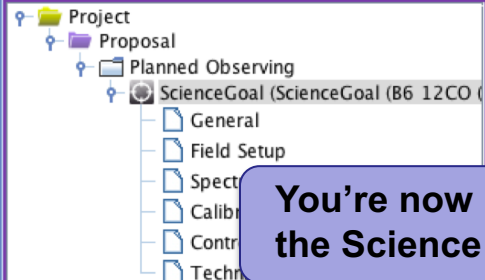




## Project Structure

Proposal Program

Unsubmitted Proposal



**You're now ready to flesh out the Science Goal (SG)**

**Give the SG a brief, descriptive name.**

## Editors

Spectral Spatial ScienceGoal (Science Goal)

General (Optional)

Science Goal Name 

This is a project to observe the nearby starburst galaxy NGC3256 in band 6 in the emission line of 12CO (2-1). As the source is extended a mosaic will be used to cover the 30x30 area of interest.

e

ular System Object? Name of object 

Resolve

System  Sexagesimal display? Parallax  

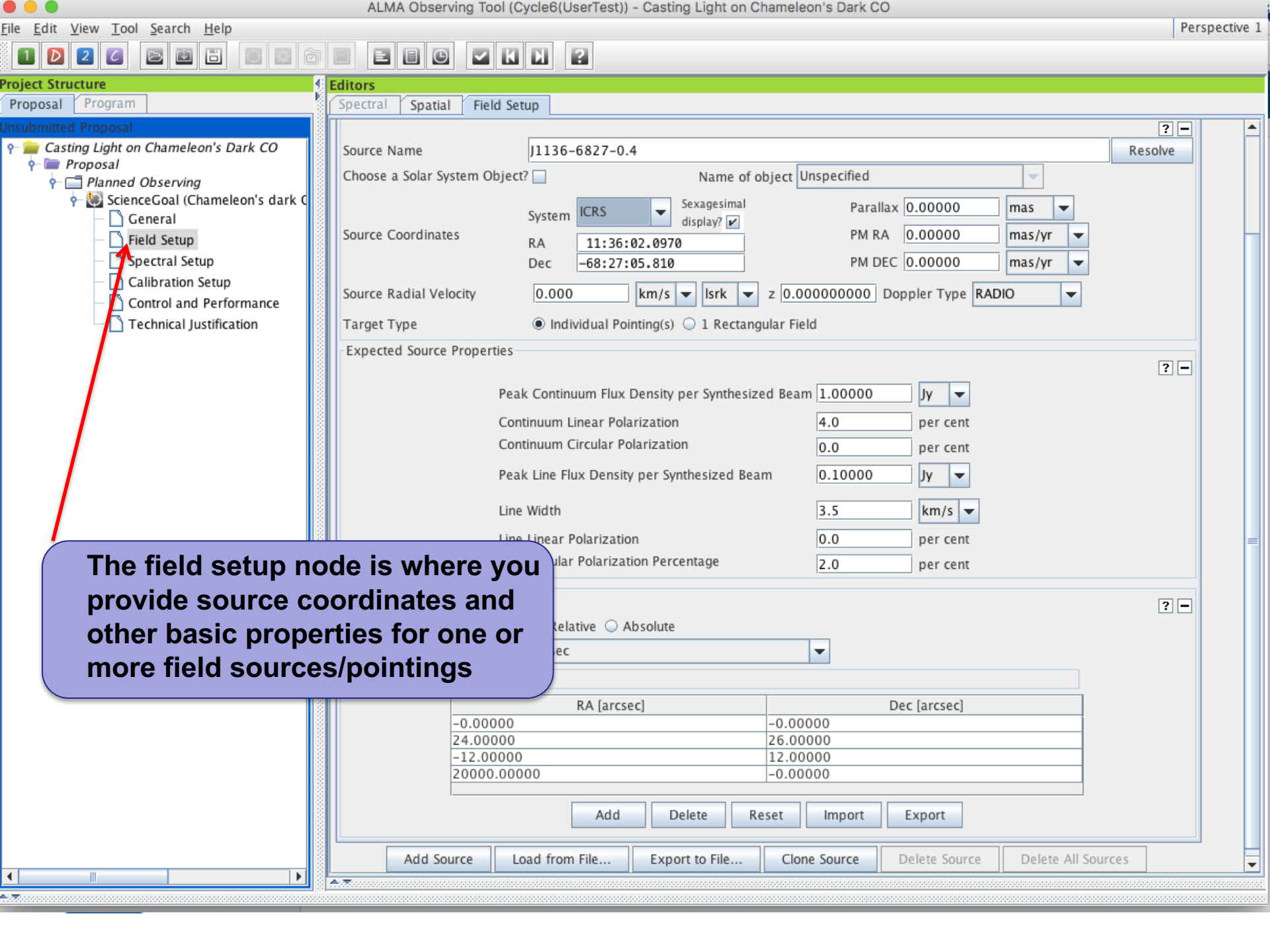
Coordinates

RA PM RA  

Validation History Log

**A description is useful for you, for the technical assessors, and for your Contact Scientist after your project is approved. But it's optional**

Suggestion



The field setup node is where you provide source coordinates and other basic properties for one or more field sources/pointings

Source Name: J1136-6827-0.4 [Resolve]

Choose a Solar System Object?  Name of object: Unspecified

System: ICRS Sexagesimal display?  Parallax: 0.00000 mas

Source Coordinates: RA: 11:36:02.0970 PM RA: 0.00000 mas/yr  
Dec: -68:27:05.810 PM DEC: 0.00000 mas/yr

Source Radial Velocity: 0.000 km/s Isrk z: 0.000000000 Doppler Type: RADIO

Target Type:  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam: 1.00000 Jy

Continuum Linear Polarization: 4.0 per cent

Continuum Circular Polarization: 0.0 per cent

Peak Line Flux Density per Synthesized Beam: 0.10000 Jy

Line Width: 3.5 km/s

Line Linear Polarization: 0.0 per cent

Line Circular Polarization Percentage: 2.0 per cent

Relative  Absolute

RA [arcsec]	Dec [arcsec]
-0.00000	-0.00000
24.00000	26.00000
-12.00000	12.00000
20000.00000	-0.00000

Add Delete Reset Import Export

Add Source Load from File... Export to File... Clone Source Delete Source Delete All Sources



**Project Structure**

Proposal Program

Unsubmitted Proposal

- Casting Light on Chameleon's Dark CO
  - Proposal
    - Planned Observing
      - ScienceGoal (Chameleon's dark CO)

**Source name, position, proper motion, velocity, velocity rest frame. use "lsrk" for  $v_{LSR}$**

**Rectangular mosaic or 1/more offset pointings?**

**The expected source properties are used with the spectral setup, desired angular resolution, rms, to set the S/N, dynamic range and overall project viability**

**Editors**

Spectral

Since Cycle 4, OT defaults to ICRS, the standard radio coordinate system

Source Name: J1136-6827-0.4 Resolve

Choose a Solar System Object?  Name of object: Unspecified

System: ICRS Sexagesimal display?

Parallax: 0.00000 mas

Source Coordinates: RA: 11:36:02.0970 PM RA: 0.00  
Dec: -68:27:05.810 PM DEC: 0.00

Source Radial Velocity: 0.000 km/s  lsrk  z: 0.000000000 Doppler

Target Type:  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam: 1.00000 Jy

Continuum Linear Polarization: 4.0 per cent

Continuum Circular Polarization: 0.0 per cent

Peak Line Flux Density per Synthesized Beam: 0.10000 Jy

Line Width: 3.5 km/s

Line Linear Polarization: 0.0 per cent

Line Circular Polarization Percentage: 2.0 per cent

Field Center Coordinates

Coord Type:  Relative

Offset Unit: arcsec

#Pointings: 1

RA [arcsec]: 0.00000

*When you resolve a source name from the server, check all the returned info, some may be junk*

*New Cycle 7: Polarization lower limits have been made much simpler: 0.1% for linear polarization and 1.8% for circular. These are now independent of correlator mode or source extent.*

**Feedback**

Validation Validation History Log

0 errors, 1 warning : double-click on each row to be taken to the problem

Description	Suggestion
-------------	------------

When you toggle the coordinate system between ICRS and Galactic the OT will convert between them

When using the spatial visualizer, the OT will find the correct image center for a position specified in galactic coordinates, but images returned by the standard image query servers are always in ICRS

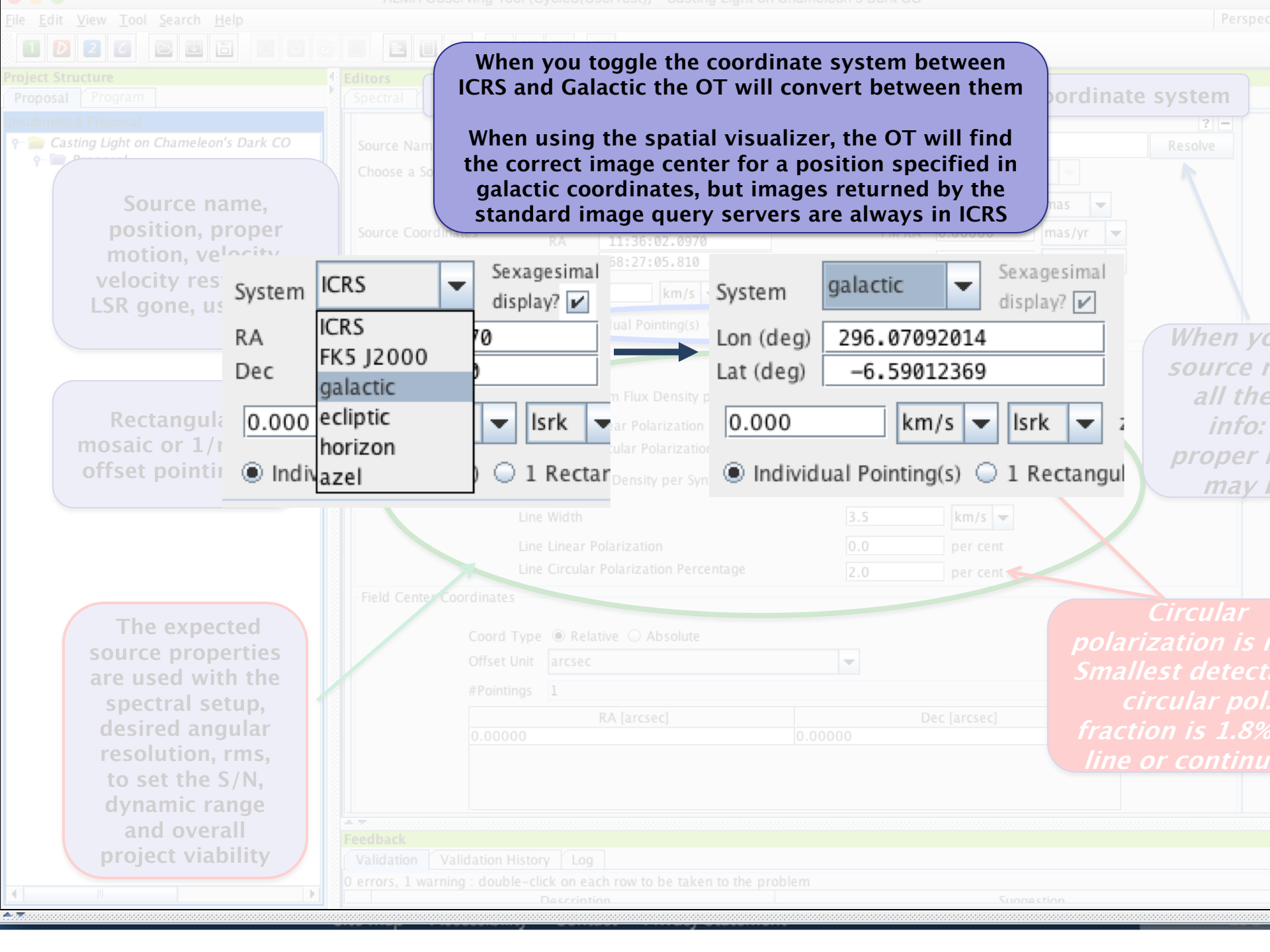
Source name, position, proper motion, velocity, LSR gone, us

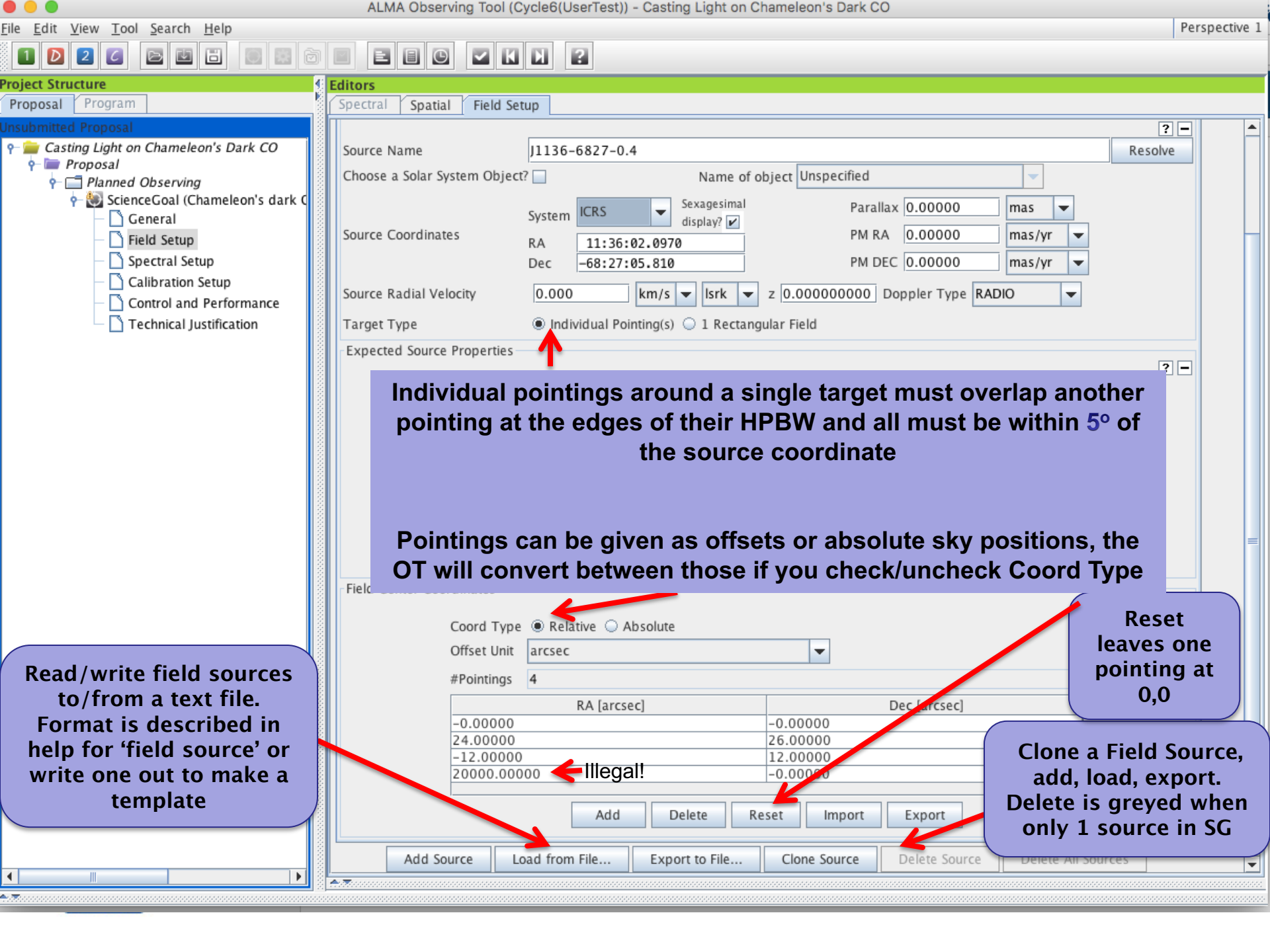
Rectangular mosaic or 1/r offset pointing

The expected source properties are used with the spectral setup, desired angular resolution, rms, to set the S/N, dynamic range and overall project viability

When you source n all the info: proper may

Circular polarization is Smallest detect circular pol. fraction is 1.8% line or continu





Individual pointings around a single target must overlap another pointing at the edges of their HPBW and all must be within 5° of the source coordinate

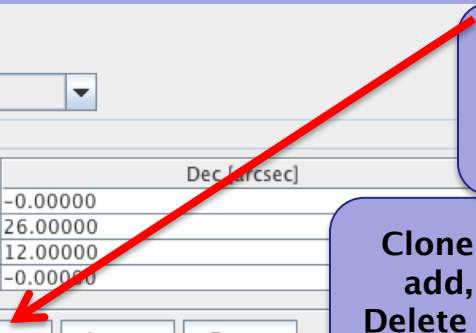
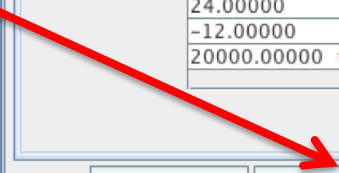
Pointings can be given as offsets or absolute sky positions, the OT will convert between those if you check/uncheck Coord Type

Reset leaves one pointing at 0,0

Clone a Field Source, add, load, export. Delete is greyed when only 1 source in SG

Read/write field sources to/from a text file. Format is described in help for 'field source' or write one out to make a template

Illegal!







Project Structure

Proposal Program

- Unsubmitted Proposal
  - Casting Light on Chameleon's Dark CO
    - Proposal
      - Planned Observing
        - ScienceGoal (Chameleon's dark CO)
          - General
          - Field Setup
          - Spectral Setup
          - Calibration Setup
          - Control and Performance
          - Technical Justification

Editors

Spectral Spatial Field Setup

Source Name: J1136-6827-0.4 [Resolve]

Choose a Solar System Object?  Name of object: Unspecified

System: ICRS Sexagesimal display?  Parallax: 0.00000 mas

Source Coordinates: RA: 11:36:02.0970 PM RA: 0.00000 mas/yr  
Dec: -68:27:05.810 PM DEC: 0.00000 mas/yr

Source Radial Velocity: 0.000 km/s Isrk z: 0.000000000 Doppler Type: RADIO

Target Type:  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

**Individual pointings around a single target must overlap another pointing at the edges of their HPBW and all must be within 5° of the source coordinate**

**Pointings can be given as offsets or absolute sky positions, the OT will convert between those if you check/uncheck Coord Type**

Read/write field sources to/from a text file. Format is described in help for 'field source' or write one out

Read/write a text file for a custom mosaic See help for format

Coord Type:  Relative  Absolute

Offset Unit: arcsec

#Pointings: 4

RA [arcsec]	Dec [arcsec]
-0.00000	-0.00000
24.00000	26.00000
-12.00000	12.00000
20000.00000	-0.00000

Buttons: Add, Delete, Reset, Import, Export

Buttons: Add Source, Load from File..., Export to File..., Clone Source, Delete Source, Delete All Sources

Illegal!

Project Structure

- Unsubmitted Proposal
- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of 34 Sources)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

Editors

Spectral Spatial Field Setup

Input source details and mapping info or use the Visual Editor on the spatial tab.  
You must choose between checking 1 Rectangular Field on all sources or none.  
Check 1 Rectangular Field on the first source before adding others to put rectangular mosaics around multiple sources.

aj0426+2327-210-0.54	aj0439+3045-154-0.87	aj0445+0715-305-0.12	aj0510+1800-2990-0.33
aj0231+1322-790-0.12	aj0242+1742-168-0.08	aj0329+2756-195-0.20	aj0356+2903-151-0.21
J0502+1338i-600-0.56	aj0203+1134-151-0.14	aj0209+1352-413-0.09	aj0213+1820-161-0.13
J0437+2940i-224-0.98	J0438+3004i-478-0.95	J0440+1437i-326-0.68	J0449+1121i-887-0.50
J0427+0457i-233-0.33	J0437+2037i-245-0.53	J0431+1731i-213-0.46	J0433+0521i-2178-0.30
J0403+2600i-327-0.20	J0406+0637i-330-0.28	J0407+0742i-990-0.26	J0426+0518i-372-0.29
J0357+2319s-170-0.18	J0357+2319i-160-0.18	J0400+0550i-217-0.27	J0401+0413i-550-0.34
J0325+2224i-400-0.21	J0329+3510i-254-0.27	J0334+0800i-331-0.39	J0336+3218i-1050-0.73
J0211+1051i-547-0.14		J0252+1718i-342-0.22	

Source

Source Name: J0211+1051i-547-0.14 [Resolve]

Choose a Solar System Object?

Source Coordinates: [mas] [mas/yr] [mas/yr]

Source Radial Velocity: [RADIO]

Target Type

Expected Source Properties

Line Linear Polarization: 0.0 per cent

Line Circular Polarization: 0.0 per cent

**All sources having a common spectral setup and observing pattern (single pointings or rectangular mosaic) should be put in the same Science Goal no matter how far apart they are**

When you resolve a source, check all the returned info, velocity, proper motions may be bogus

A 10° limitation on source separation in a Science Goal was removed in Cycle 4. The OT groups targets using hierarchical clustering

Cycle3: more than one field source can have a mosaic but it's all with mosaics or none in one SG

Source name, position, proper motion, velocity velocity rest frame

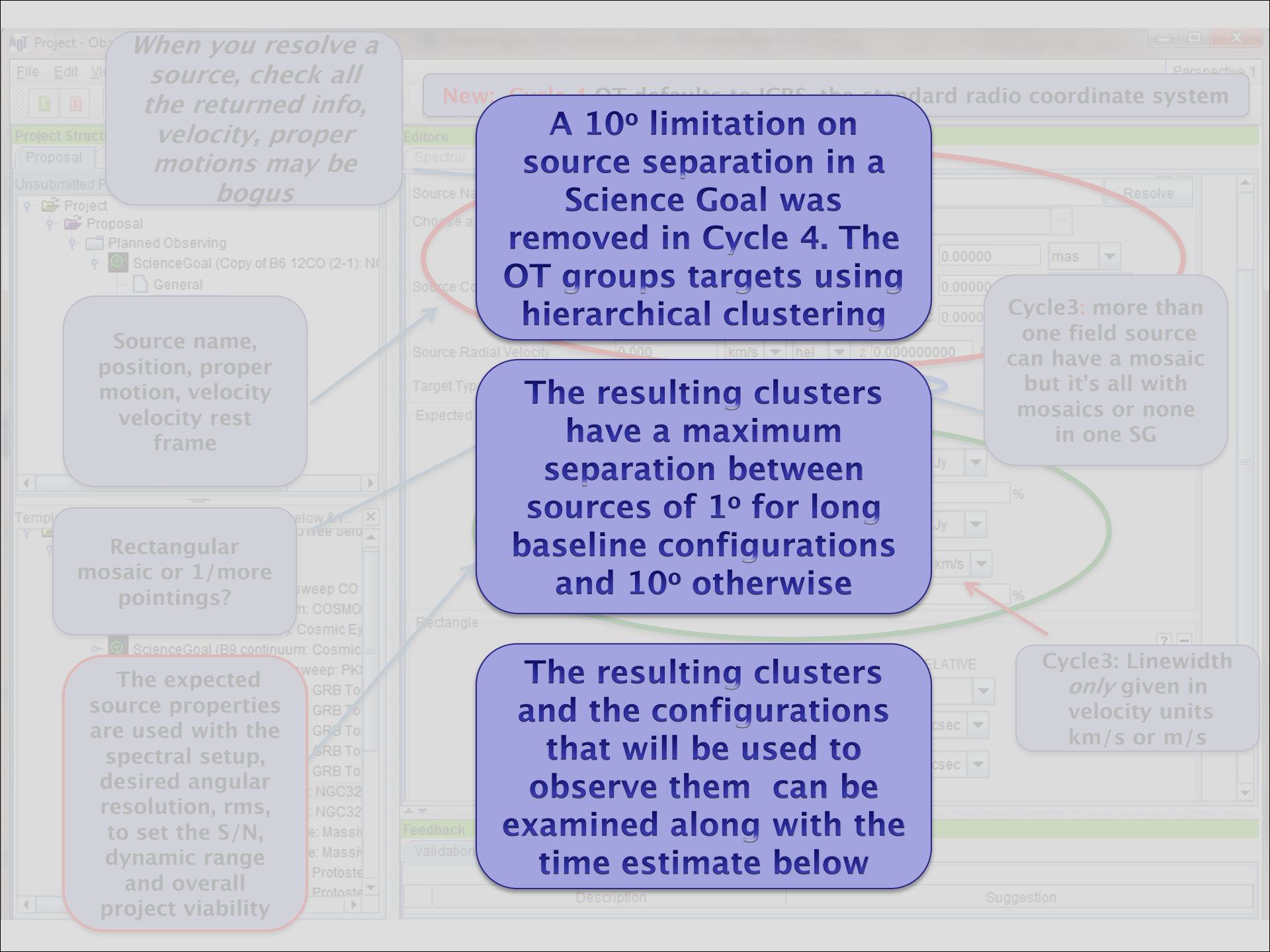
The resulting clusters have a maximum separation between sources of 1° for long baseline configurations and 10° otherwise

Rectangular mosaic or 1/more pointings?

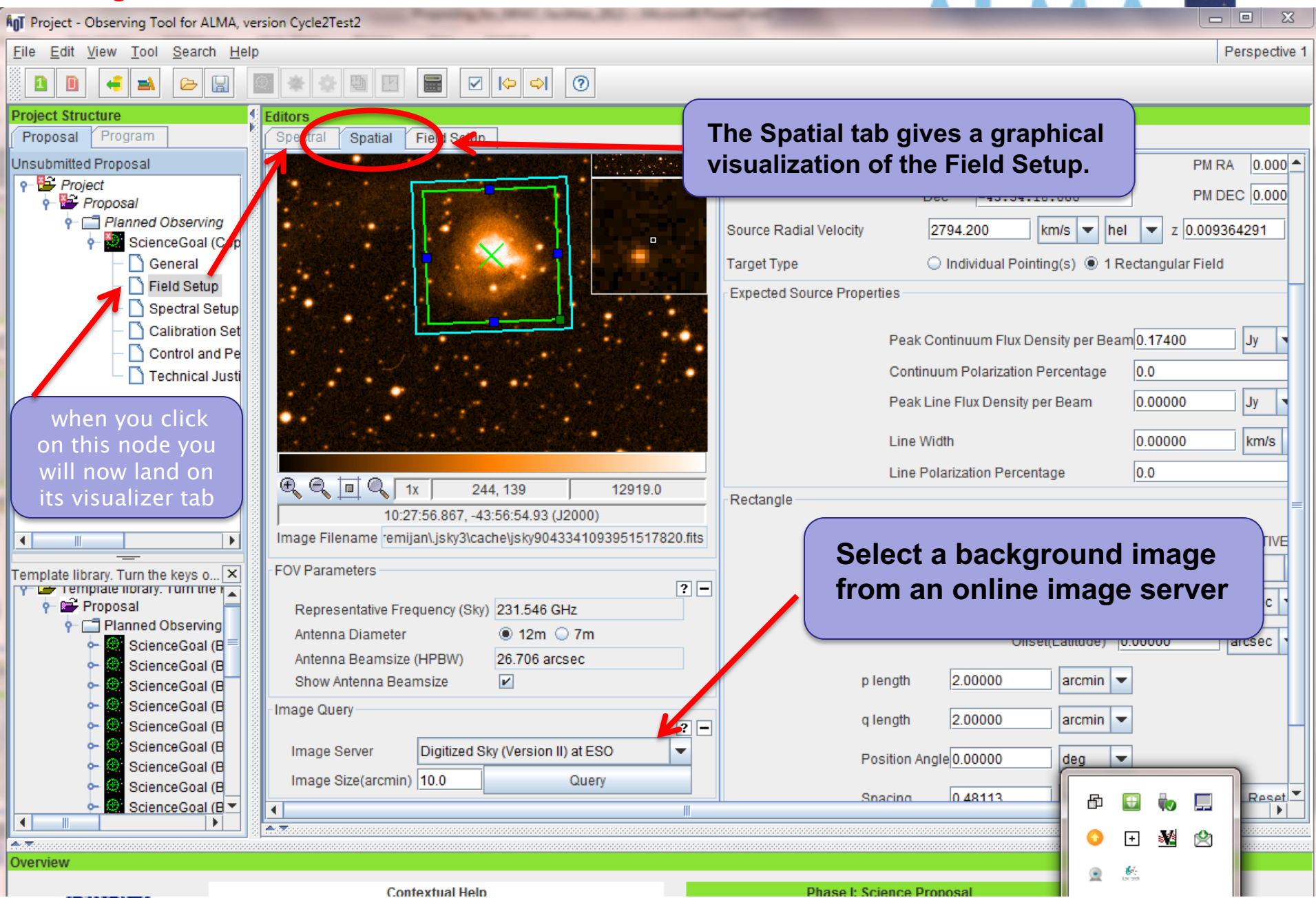
The resulting clusters and the configurations that will be used to observe them can be examined along with the time estimate below

Cycle3: Linewidth *only* given in velocity units km/s or m/s

The expected source properties are used with the spectral setup, desired angular resolution, rms, to set the S/N, dynamic range and overall project viability



# Crafting mosaics



The Spatial tab gives a graphical visualization of the Field Setup.

when you click on this node you will now land on its visualizer tab

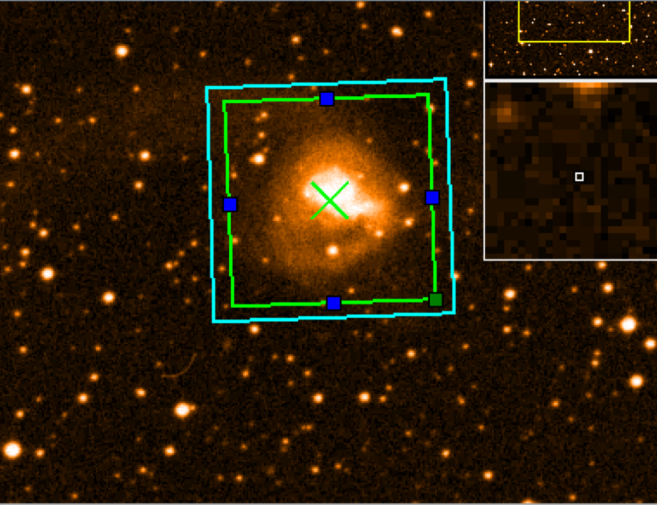
Select a background image from an online image server

# Crafting mosaics



Editors

Spectral Spatial Field Setup



1x 469, 175 13357.0

10:27:35.522, -43:56:25.99 (J2000)

Image Filename emijan\jsky3\cache\jsky9043341093951517820.fits

FOV Parameters

Representative Frequency (Sky) 231.546 GHz

Antenna Diameter  12m  7m

Antenna Beamsize (HPBW) 26.706 arcsec

Show Antenna Beamsize

Image Query

Image Server Digitized Sky (Version I

Image Size(arcmin) 10.0

**Setting up the mosaic in the Field Setup**

Define the length, width and position angle of the region to mosaic. Default is to separate the field centers by about 48% of the primary beam (the Nyquist rate).

**HPBW for the 12m antennas are  $1.13\lambda/D$**

Line Width 0.00000 km/s

Line Polarization Percentage 0.0 %

Rectangle

Coords Type  ABSOLUTE  RELATIVE

System J2000

Field Center Coordinates

Offset(Longitude) 0.00000

Offset(Latitude) 0.00000

p length 2.0 arcmin

q length 2.0 arcmin

Position Angle 0.00000 deg

Spacing 0.48113 fraction of main beam

#Pointings

12m Array	105	7m Array	39
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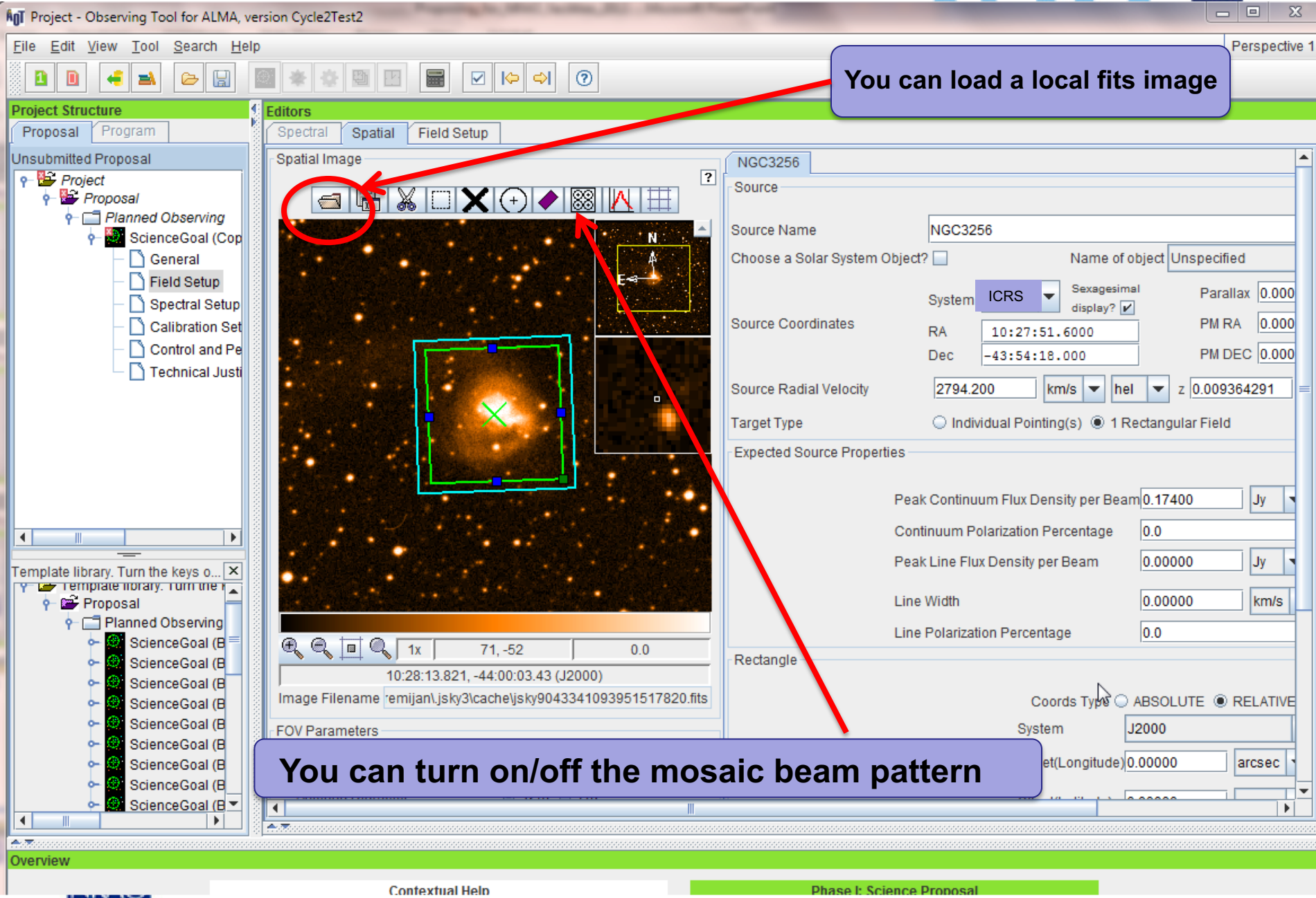
Reset to Nyquist

Export

**No more than 150 12m Array pointings.**

**Estimated number of 7m Array pointings**

# Crafting mosaics



The screenshot displays the ALMA Observing Tool interface. The main window shows a 'Spatial Image' editor for source NGC3256. A red circle highlights the toolbar icons for file operations (load, save, cut, copy, paste, zoom, pan) and a red arrow points to the mosaic beam pattern icon. A callout box at the top right states 'You can load a local fits image'. Another callout box at the bottom states 'You can turn on/off the mosaic beam pattern'. The right panel shows source properties for NGC3256, including coordinates (RA: 10:27:51.6000, Dec: -43:54:18.000) and expected source properties like Peak Continuum Flux Density per Beam (0.17400 Jy).

**You can load a local fits image**

**You can turn on/off the mosaic beam pattern**

Property	Value
Source Name	NGC3256
Source Coordinates RA	10:27:51.6000
Source Coordinates Dec	-43:54:18.000
Source Radial Velocity	2794.200 km/s
Peak Continuum Flux Density per Beam	0.17400 Jy
Continuum Polarization Percentage	0.0
Peak Line Flux Density per Beam	0.00000 Jy
Line Width	0.00000 km/s
Line Polarization Percentage	0.0

# Crafting mosaics

Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help

Perspective 1

Project Structure

- Unsubmitted Proposal
  - Project
    - Proposal
      - Planned Observing
        - ScienceGoal (Cop)
          - General
          - Field Setup
          - Spectral Setup
          - Calibration Set
          - Control and Pe
          - Technical Just

Editors

Spectral Spatial Field Setup

Spatial Image

NGC3256

Source

Source Name NGC3256

Choose a Solar System Object?  Name of object Unspecified

System ICRS Sexagesimal display?  Parallax 0.000

Source Coordinates RA 10:27:51.6000 PM RA 0.000  
Dec -43:54:18.000 PM DEC 0.000

Source Radial Velocity 2794.200 km/s hel z 0.009364291

Target Type  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Beam	0.17400	Jy
Continuum Polarization Percentage	0.0	
Peak Line Flux Density per Beam	0.00000	Jy
Line Width	0.00000	km/s
Line Polarization Percentage	0.0	

Rectangle

Coords Type  ABSOLUTE  RELATIVE

System J2000

Offset(Longitude) 0.00000 arcsec

Image Filename emijan\jsky3\cache\jsky9043341093951517820.fits

1x 388, 468 13678.0

10:27:42.245, -43:51:24.64 (J2000)

Each circle is the size of the hpbw, centered on the pointing center

Or load a local fits image

Overview

Contextual Help Phase I: Science Proposal

# The spectral setup has a visualizer for spectral windows and spectral lines

The screenshot shows a software interface with a 'Project Structure' tree on the left, a 'Spectral Setup' tab in the center, and a 'Feedback' section at the bottom. The 'Spectral Setup' tab contains a graph of 'Observed Frequency' vs 'Rest Frequency' with various overlays and controls. Annotations include a blue callout box, a red circle around the 'Spectral' tab, and several red arrows pointing to specific elements on the graph and interface.

**The spectral tab gives you a graphical visualization of the spectral setup. The orange vertical bars are sidebands. This setup is okay!**

Drag the green slider to slide the VIEW

Drag the yellow vertical to move the first LO

Click in the yellow area to MAGNIFY

Zoom in here to start

Contextual Help Phase I: Science Proposal



# The spectral setup tab

## Project Structure

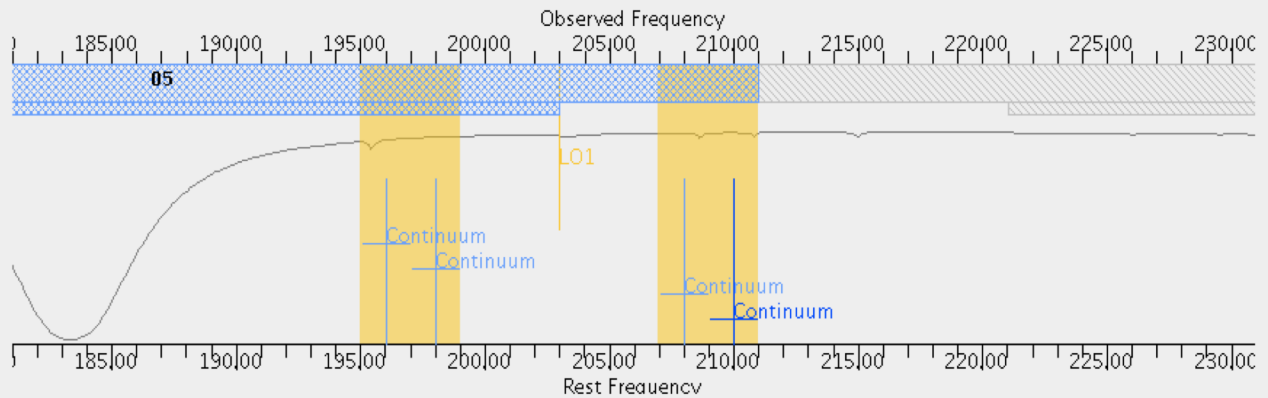
- Unsubmitted Proposal
  - Project
    - Proposal
      - Planned Observing
        - ScienceGoal (Copy of Chameleon's data)
          - General
          - Field Setup
          - Spectral Setup**
          - Calibration Setup
          - Control and Performance
          - Technical Justification

when you click on this node you will land on its visualizer tab

## Editors

Spectral Spatial Spectral Setup

Note that for bands 3 to 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.  
Left/right click to zoom in/out, grab sliding bar to pan  
Note: Moving LO1 here is for experimentation only - actual setup determined by the windows



Overlays:  Receiver Bands  Transmission  DSB Image  Spectral Lines

Water Vapour Column Density:  Automatic Choice  Manual Choice 1.796mm (5th Octile)

Viewport:

Overlaid lines are saved with the project see below

Bands 9,10 are DSB but sidebands are correlated separately using 90° Walsh switching  
New! In Cycle 7 90° Walsh switching is on by default

Spectral Type

Spectral Line  
 Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  XX  DUAL

Band 5 enabled in Cycle 6, overlaps more with Band 4 in Cycle 7

Receiver Band 5 [163.0-211.0 GHz]

Sky Frequency 203.00000 GHz

## Project Structure

Unsubmitted Proposal
Project
Proposal
Planned Observing
ScienceGoal (Copy of Chameleon's da
General
Field Setup
Spectral Setup
Calibration Setup
Control and Performance
Technical Justification

## Editors

**Scrolled down from previous slide**

**ADD spectral windows to get started!**

**This option will call up the spectral line picker. Spectral windows added this way retain line id and other info from the Splatologue**

**Frequencies may also be entered by hand**

**Add spectral window centred on a spectral line**    **Add spectral window manually**    **Delete**     Show image spectral windows

**Add spectral window centred on a spectral line**    **Add spectral window manually**    **Delete**     Show image spectral windows

**Add spectral window centred on a spectral line**    **Add spectral window manually**    **Delete**     Show image spectral windows

**Add spectral window manually**    **Delete**     Show image spectral windows

**Representative Frequency**

The representative frequency is used in conjunction with the sensitivity entered on the 'Control and Performance' page to estimate the required observing time and to set the size of the antenna beam shown in the 'Spatial Visual' editor. If the transition you are most interested in does

Fractor	Centre Freq (rest,lsrk)				Spec. Avg.	Representative Window
1(Full)	98.70000 GHz	98.69607 GHz	continuum	1875.000 MHz	1	<input type="radio"/>
1/2	97.99517 GHz	97.99127 GHz	l-C3H v=0 J=9...	58.594 MHz( 179 km/s), 70.557 kHz( 0.216 km/s)	2	<input type="radio"/>
1/2	97.98095 GHz	97.97705 GHz	CS v=0 2-1	58.594 MHz( 179 km/s), 61.035 kHz( 0.187 km/s)	1	<input type="radio"/>
1/2	86.67076 GHz	86.66731 GHz	HCO 1(0,1)-0(...	58.594 MHz( 203 km/s), 61.035 kHz( 0.211 km/s)	1	<input type="radio"/>
1/2	87.31690 GHz	87.31342 GHz	CCH v=0 N=1-...	58.594 MHz( 201 km/s), 61.035 kHz( 0.210 km/s)	1	<input type="radio"/>
1-0	58.594 GHz				1	<input checked="" type="radio"/>
-0	58.594 GHz				1	<input type="radio"/>

# The spectral line picker has new filters

Create spectral windows centred on spectral lines

**Transition Filter**

\*  
e.g. CO<sup>2-1</sup> or "oxide"  
 Include description

**Frequency Filters**

ALMA Band  
1 2 3 4 5 6 7 8 9 10

Sky Frequency (GHz)  
Min 84 Max 116

**Receiver/Back End Configuration**

All lines  
 Potentially selectable lines  
 Lines in defined spws  
 Filtering unobservable lines

**Upper-state Energy (K)**

Min 0 Max 0

**Molecule Filter / Environment**

Show all atoms and molecules

Can't find the transition you're looking for in the offline pool? Find more in the online Splatalogue.  
[Search Online](#)  
[Reset Filters](#)

**Transitions matching your filter settings:**  
(double-click column header for primary sort, single-click subsequent columns for secondary sorting. Single clicks will reverse sort order of already selected columns.)

Transition $\triangle$	Description	Rest Freque... $\triangle$	Sky Frequency	Upper-state Ene...	Lovas Inten...	Sij $\mu^2$	Catalog
C13CH N=1-0, J=3/2-1/2, F1=1-0, F=3...	Ethynyl	85.256952 GHz	85.254936 ...	4.092 K	0.07	0.754 D <sup>2</sup>	Offline
t-CH3CH2OH 6(0,6)-5(1,5)	trans-Ethanol	85.265503 GHz	85.263486 ...	17.483 K	0.25	5.343 D <sup>2</sup>	Offline
CH3CN v8=1 J=9-8, K=-1--3	Methyl Cyanide	85.267374 GHz	85.265357 ...	585.474 K		0.001 D <sup>2</sup>	Offline
H2CO 50(6,44)-50(6,45)	Formaldehyde	85.310678 GHz	85.308661 ...	4881.916 K		6.63 D <sup>2</sup>	Offline
CC13CCH N=9-8, J=19/2-17/2, F1=17/...	1,3-Butadiynyl radical	85.331915 GHz	85.329897 ...	20.474 K	0.03	6.372 D <sup>2</sup>	Offline
CC13CCH N=9-8, J=19/2-17/2, F1=19/...	1,3-Butadiynyl radical	85.331917 GHz	85.329898 ...	20.473 K	0.03	7.12 D <sup>2</sup>	Offline
CC13CCH N=9-8, J=19/2-17/2, F1=19/...	1,3-Butadiynyl radical	85.331935 GHz	85.329916 ...	20.473 K	0.03	7.888 D <sup>2</sup>	Offline
CC13CCH N=9-8, J=19/2-17/2, F1=17/...	1,3-Butadiynyl radical	85.331936 GHz	85.329918 ...	20.473 K	0.03	7.138 D <sup>2</sup>	Offline
c-HCCCH v=0 2(1,2)-1(0,1)	Cyclopropenylidene	85.338893 GHz	85.336875 ...	6.445 K	3.1	52.945 D <sup>2</sup>	Offline
HCS+ 2-1	Thioformylum	85.347869 GHz	85.345850 ...	6.143 K	0.4	7.668 D <sup>2</sup>	Offline
CH3OH v t=1 14(10,4)-14(11,3)	Methanol	85.355421 GHz	85.353402 ...	1156.266 K		5.135 D <sup>2</sup>	Offline
U-85396							Offline
CH3CCH v=0							Offline
CH3CCH v=0							Offline
CH3CCH v=0							Offline
CH3CCH v=0							Offline
U-85468.3	UNIDENTIFIED	85.468300 GHz	85.466279 ...		1.84		Offline
U-85486.6	UNIDENTIFIED	85.486600 GHz	85.484578 ...		0.22		Offline
CH3CN v8=1 J=65-65, K=2-0	Methyl Cyanide	85.489615 GHz	85.487593 ...	2424.382 K		0.675 D <sup>2</sup>	Offline
U-85492.6	UNIDENTIFIED	85.492600 GHz	85.490578 ...		0.18		Offline
CH3C4H 21(0)-20(1)	Methyl diacetylene	85.497333 GHz	85.495311 ...	55.32 K		58.628 D <sup>2</sup>	Offline
CH3C4H 21(0)-20(0)	Methyl diacetylene	85.498166 GHz	85.496144 ...	47.402 K	0.1	58.699 D <sup>2</sup>	Offline
U-85499.3	UNIDENTIFIED	85.499300 GHz	85.497278 ...		-0.1		Offline
CH3CN v8=1 J=39-39, K=3-1	Methyl Cyanide	85.500670 GHz	85.498648 ...	1239.893 K		0.15 D <sup>2</sup>	Offline
CH3OH v t=1 22(8,14)-22(6,16)	Methanol	85.501157 GHz	85.499135 ...	1180.751 K		0.043 D <sup>2</sup>	Offline
U-85506	UNIDENTIFIED	85.506000 GHz	85.503978 ...		0.1		Offline

**Select one or more lines from a splatalogue-based list you can filter using the tools at left (see below)**

Add to spectral window list

**Spectral windows in this baseband (maximum of four)**

Transition $\triangle$	Description	Rest Frequency $\triangle$	Sky Frequency
U-85468.3	UNIDENTIFIED	85.468300 GHz	85.466279 GHz

Remove spectral window(s)

Cancel Ok

**Transition Filter**

\*  
e.g. CO<sup>2-1</sup> or "oxide"

Include description

---

**Frequency Filters**

ALMA Band

1 2 3 4 5 6 7 8 9

Sky Frequency (GHz)

Min  Max

**Receiver/Back End Configuration**

All lines

Potentially selectable lines

Lines in defined spws

Filtering unobservable lines

**Upper-state Energy (K)**

Min  Max

**Molecule Filter / Environment**

Show

Can't find the transition you're looking for in the offline pool? Find more in the online Splatalogue.

**Filter by name**

**The line lists can be long, so use filters**

**Filter by receiver band / frequency**

**New! The Receiver/Back End Configuration Filters have been revised.**  
**Potentially selectable = in either sideband**

**This previously used a slider**

Transition	Description	Rest Frequency	Sky Frequency	Energy	Line Type
CH3NH2 4(1)A2-4(0)A1, F=5-5	Methylamine	86.074729 GHz	86.072693 ...	25.405 K	Offline
CH3NH2 4(1)A2-4(0)A1	Methylamine	86.075367 GHz	86.073331 ...	25.405 K	Offline
CH3NH2 4(1)A2-4(0)A1, F=4-4	Methylamine	86.075367 GHz	86.073331 ...	25.405 K	Offline
SO 3Σ v=0 2(2)-1(1)	Sulfur Monoxide	86.093950 GHz	86.091914 ...	19.314 K	Offline
U-86151.6	UNIDENTIFIED	86.151600 GHz	86.149562 ...	0.6	Offline
13CH3OH v t=1 5(3,3)-6(2,5)	Methanol	86.168150 GHz	86.166112 ...	451.624 K	Offline
CH3OCH3 2(2,0)-2(1,1) AA	Dimethyl ether	86.228720 GHz	86.226681 ...	8.357 K	Offline
U-86239.6	UNIDENTIFIED	86.239600 GHz	86.237560 ...	1775.339 K	Offline
U-86250.7	UNIDENTIFIED	86.250700 GHz	86.257660 ...	0.12	Offline

Spectral windows in this baseband (maximum of four)

Transition	Description	Rest Frequency	Sky Frequency
our pseudo continuum		88.000000 GHz	87.997919 GHz

File Edit View Tool Search Help

Project Structure

Proposal Program

Unsubmitted Proposal

Project  
 Proposal  
 Planned Observing  
 ScienceGoal (Copy of Chameleon's data)  
 General  
 Field Setup  
 Spectral Setup  
 Calibration Setup  
 Control and Performance  
 Technical Justification

Editors

Spectral Spatial Spectral Setup

Spectral Line

Baseband-1

Fraction	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Spec. Avg.	Representative Window
(Full)	98.70000 GHz	98.69607 GHz	continuum	1	<input type="radio"/>

Sky frequency is shown in barycentric frame so rest and sky frequency differ even when  $V_{lsrk}=0$

### New Cycle 7!

The OT should give validation warnings if a) any part of a spw is closer than 30 MHz to the baseband edge or b) more than half of the spw is within (30 MHz + the line width) of the baseband edge.

Default spectral binning is 2 but can be set to other values with justification

### Note!

Once a spectral window is defined with a rest frequency within it, the window must always thereafter contain that rest frequency or the OT will complain!

Baseband-4

1/2	88.63160 GHz	88.62807 GHz	HCN v=0 J=1-0	58.594 MHz( 198 km/s), 61.035 kHz( 0.206 km/s)	1	<input checked="" type="radio"/>
1/2	89.18853 GHz	89.18498 GHz	HCO+ v=0 1-0	58.594 MHz( 197 km/s), 61.035 kHz( 0.205 km/s)	1	<input type="radio"/>

spectral window manually

Delete

 Show image spectral windows

the sensitivity entered on the 'Control and Performance' page to estimate the required shown in the 'Spatial Visual' editor. If the transition you are most interested in does

File Edit View Tool Search Help



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's data)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

## Editors

Spectral Spatial Spectral Setup

Polarization products desired

 XX
  DUAL
  FULL

Spectral Setup Errors

No suitable receiver band for the range :[0.0 GHz, 98.02251613655123 GHz]

Spectral Line

Baseband-1

Fractor	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1(Full)	0.00000 GHz	0.00000 GHz	...Enter Name ...	58.594 MHz, 30.518 kHz	1	<input type="radio"/>
				58.594 MHz, 30.518 kHz		
				117.188 MHz, 61.035 kHz		
				234.375 MHz, 122.070 kHz		
				468.750 MHz, 244.141 kHz		
				937.500 MHz, 488.281 kHz		
				1875.000 MHz, 976.563 kHz		
				1875.000 MHz, 31.250 MHz		

Add spectral window centred on a spectral line

Add

Baseband-2

1/2	97.89517 GHz	97.99127 GHz	I-C3H v=0 J=9...	58.594 MHz, 70.557 kHz	2	<input type="radio"/>
1/2	97.98095 GHz	97.97705 GHz	CS v=0 2-1	58.594 MHz, 61.035 kHz	1	<input type="radio"/>

Add spectral window centred on a spectral line

Add spectral window manually

Delete

 Show image spectral windows

Baseband-3

1/2	86.67076 GHz	86.66731 GHz	HCO 1(0,1)-0(...	58.594 MHz, 61.035 kHz	1	<input type="radio"/>
1/2	87.31690 GHz	87.31342 GHz	CCH v=0 N=1-...	58.594 MHz, 61.035 kHz	1	<input type="radio"/>

Add spectral window centred on a spectral line

Add spectral window manually

Delete

 Show image spectral windows

Baseband-4

1/2	88.63160 GHz	88.62807 GHz	HCN v=0 J=1-0	58.594 MHz, 61.035 kHz	1	<input checked="" type="radio"/>
1/2	89.18853 GHz	89.18498 GHz	HCO+ v=0 1-0	58.594 MHz, 61.035 kHz	1	<input type="radio"/>

Add spectral window centred on a spectral line

Add spectral window manually

Delete

 Show image spectral windows

Double click this field to select bandwidth & resolution from a dropdown list

File Edit View Tool Search Help

## Project Structure

- Unsubmitted Proposal
  - Project
    - Proposal
      - Planned Observing
        - ScienceGoal (Copy of Chameleon's d...
          - General
          - Field Setup
          - Spectral Setup
          - Calibration Setup
          - Control and Performance
          - Technical Justification

## Editors

Spectral Spatial Spectral Setup

Polarization products desired

-Spectral Setup Errors

No suitable receiver band for the range :[0.0 GHz, 98.02251613655123 GHz]

Spectral Line

Baseband-1

Fraction	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1(Full)	0.00000 GHz	0.00000 GHz	...Enter Name ...	58.594 MHz, 30.518 kHz	1	<input type="radio"/>
				58.594 MHz, 30.518 kHz		
				117.188 MHz, 61.035 kHz		
				234.375 MHz, 122.070 kHz		
				468.750 MHz, 244.141 kHz		
				937.500 MHz, 488.281 kHz		
				1875.000 MHz, 976.563 kHz		
				1875.000 MHz, 31.250 MHz		

Add spectral window centred on a spectral line

Add

Baseband-2

1/2	97.99517 GHz	97.99127 GHz	l-C3H v=0 J=9...	58.594 MHz, 70.557 kHz	2	<input type="radio"/>
1/2	97.98095 GHz	97.97705 GHz	CS v=0 2-1	58.594 MHz, 61.035 kHz	1	<input type="radio"/>

Add spectral window centred on a spectral line

Add spectral window manually

Delete

 Show image spectral windows

Baseband-3

1/2	86.67076 GHz	86.66731 GHz	HCO 1(0,1)-0(...	58.594 MHz, 61.035 kHz	1	<input type="radio"/>
1/2	87.31690 GHz	87.31342 GHz	CCH v=0 N=1-...	58.594 MHz, 61.035 kHz	1	<input type="radio"/>

Add spectral window manually

Delete

 Show image spectral windows

5 kHz

5 kHz

1

1

Add spectral window manually

Delete

 Show image spectral windows

Failing to rename a new spw brings a validation error

Spectral specs share a baseband so the sum of shares can't exceed 1. Choices for resolution change with this fraction

# Full Continuum & Polarization

ALMA Observing Tool (FEB2017) - Project

Perspective 1

File Edit View Tool Search Help



**Project Structure**

Proposal Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's d...
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control
        - Techni

**Editors**

Spectral Spatial Spectral Setup

Spectral Type  
 Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  
 XX  DUAL  FULL

Spectral Setup Errors

Single Continuum

Receiver Band  
4 [125.0-163.0 GHz]

Sky Frequency  
3 [84.0-116.0 GHz]  
4 [125.0-163.0 GHz]  
5 [163.0-211.0 GHz]  
6 [211.0-275.0 GHz]  
7 [275.0-373.0 GHz]

Rest Frequency  
145.000000 GHz

Centre Freq (sky,topo)	Transition	Bandwidth, Resolution
145.000000 GHz	Single Continuum	1875.000 MHz( 4073 km/s), 62.500 MHz

Show image spectral windows

Baseband-2

1(Full)	140.00000 GHz	140.00000 GHz	Single Continuum	1875.000 MHz( 4015 km/s), 62.500 MHz(133.836 km/s)	1	<input type="radio"/>
---------	---------------	---------------	------------------	--	---	-----------------------

Show image spectral windows

Baseband-3

1(Full)	150.00000 GHz	150.00000 GHz	Single Continuum	1875.000 MHz( 3747 km/s), 62.500 MHz(124.914 km/s)	1	<input type="radio"/>
---------	---------------	---------------	------------------	--	---	-----------------------

Show image spectral windows

Baseband-4

1(Full)	152.00000 GHz	152.00000 GHz	Single Continuum	1875.000 MHz( 3698 km/s), 62.500 MHz(123.270 km/s)	1	<input checked="" type="radio"/>
---------	---------------	---------------	------------------	--	---	----------------------------------

**Standard single continuum setups, can be modified with justification**

**Full Polarization for Bands 3 - 7**

You can edit frequencies used for continuum polarization. If FULL is specified, expected polarization percentages must be given with the field setup tab



# Full Continuum & Polarization

ALMA Observing Tool (FEB2017) - Project

File Edit View Tool Search Help

Perspective 1

Project Structure

Proposed

Editors

Spectral Spectral Setup

Spectral Type

Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  XX  DUAL  FULL

Receiver Band 4 [125.0-163.0 GHz]

3 [84.0-116.0 GHz]

5 [137.0-163.0 GHz]

Standard single continuum setups, can be modified with justification

**Suggestion:**

**Polarization Schedule blocks are 3+ hours long to get parallactic angle coverage and the rms noise may be much less than specified on the ctrl&perf page**

**TECHNICAL JUSTIFICATION shows the actual expected band rms noise and various S/N ratios**

Full Polarization for Bands 3 - 7  
User can edit frequencies used for continuum polarization. If FULL is specified, an expected polarization percentage must be given with the field setup tab

Baseband-2

1(Full) 140.0000 GHz (133.850 km/s)

Baseband-3

1(Full) 150.00000 GHz (124.914 km/s) 1

Baseband-4

1(Full) 152.00000 GHz 152.00000 GHz Single Continuum 1875.000 MHz( 3698 km/s), 62.500 MHz(123.270 km/s) 1

# Automated spectral scan - I



Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure: Proposal, Program, Unsubmitted Proposal, Project, Proposal, Planned Observing, ScienceGoal (Copy), General, Field Setup, Spectral Setup, Calibration Setu, Control and Perf, Technical Justifi

Editors: Spectral, Spatial, Spectral Setup

Spectral Type:  Spectral Line,  Single Continuum,  Spectral Scan

Polarization products desired:  XX,  DUAL,  FULL

Spectral Setup Errors

Spectral Scan

Requested start frequency (sky): 95.0 GHz, 107.0 GHz, 95.8896 GHz - 108.0020 GHz, 95.0 GHz - 110.0 GHz, 1875.000 MHz, 976.563 kHz, 1, 102.50000 GHz

Automated Spectral Scan mode and tunings

**New Cycle 7: Spectral scan observing has been made more efficient by joining all calibrator tunings to lessen the number of antenna pointing calibrations**

The representative frequency defined in the observed frame is used in conjunction with the sensitivity entered on the 'Control and Performance' page to estimate the required observing time and to set the size of the antenna beam shown in the 'Spatial Visual' editor. The representative frequency defaults to the average mid-frequency of the achieved scan range but may be subsequently set by the user to any frequency within the achieved scan range.

Tuning (Max. 5)	SPW 1 (GHz)	SPW 2 (GHz)
1	95.9375 GHz	97.8125 GHz
2	99.6875 GHz	101.5625 GHz
3	103.4375 GHz	105.3125 GHz
4	107.1875 GHz	109.0625 GHz

Feedback

# Automated spectral scan - II



Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure: Proposal, Program, Unsubmitted Proposal, Project, Proposal, Planned Observing, ScienceGoal (Copy), General, Field Setup, Spectral Setup, Calibration Setu, Control and Perf, Technical Justifi

Editors: Spectral, Spatial, Spectral Setup

Visualisation

**Visual Representation of the Spectral Scan Mode – Actual spectral coverage vs. requested coverage**

Spectral windows, 4 per baseband as long as the total Fraction per baseband is no more than 1. configured i.e. each spectral window can have a different bandwidth and resolution. put 3 basebands in one sideband and the fourth one in the other.

Actual setup determined by the windows

Observed Frequency

Rest Frequency

Overlays:  Receiver Bands  Transmission  Overlay Lines  DSB Image

Spectral Scan:  Requested Scan  Tuning 1  Tuning 2  Tuning 3  Tuning 4

Water Vapour Column Density:  Automatic Choice  Manual Choice 1.262mm (4th Octile)

Viewport:

Spectral Type

Spectral Line  Single Continuum  Spectral Scan

Feedback

# Saving spw & line rest frequencies



**Project Structure**

- Unsubmitted Proposal
  - Project
    - Proposal
      - Planned Observing
        - ScienceGoal (Copy of Chameleon's d...
          - General
          - Field Setup
          - Spectral Setup
          - Calibration Setup
          - Control and Performance
          - Technical Justification

**Editors**

Spectral Spatial Spectral Setup

**Representative Frequency**

The representative frequency is used in conjunction with the sensitivity entered on the 'Control and Performance' editor to set the size of the antenna beam shown in the 'Spatial Visual' editor. If the frequency is not in the centre of the chosen spectral window, its frequency can be changed here. The sky position is shown in the targets table below.

152.00000 GHz

**Rest Frequencies**

Please set the rest frequencies of spectral lines that will be observed. These will be used to set the velocity scale and will enhance the ALMA Science Archive. We recommend setting these once the spectral setup is fully defined.

Define Rest Frequencies

**Targets**

Source Name	Velocity	System	Representative Frequency (Sky)
J0942-7731...	0.0 km/s	lsrk	152.0000 GHz
J1058-8003...	0.0 km/s	lsrk	152.0000 GHz
J1136-6827...	0.0 km/s	lsrk	152.0000 GHz
J1145-6954...	0.0 km/s	lsrk	152.0000 GHz
J1147-6753...	0.0 km/s	lsrk	152.0000 GHz
J1152-8344...	0.0 km/s	lsrk	152.0000 GHz
J1224-8313...	0.0 km/s	lsrk	152.0000 GHz
B1251-713...	0.0 km/s	lsrk	152.0000 GHz
J1312-7724...	0.0 km/s	lsrk	152.0000 GHz
J1550-8258...	0.0 km/s	lsrk	152.0000 GHz
J1617-7717...	0.0 km/s	lsrk	152.0000 GHz
J1723-7713...	0.0 km/s	lsrk	152.0000 GHz
J1733-7935...	0.0 km/s	lsrk	152.0000 GHz

This calls a version of the spectral line picker to add rest frequencies that you may wish to note. This can be used later in data reduction to set velocity scales for lines that fall within a spectral window

List of saved rest frequencies including:  
+ spw centers  
+ Saved overlaid lines (if desired)  
+ Defined Rest Frequencies

# Viewing spw & line rest frequencies



ALMA Observing Tool (Cycle7(2018dec-20190121)) - Project

File Edit View Tool Search Help Perspective 1

Project Structure: Unsubmitted Proposal, Project, Proposal, Planned Observing, ScienceGoal (Copy of 34 Sources), General, Field Setup, Spectral Setup, Calibration Setup, Control and Performance, Technical Justification

Editors: Spectral, Spatial, Spectral Setup

Visualisation

In the table below, it is possible to define up to 16 spectral windows, 4 per baseband as long as the total Fraction per baseband is no more than Each baseband is 2GHz wide and can be separately configured i.e. each spectral window can have a different bandwidth and resolution. Note that for bands 3 to 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Left/right click to zoom in/out, grab sliding bar to pan  
Note: Moving LO1 here is for experimentation only - actual setup determined by the windows

Observed Frequency

Rest Frequency

Overlays:  Receiver Bands  Transmission  DSB Image  Spectral Lines

Water Vapour Column Density:  Automatic Choice  Manual Choice 5.186mm (7th Octile)

Viewport:

Spectral Type

Spectral Setup Errors

Spectral Line

ALL

U-84496

U-85486.5

U-85468.3

HCO+ v=0 1-0

HCN v=0 J=1-0

CCH v=0 N=1-0, J=3/2-1/2, F=2-1

HCO 1(0,1)-0(0,0), J=3/2-1/2, F=2-1

H13CO+ 1-0

H13CN v=0 J=1-0

All the spw centers, saved overlaid lines and defined rest frequencies will be visualized even if they can't or won't be observed

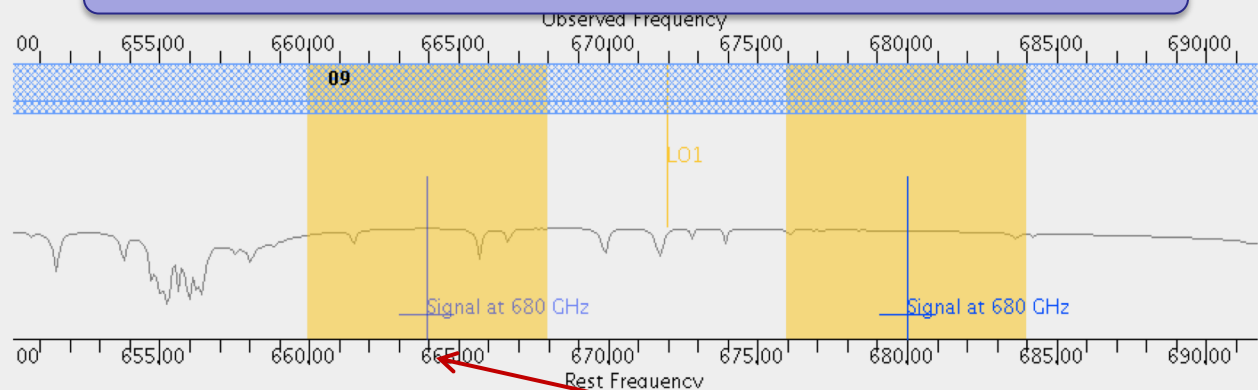
# Bands 9&10 - sideband separation (90° Walsh)

ALMA Observing Tool (FEB2017) - Cycle 5 Kelvin Sensitivity Test

Perspective 1

Bands 9,10 have double sideband rcvrs but the sidebands can be separated using an additional phase-switching step, 90° Walsh switching. This can be turned on solely to reject lines in the image sideband, but once enabled, the two SB may be stored separately. Note that the noise is not affected because only a correlated signal can be separated.

Only 1.875 GHz bandwidth, line or continuum allowed



See where lines in one SB appear in the other if checked

New in Cycle 7! ON by default

Record both SB?

Overlays:  Receiver Bands  Transmission  DSB Image  Spectral Lines Select Lines to Overlay

Water Vapour Column Density:  Automatic Choice  Manual Choice (0.658 mm (2nd Octile))

Viewport: Pan to Spectral Wind

Spectral Type:  Spectral Line  Single Continuum  Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired:  XX  DUAL  FULL

Fraction	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec. Store Avg. Image	Representativ Window
1(Full)	679.99934 GHz	680.00000 GHz	Signal at 680 ...	1875.000 MHz( 827 km/s), 1.129 MHz( 0.498 km/s)	<input checked="" type="checkbox"/>	<input checked="" type="radio"/>

Only 1.875 GHz bandwidth, line or continuum allowed



## Project Structure

Proposal Program

## Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's data)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance**
        - Technical Justification

## Editors

Spectral Spatial **Control and Performance**

**Control and Performance defines the required angular resolution, sensitivity, largest angular scale, etc.**

These parameters are used to control various aspects of the observing program.

## Control and Performance

## Configuration Information

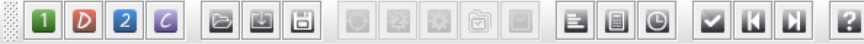
Antenna Beam size ( $1.13 * \lambda / D$ )	12m	<input type="text" value="38.309 arcsec"/>	7m	<input type="text" value="65.672 arcsec"/>	
Number of Antennas	12m	<input type="text" value="43"/>	7m	<input type="text" value="10"/>	TP <input type="text" value="3"/>
		ACA 7m configuration	Most compact 12m configuration	Most extended 12m configuration	
Longest baseline		<input type="text" value="0.049 km"/>	<input type="text" value="0.161 km"/>	<input type="text" value="16.197 km"/>	
Synthesized beam size		<input type="text" value="10.103 arcsec"/>	<input type="text" value="2.906 arcsec"/>	<input type="text" value="0.033 arcsec"/>	
Shortest baseline		<input type="text" value="0.009 km"/>	<input type="text" value="0.015 km"/>	<input type="text" value="0.256 km"/>	
Maximum recoverable scale		<input type="text" value="47.725 arcsec"/>	<input type="text" value="24.192 arcsec"/>	<input type="text" value="0.409 arcsec"/>	

## Desired Performance

Desired Angular Resolution

**Array properties summarized**

Largest Angular Structure in source  Desired sensitivity per pointing   equivalent to Bandwidth used for Sensitivity  Frequency Width Science goal integration time estimate Override OT's sensitivity-based time estimate (must be justified)  Yes  NoAre the observations time-constrained?  Yes  No



**Project Structure**

Unsubmitted Proposal

- Cycle 5 Kelvin Sensitivity Test
  - Proposal
    - Planned Observing
      - ScienceGoal (Range 1.05" .. 3" las=
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance**
        - Technical Justification
      - ScienceGoal (Single at 1.053" las=
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification
      - ScienceGoal (Single at 2" las=29")
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification
      - ScienceGoal (Single at 3" las=29")
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification
      - ScienceGoal (Range 1.05" .. 2.63")
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

**Editors**

Spectral **Control and Performance**

These parameters are used to control various aspects

Control and Performance

Configuration Information

Antenna Beamsize ( $1.13 * \lambda / D$ )	12m	65.288 arcsec	
Number of Antennas	12m	43	
ACA 7m configura			
Longest baseline	0.049 km		
Synthesized beamsize	14.158 arcsec	3.882 arcsec	0.048 arcsec
Shortest baseline	0.009 km	0.015 km	0.256 km
Maximum recoverable scale	75.610 arcsec	33.005 arcsec	0.568 arcsec

Desired Performance

Desired Angular Resolution (Synthesized Beam)  Single  Range  Any  Standalone ACA

arcsec to  arcsec

Largest Angular Structure in source  arcsec

Desired sensitivity per pointing  K equivalent to  uJy @ 1.05 "

will provide  mK @ 3.00 "

Bandwidth used for Sensitivity  Frequency Width  MHz

**Control and Performance shows what resolution and angular scales are observable and defines required angular resolution, sensitivity, largest angular scale etc**

**Specify the desired rms Jy/beam noise level and the bandwidth over which that should be measured**

**For line work the bandwidth for sensitivity must not be less than the channel spacing in the representative spectral window**





## Project Structure

Proposal Program

## Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's d...
      - General
      - Field Setup
      - Spectral Setup
      - Calibration Setup
      - Control and Performance**
      - Technical Justification

## Editors

Spectral Spatial **Control and Performance**

These parameters are used to control various aspects of the observations, including the required antenna configurations and integration times.

## Control and Performance

## Configuration Information

Antenna Beamsize (  $1.13 * \lambda / D$  ) 12m 38.309 arcsec 7m 65.672 arcsec

Number of Antennas 12n ACA

Longest baseline 0.0

Synthesized beamsize 10.0

Shortest baseline 0.0

Maximum recoverable scale 47.7

**Angular resolution options control which configurations and combinations of arrays are considered. Here a single resolution is entered and it will be considered to have a +/-20% margin**

## Desired Performance

Desired Angular Resolution (Synthesized Beam)  Single  Range  Any  Standalone ACA

3.00000 arcsec

Largest Angular Structure in source

2.0 arcsec

Desired sensitivity per pointing

0.00350 Jy equivalent to 20.581 mK

Bandwidth used for Sensitivity

AggregateBandWidth Frequency Width 7.500000 GHz

Science goal integration time estimate

Time Estimate

Override OT's sensitivity-based time estimate (must be justified)

Yes  No

Are the observations time-constrained?

Yes  No

**Flux - Temperature conversion at the desired resolution**

File Edit View Tool Search Help



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project name
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of 34 Sources)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup**
        - Control and Performance
        - Technical Justification

## Editors

Spectral Spatial **Control and Performance**

These parameters are used to control various aspects of the observation

## Control and Performance

## Configuration Information

Antenna Beamsize (  $1.13 * \lambda / D$  ) 12m 8.260 arcsec

Number of Antennas 12m 43

ACA 7m configuration Mos

Longest baseline 0.049 km 0.16

Synthesized beamsize 2.046 arcsec 0.62

Shortest baseline 0.009 km 0.01

Maximum recoverable scale 10.413 arcsec 4.773

## Desired Performance

Desired Angular Resolution (Synthesized Beam)  Single  Range  Any  Standalone ACA

0.10000 arcsec to 0.20000 arcsec

Largest Angular Structure in source 1.00000 arcsec

Desired sensitivity per pointing 0.50000 Jy

Bandwidth used for Sensitivity AggregateBandWidth

Override OT's sensitivity-based time estimate (must be justified)  Yes  No

Science Goal time estimate (includes configuration and beam information) Time Estimate

Simultaneous 12-m and ACA observations  Yes  NoAre the observations time-constrained?  Yes  No

**RANGE:**  
You can specify an acceptable range of angular resolution for the 12m array. This implies a set of configuration possibilities, use the time estimate to see what they are

Since Cycle 6 the min and max allowed user-input angular resolutions are  $\frac{1}{2}$  the smallest and twice the largest of the values shown for the 12m configurations



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's d
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance**
        - Technical Justification

## Editors

Spectral Spatial **Control and Performance**

These parameters are used to control various aspects of the observations, including the required antenna configurations and integration times.

## Control and Performance

## Configuration Information

Antenna Beamsize ( $1.13 * \lambda / D$ )	12m	<input type="text" value="38.309 arcsec"/>	7m	<input type="text" value="65.672 arcsec"/>
Number of Antennas	12m	<input type="text" value="43"/>	7m	<input type="text" value="10"/>
			TP	<input type="text" value="3"/>
		ACA 7m configuration	Most compact 12m configuration	Most extended 12m configuration
Longest baseline	<input type="text" value="0.049 km"/>	<input type="text" value="0.161 km"/>	<input type="text" value="2.517 km"/>	
Synthesized beamsize	<input type="text" value="10.103 arcsec"/>	<input type="text" value="2.906 arcsec"/>	<input type="text" value="0.236 arcsec"/>	
Shortest baseline	<input type="text" value="0.009 km"/>	<input type="text" value="0.015 km"/>	<input type="text" value="0.015 km"/>	
Maximum recoverable scale	<input type="text" value="47.725 arcsec"/>	<input type="text" value="24.192 arcsec"/>	<input type="text" value="3.555 arcsec"/>	

## Desired Performance

Desired Angular Resolution (Synthesized Beam)  Single  Range  Any  Standalone ACA

Desired sensitivity per pointing

Bandwidth used for Sensitivity

Science goal integration time

Override OT's sensitivity-based time estimate (must be justified)

Are the observations time-constrained?  Yes  No

**With "ANY" there is no largest angular scale (0 by definition) or angular resolution and the project is supposed to be suited to any non-LB configuration**

**The "ANY" option replaced older ways of specifying a point source but is more general**



## Project Structure

Proposal Program

## Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Copy of Chameleon's d
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance**
        - Technical justification

## Editors

Spectral Spatial **Control and Performance**

These parameters are used to control various aspects of the observations, including the required antenna configurations and integration times.

## Control and Performance

## Configuration Information

Antenna Beamsize ( $1.13 * \lambda / D$ )	12m 38.309 arcsec	7m 65.672 arcsec
Number of Antennas	12m 43	7m 10
	ACA 7m configuration	Most compact 12m configuration
Longest baseline	0.049 km	0.161 km
Synthesized beamsize	10.103 arcsec	2.906 arcsec
Shortest baseline	0.009 km	0.015 km
Maximum recoverable scale	47.725 arcsec	24.192 arcsec

## Desired Performance

Desired Angular Resolution (Synthesized Beam)  Single  Range  Any  Standalone ACA

Largest Angular Structure in source  arcsec

Desired sensitivity per point

Bandwidth used for Sens

Science goal integration t

Override OT's sensitivity-  
time estimate (must be j

Are the observations tim

**From Cycle 6 band 8 is no longer a non-standard observing mode, so can be used with Standalone ACA**

**With Standalone ACA there is a largest angular scale but the angular resolution is fixed by the observing frequency in the representative spectral window**

Note: The operation is longer than details.

Input Parameters

Requested sensitivity 500.0 mJy  
Bandwidth used for sensitivity 1.875 GHz  
Representative frequency (sky, first source) 704.983 GHz

Estimated Total time for Science Goal 3.40 h

Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9
Cluster 1		Cluster 2		Cluster 3	

Source Name	RA	Dec	Velocity
aj0252+1718i-342-0...	02:52:07.7190	17:18:42.686	0.000 km/s
aj0242+1742-168-...	02:42:24.2680	17:42:58.849	0.000 km/s
aj0231+1322-790-...	02:31:45.8940	13:22:54.716	0.000 km/s

Possible Configuration Combinations

12-m (1)	12-m (2)	7-m	TP	Nominal Beam(")	Max expected axial ratio
C43-4	None	None	No	0.973863 x 1.10910	1.5

Input Parameters

Precipitable water vapour (all sources) 0.472mm (1st Octile)

Time required for 12m (1) [C43-4]

Time on source per pointing (first source) 1.75 min [ 10.18 ms]  
 Total number of pointings (all sources) 3  
 Number of tunings 1  
 Total time on source 5.24 min [29.40 ms]  
 Total calibration time 15.60 min  
 Other overheads 1.97 min  
 Total time for 1 SB execution 22.80 min  
 Number of SB executions 1  
 Total time to complete SB 22.80 min

Calibration Breakdown per SB execution

2 x Pointing 4.00 min

Close

Use the time estimate popup to see how your sources will be observed

The time estimate popup shows how the OT has grouped targets into clusters and what combinations of synthesis + TP will be used to observe them

New in Cycle 7  
The beam ellipticity is shown and the maximum axial ratio that will be allowed during scheduling

Use the time estimate to see what combinations are possible, what was chosen

Yes  No

Time Estimate

# SG Time Estimates

ALMA Observing Tool (2015.8) - Debris Disk Structure around Nearby Sun-like Stars (2015)

Time Estimate

File Edit View Tool Search Help

Project Structure

Proposal Program

- Debris Disk Structure around Nearby Sun-like Stars
  - Science Plan
    - ScienceGoal (HD 10647) - generat
      - General
      - Field Setup
      - Spectral Setup
      - Calibration Setup
      - Control and Performance
      - Technical Justification
      - SG OUS (HD 10647)
        - Group OUS
          - Member OUS (HD\_10647)
            - HD\_10647\_a\_06\_TE
              - Group 1 : Calibra
              - Group 2 : Science
              - 6 Targets
                - query Pointing
                - query Pointing
                - query Amplitu

Cycle3 Template Library (read-only)

- Cycle3 Template Library
  - Science Plan

Editors

Spectral Spatial Control and Performance

These parameters are used to control various aspects of the observations, including the

Control and Performance

Configuration Information

Antenna Beamsize (  $1.13 * \lambda / D$  ) 12m 25.260 arcsec 7m 43.3

Number of Antennas 12m 40 7m 10

ACA 7m configuration Most compact

Longest baseline 0.049 km 0.157 km

Synthesized beamsize 5.712 arcsec 1.721 arcsec

5 km

5 arcsec

Des

Des

Larg

Des

Band

Science goal integration time estimate

Override OT

Are the ob

Feedback

Validation

scroll down in the time estimate popup to see a breakdown of how the required time is made of its various constituents

This project needs 12m + 7m synthesis owing to the combination of angular resolution and largest angular scale

Note: The time in brackets is that required to reach the sensitivity. Operational requirements often mean that the actual observed time is longer, especially for mosaics. Please see the User Manual for more details.

**Input Parameters**

Requested sensitivity	0.01400 mJy
Bandwidth used for sensitivity	7.500 GHz
Representative frequency (sky, first source)	230.52 GHz

**Estimated Total time for Science Goal 6.02 h**

SB-1

**Input Parameters**

Precipitable water vapour (all sources)	1.796mm (5th Octile)
<b>Time required for C40-3</b>	
Time on source per pointing (first source)	1.44 h [1.43 h]
Total number of pointings (all sources)	1
Number of tunings	1
Total time on source	1.44 h [1.43 h]
Total calibration time	49.50 min
Other overheads	14.30 min
Total time for 1 SB execution	1.25 h
Number of SB executions	2
Total time to complete SB	2.51 h

**Calibration Breakdown per SB execution**

5 x Pointing	35.00 min
1 x SidebandRatio	1.58 min
1 x Amplitude	2.50 min
1 x Bandpass	5.00 min
6 x Phase	3.00 min
2 x CheckSource	2.00 min
7 x Atmospheric	4.67 min
Calibration overheads	5.40 min

**Additional Arrays**

ACA 7-m time (t_12m x 1.40)	3.51 h
Total ACA time (max[t_7-m, t_TP])	3.51 h

**Estimated total time for SB-1 6.02 h**

Close

# Single source time estimates

ALMA Observing Tool (2015.8) - Debris Disk Structure around Nearby Sun-like Stars (2015.

Time Estimate

File Edit View Tool Search Help



Project Structure

- Proposal
- Program
- Debris Disk Structure around Nearby Sun-like Stars
  - Science Plan
  - ScienceGoal (HD 10647) - generat
    - General
    - Field Setup
    - Spectral Setup
    - Calibration Setup
    - Control and Performan
    - Technical Justification
    - SG OUS (HD 10647)
      - Group OUS
        - Member OUS (H
          - HD\_10647\_
            - Group 1
            - Group 2
            - 6 Target
              - query
              - query
              - query

Editors

Spectral Spatial Control and Performance

These parameters are used to control various aspects of the observations, including th

Control and Performance

Configuration Information

Antenna Beamsize (  $1.13 * \lambda / D$  ) 12m 25.260 arcsec 7m 43.3

Note that the OT calculates the number of executions based on an estimate of the maximum duration of an SB. This means that adding a little bit of on-source time can sometimes make for a significantly larger total time if another execution is implied

Note: The time in brackets is that required to reach the sensitivity. Operational requirements often mean that the actual observed time is longer, especially for mosaics. Please see the User Manual for more details.

Input Parameters

Requested sensitivity	0.01400 mJy
Bandwidth used for sensitivity	7.500 GHz
Representative frequency (sky, first source)	230.52 GHz

**Estimated Total time for Science Goal 6.02 h**

Cycle3 Template Library (read-only)

- Cycle3 Template Library
- Science Plan

Desired sensitivity per pointing 0.00001 Jy

Bandwidth used for Sensitivity AggregateBandWidth

Science goal integration time estimate Time Estimate

Override OT's sensitivity-based time estimate (must be justified)  Yes  No

Are the observations time-constrained?  Yes  No

Input Parameters

Precipitable water vapour (all sources)	1.796mm (5th Octile)
---	----------------------

Time required for C40-3

Time on source per pointing (first source)	1.44 h [1.43 h]
Total number of pointings (all sources)	1
Number of tunings	1
Total time on source	1.44 h [1.43 h]
Total calibration time	49.50 min
Other overheads	14.30 min
Total time for 1 SB execution	1.25 h
Number of SB executions	2
Total time to complete SB	2.51 h

Calibration Breakdown per SB execution

3 x Pointing	36.00 s
1 x SidebandRatio	1.58 min
1 x Amplitude	2.50 min
1 x Bandpass	5.00 min
6 x Phase	3.00 min
2 x CheckSource	2.00 min
7 x Atmospheric	4.67 min
Calibration overheads	5.40 min

Additional Arrays

ACA 7-m time (t_12m x 1.40)	3.51 h
Total ACA time (max[t_7-m,t_TP])	3.51 h

Estimated total time for SB-1 6.02 h

Close

File Edit View **Tool** Search Help

- ALMA Calibrator Selection Tool...
- ALMA LO Configuration Tool...
- Sensitivity Calculator...
- Generate SBS from the Selected Goal
- Generate Phase I SBS from all the Science Goals
- Generate Phase II SBS from all the Science Goals
- Export selected Scheduling
- Generate a PDF of Whole P
- Disable Edit Protect

**Display Project Time Summary**

**Use the the project time summary button or Tool->display project time summary on the main menu to see these summaries per science goal**

**Total and Calibration Times**

Science Goal	12-m Ext.		12-m Compact		12-m Ext. + Compact		ACA 7-m		ACA TP		Overall		Non-standard Mode
	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	
MSXiiiRA16a1	51.12 min	24.75 min	-	-	51.12 min	24.75 min	-	-	-	-	51.12 min	24.75 min	No
MSXiiiRA16a2	51.12 min	24.75 min	-	-	51.12 min	24.75 min	-	-	-	-	51.12 min	24.75 min	No
MSXiiiRA16a3	51.97 min	24.75 min	-	-	51.97 min	24.75 min	-	-	-	-	51.97 min	24.75 min	No
MSXiiiRA16a4	51.12 min	24.75 min	-	-	51.12 min	24.75 min	-	-	-	-	51.12 min	24.75 min	No
MSXiiiRA16b1	1.29 h	29.95 min	-	-	1.29 h	29.95 min	-	-	-	-	1.29 h	29.95 min	No
MSXiiiRA16b2	1.29 h	29.95 min	-	-	1.29 h	29.95 min	-	-	-	-	1.29 h	29.95 min	No
Overall	6.01 h	2.65 h	-	-	6.01 h	2.65 h	-	-	-	-	6.01 h	2.65 h	

Template library. Turn the keys on the JTr...

- Template library. Turn the keys on the
- Proposal
- Planned Observing
  - ScienceGoal (B3 spectral sv
  - ScienceGoal (B7 continuum
  - ScienceGoal (B7 CO(9-8): C
  - ScienceGoal (B9 continuum
  - ScienceGoal (B3 spectral sv
  - ScienceGoal (B3 continuum
  - ScienceGoal (B6 continuum
  - ScienceGoal (B7 continuum
  - ScienceGoal (B6 continuum
  - ScienceGoal (B3 continuum
  - ScienceGoal (B6 12CO (2-1
  - ScienceGoal (B6 13CO (2-1
  - ScienceGoal (B6 spectral lir
  - ScienceGoal (B9 spectral lir
  - ScienceGoal (B3 continuum
  - ScienceGoal (B6 continuum

**Data Volumes and Data Rates**

Science Goal	Data Volume			Data Rate		
	12-m	ACA 7-m	ACA TP	12-m	ACA 7-m	ACA TP
MSXiiiRA16a1	54.85 GB	-	-	18.31 MB/s	-	-
MSXiiiRA16a2	54.85 GB	-	-	18.31 MB/s	-	-
MSXiiiRA16a3	55.77 GB	-	-	18.31 MB/s	-	-
MSXiiiRA16a4	54.85 GB	-	-	18.31 MB/s	-	-
MSXiiiRA16b1	83.35 GB	-	-	18.31 MB/s	-	-
MSXiiiRA16b2	83.35 GB	-	-	18.31 MB/s	-	-
Overall	387.01 GB	-	-			

OK



## Total and Calibration Times

Science Goal	12-m (1)		12-m (2)		12-m (1+2)		ACA 7-m		ACA TP		Overall		Non-standard Mode
	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	
At ar 1"	1.03 d	6.21 h	9.92 h	2.48 h	1.45 d	8.70 h	-	-	-	-	1.45 d	8.70 h	No
Overall	1.03 d	6.21 h	9.92 h	2.48 h	1.45 d	8.70 h	-	-	-	-	1.45 d	8.70 h	

## Total and Calibration Times

Science Goal	12-m (1)		12-m (2)		12-m (1+2)		ACA 7-m		ACA TP		Overall		Non-standard Mode
	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	Tot.	Cal.	
At ar 3"	31.53 min	13.83 min	-	-	31.53 min	13.83 min	2.63 h	1.15 h	-	-	3.15 h	1.38 h	No
Overall	31.53 min	13.83 min	-	-	31.53 min	13.83 min	2.63 h	1.15 h	-	-	3.15 h	1.38 h	

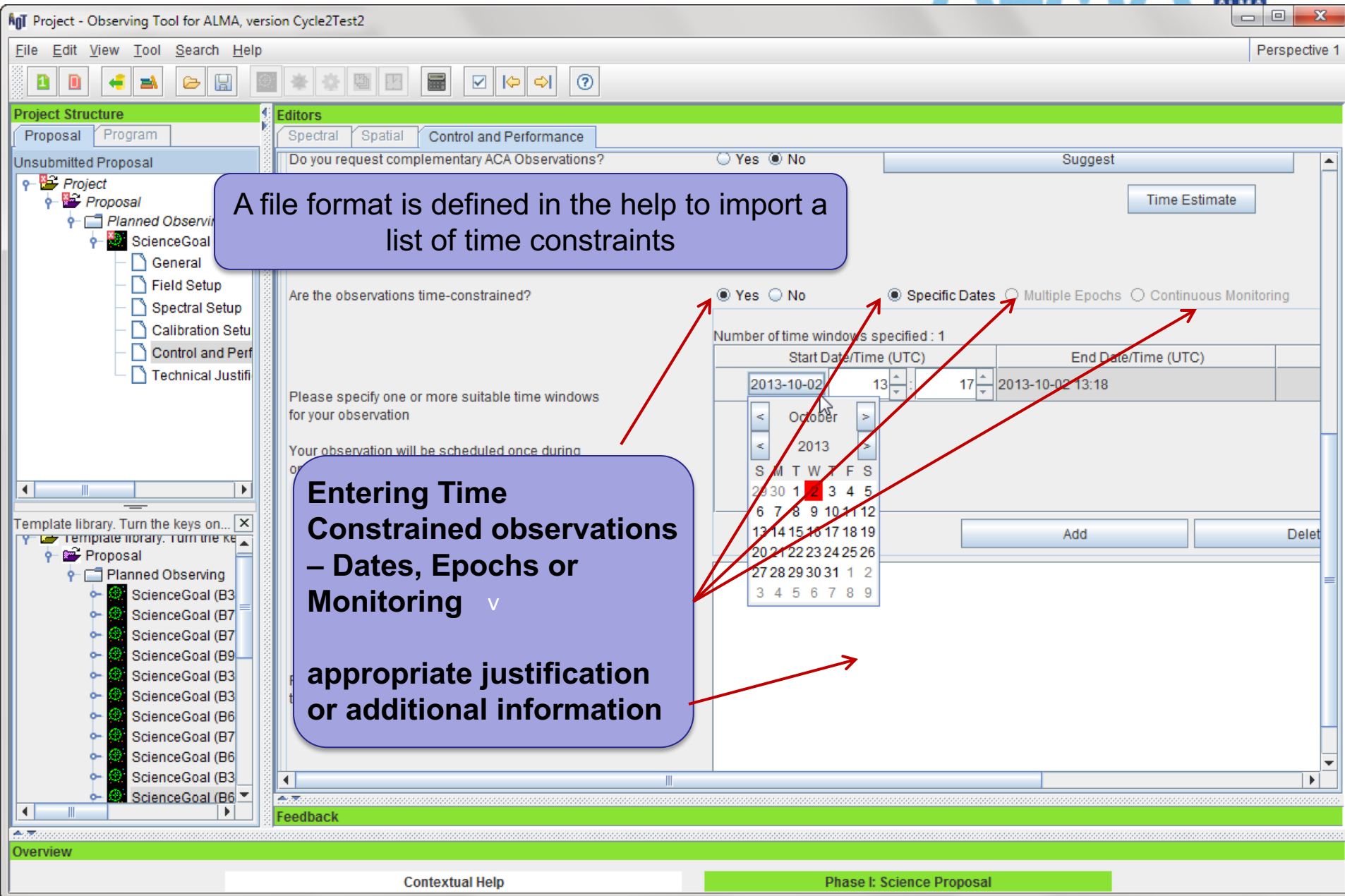
### Especially when using RANGE:

Rules are operating under the hood to choose among the possible configuration choices and they may be biased toward the low resolution end of a range because less 12m time is needed. *Variations in the range can cause disproportionately large differences in the required time.*

In the two cases only the upper end of a range changes, from 1" to 3"

Be careful that the OT is not making choices for you that you would not make for yourself. Before submitting with a range, narrow it and use the project time summary to examine the choices the OT is making

# Time constrained observing



**A file format is defined in the help to import a list of time constraints**

**Entering Time Constrained observations – Dates, Epochs or Monitoring**  
appropriate justification or additional information

Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure: Proposal, Program

Editors: Spectral, Spatial, Control and Performance

Unsubmitted Proposal

Project

Proposal

Planned Observing

ScienceGoal

General

Field Setup

Spectral Setup

Calibration Setup

Control and Performance

Technical Justification

Do you request complementary ACA Observations?  Yes  No

Suggest

Time Estimate

Are the observations time-constrained?  Yes  No

Specific Dates  Multiple Epochs  Continuous Monitoring

Number of time windows specified : 1

Start Date/Time (UTC)	End Date/Time (UTC)
2013-10-02 13:17	2013-10-02 13:18

Please specify one or more suitable time windows for your observation

Your observation will be scheduled once during

Template library. Turn the keys on...

Proposal

Planned Observing

- ScienceGoal (B3)
- ScienceGoal (B7)
- ScienceGoal (B7)
- ScienceGoal (B9)
- ScienceGoal (B3)
- ScienceGoal (B3)
- ScienceGoal (B6)
- ScienceGoal (B7)
- ScienceGoal (B6)
- ScienceGoal (B3)
- ScienceGoal (B6)

Feedback

Contextual Help Phase I: Science Proposal

The sensitivity calculator is available separately in the OT (or on the web)

ALMA Observing Tool (FEB2017) - Chameleon's Dark Neutral Matter (2016.1.00714.S last submitted 2016-08-30 10:29:11)

File Edit View Tools Search Menu or Button

ALMA LO Configuration Tool...

Project Structure

SubMITTED

Chameleon's Dark Neutral Matter

- Science Plan
  - ScienceGoal (Chameleon's dark neutral matter)
  - General
  - Field Setup
  - Spectral Setup
  - Calibration Setup
  - Control and Performance
  - Technical Justification
- SG OUS (Chameleon's dark neutral matter)
  - Group OUS
    - Member OUS (J1723-7713)
      - J1723-77\_a\_03\_TM1[1]
        - Group 1 : Calibrator
        - Group 2 : Science
          - 9 Targets
            - query Pointing Temperature
            - query Pointing Temperature
            - query Amplitude
            - query Phase (Phase)
            - query Bandpass
            - [R] [D2] J1723-7713
            - J1550-8258-40
            - J1617-7717-16
            - J1733-7935-11
  - Resources
    - 9 Field Sources
      - Pointing Temperature
      - Pointing Temperature
      - Amplitude query
      - Phase query
      - Bandpass query
      - Primary: J1723-7713
      - Primary: J1550-8258-40
      - Primary: J1617-7717-16
      - Primary: J1733-7935-11
  - 2 Instrument Setup
    - B3 Pointing Setup
    - HCN v=0 J=1-0

Sensitivity Calculator

These parameters are used

Control and Performance

Configuration Information

Antenna Beamsize ( 1.13 \* )

Number of Antennas

Water Vapour Column Density

Trx, tau, Tsky

Tsys

Common Parameters

Dec	00:00:00.000	
Polarization	Dual	
Observing Frequency	345.00000	GHz
Bandwidth per Polarization	7.50000	GHz
Water Vapour	<input checked="" type="radio"/> Automatic Choice <input type="radio"/> Manual Choice	
Column Density	0.913mm (3rd Octile)	
Trx, tau, Tsky	75 K, 0.158, 39.538 K	
Tsys	157.027 K	

Individual Parameters

	12m Array		7m Array		Total Power Array	
Number of Antennas	43		10		3	
Resolution	0.00000	arcsec	5.97455	arcsec	16.9	arcsec
Sensitivity (rms)	0.00000	ujy	0.00000	ujy	0.00000	ujy
(equivalent to)	Unknown	K	0.00000	K	0.00000	K
Integration Time	60.00000	s	60.00000	s	60.00000	s

Integration Time Unit Option Automatic

Sensitivity Unit Option Automatic

Calculate Integration Time Calculate Sensitivity Close

● A valid sensitivity must be entered in order to calculate an integration time.

# Tech Justification

ALMA Observing Tool (2014.6) - Observing Tool for ALMA Cycle3 Groundhog Day Test

File Edit View Tool Search Help Perspective 1

Project Structure

- Proposal
- Program
- Unsubmitted Proposal
- Observing Tool for ALMA Cycle3 Groundhog Day Test
- Proposal
- Planned Observing
- ScienceGoal (Science Goal)
- General
- Field Setup
- Spectral Setup
- Calibration Setup
- Control and Performance
- Technical Justification

Editors

Spectral Spatial Technical Justification

Enter a Technical Justification for this Science Goal, paying special attention to the parameters reproduced below.

**Sensitivity** [?]

Requested RMS over  is  For a peak flux density of , the achieved S/N is

Achieved RMS over the total  bandwidth is  For a continuum flux density of , the achieved S/N is

For a peak line flux of , the achieved S/N over 1/3 of the source line width (  / 3 =  ) is

Line width / bandwidth used for sensitivity  /  =

Dynamic Range:

Justify your requested RMS and resulting S/N for the spectral line and/or continuum observations.

For line observations also justify the bandwidth used for the sensitivity calculation.

Here would be the standard required justification of the sensitivity parameters

There are separate standard sections for Sensitivity, Imaging and Correlator and another may appear to allow you to justify some of the parameter choices you may have made

Each requires its own 50+ word justification

Each standard section comes with a summary of the requested input information to detail the different technical aspects of your program.

# Tech Justification



File Edit View Tool Search Help

Project Structure

- Proposal
- Program
- Unsubmitted Proposal
- Observing Tool for ALMA Cycle3 Ground
- Proposal
  - Planned Observing
    - ScienceGoal (Science Goal)
      - General
      - Field Setup
      - Spectral Setup
      - Calibration Setup
      - Control and Performance
      - Technical Justification

Editors

Spectral Spatial Technical Justification

Imaging

Requested angular resolution : 1.10 arcsec

Requested largest angular scale : 1.00 arcsec

Justify the chosen angular resolution and largest angular scale for the source(s) in this Science Goal

Here would be the standard required justification of the imaging parameters

ACA is not recommended but is selected.  
Justify over-riding of the OT recommendation for the ACA

Exceptions to standard practice require separate justification. Here, the OT notes that the ACA is selected even though the OT thinks it is unneeded.

Correlator configuration

line width / representative spectral window resolution: 30.00 km/s / 731.92 m/s = 40.99

Representative spectral window width : 702.64 km/s

Justify your correlator set-up with particular reference to the number of spectral resolution elements per line width.  
You may want to consider spectral averaging to lower the data rate

Here would be the regular required correlator justification

# When the time is ripe ... validate & submit

Project - Observing Tool for ALMA, version Cycle2Test2

Note the spiffy new icons!

Editors: Spectral, Spatial, Project

Feedback: Validation, Validation History, Log

Project fields: Project, Assigned Priority, Project Code (None Assigned)

Validation History table:

Description	Suggestion

**Click here to make sure that your project can be validated by the OT. If it doesn't validate the archive will reject it.**

Menu items: New Proposal, New DDT Proposal, Open Project, Open Project as New Proposal, Save, Save As..., Show ALMA Template Library, Use Project as Template, **Validate**, Submit Project, Preferences, Save Preferences, Quit

Overview

**Contextual Help**

1. Please ensure you and your co-Is are registered with the [ALMA Science Portal](#)
2. Create a new proposal by either:
  - Selecting *File > New Proposal*
  - Clicking on the **1** icon in the toolbar
  - Or clicking on this [link](#)
3. Click on the **proposal** tree node and complete the relevant fields.

**Phase I: Science Proposal**

New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

Click on the overview steps to view the contextual help

Importing And Exporting | Template Library | Need More Help? | View Phase 2 Steps

File Edit View Tool Search Help



## Project Structure

Proposal Program

Unsubmitted Proposal

- Observing Tool for ALMA Cycle3 Groundhog Day Test
  - Proposal
    - Planned Observing
      - ScienceGoal (Science Goal)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

## Editors

Spectral Spatial ScienceGoal (Science Goal)

System J2000  Sexagesimal display?

Parallax 0.00000 mas

Source Coordinates RA 22:02:43.2912 PM RA 0.00000 mas/yr

Dec -42:16:39.978 PM DEC 0.00000 mas/yr

Source Radial Velocity 0.000 km/s hel z 0.000000000 Doppler Type RELATIVISTIC

Target Type  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Beam 0.00000 Jy

Continuum Polarization Percentage 0.0 %

Peak Line Flux Density per Beam 0.00000 Jy

Line Width 0.00000 km/s

Line Polarization Percentage 0.0 %

Field Center Coordinates

Offset

arcsec

1

RA [arcsec]	Dec [arcsec]
0.00000	0.00000

Clicking on a validation error usually takes you to the problem directly

Template library. Turn the keys on the J...

Template library. Turn the keys on the J...

- Proposal
  - Planned Observing
    - ScienceGoal (B3 spectral)
    - ScienceGoal (B7 continuum)
    - ScienceGoal (B7 CO(9-8))
    - ScienceGoal (B9 continuum)
    - ScienceGoal (B3 spectral)
    - ScienceGoal (B3 continuum)
    - ScienceGoal (B6 continuum)
    - ScienceGoal (B7 continuum)
    - ScienceGoal (B6 continuum)
    - ScienceGoal (B3 continuum)
    - ScienceGoal (B6 12CO (2-1))
    - ScienceGoal (B6 13CO (2-1))
    - ScienceGoal (B6 spectral)
    - ScienceGoal (B9 spectral)
    - ScienceGoal (B3 continuum)
    - ScienceGoal (B6 continuum)

## Feedback

Validation Validation History Log

9 errors, 0 warnings

Description	Suggestion
<input checked="" type="checkbox"/> No Principal Investigator specified	Select the top level Project node in the tree and fill in the Principal Investigator field
<input checked="" type="checkbox"/> No scientific category defined	Select Proposal node and set a scientific category
<input checked="" type="checkbox"/> No document found - you must add a Science Case to your proposal	Select the proposal node in the Proposal tab and add your document
<input checked="" type="checkbox"/> Must select a minimum of 1 science keywords	Select the Proposal node and then add some science keywords (minimum 1)
<input checked="" type="checkbox"/> Expected peak continuum flux is required for a single continuum	Select the Target Parameters (anti-bllac) in the Science Goal and enter a valid value
<input checked="" type="checkbox"/> Either a continuum or a line polarization percentage is required for	Select the Target Parameters (anti-bllac) in the Science Goal and enter a valid value

# When the time is ripe ... validate & submit

Project - Observing Tool for ALMA, version Cycle2Test2

Note the spiffy new icons!

Perspective 1

Editors

Spectral Spatial Project

Principal Investigator

Select PI...

Main Project Information

Project Assigned Priority Project Code None Assigned

Feedback

Suggestion

When you are satisfied that your proposal is complete, click here to submit your proposal to the archive

Overview

Contextual Help

1. Please ensure you and your co-Is are registered with the [ALMA Science Portal](#)
2. Create a new proposal by either:
  - Selecting *File > New Proposal*
  - Clicking on the **1** icon in the toolbar
  - Or clicking on this [link](#)
3. Click on the **proposal** tree node and complete the relevant fields.

Phase I: Science Proposal

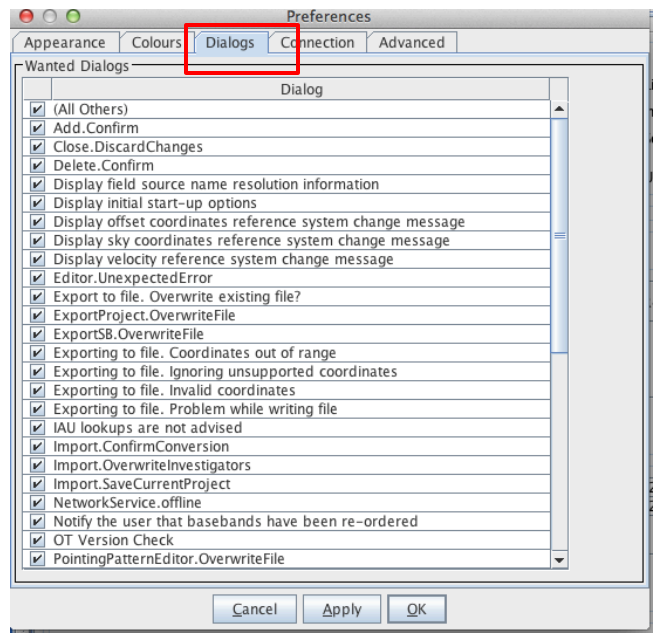
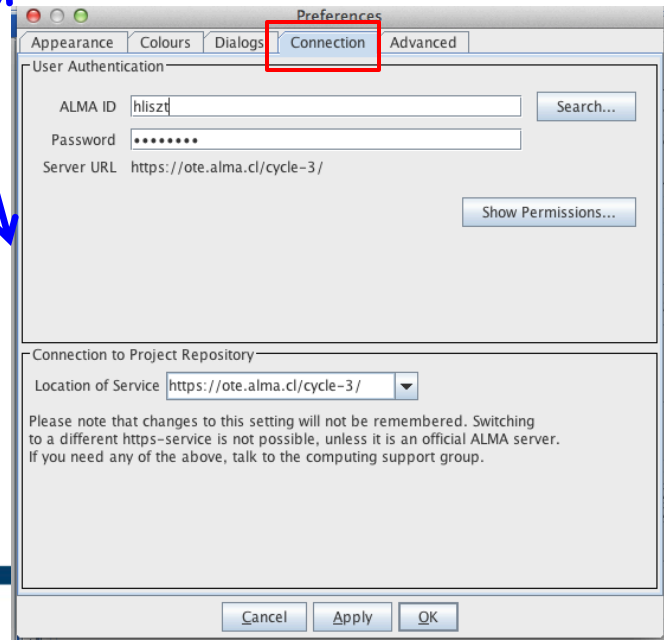
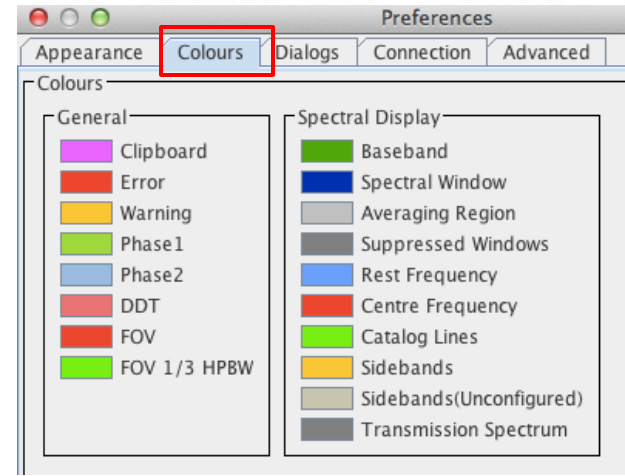
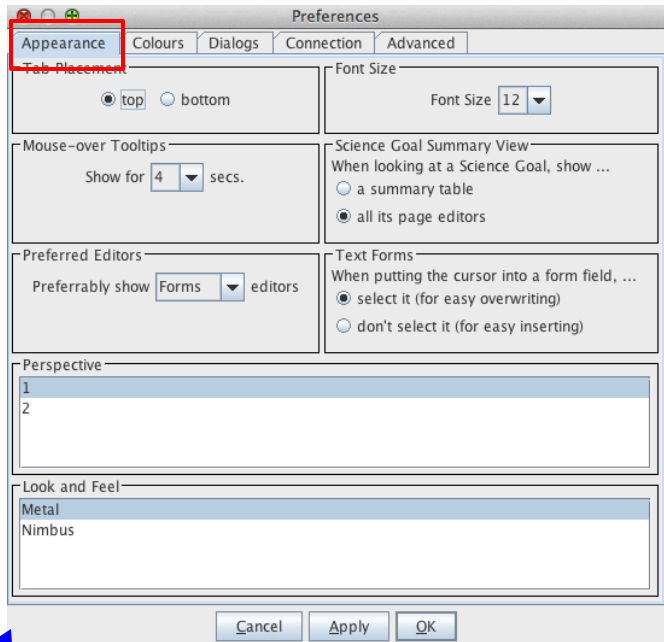
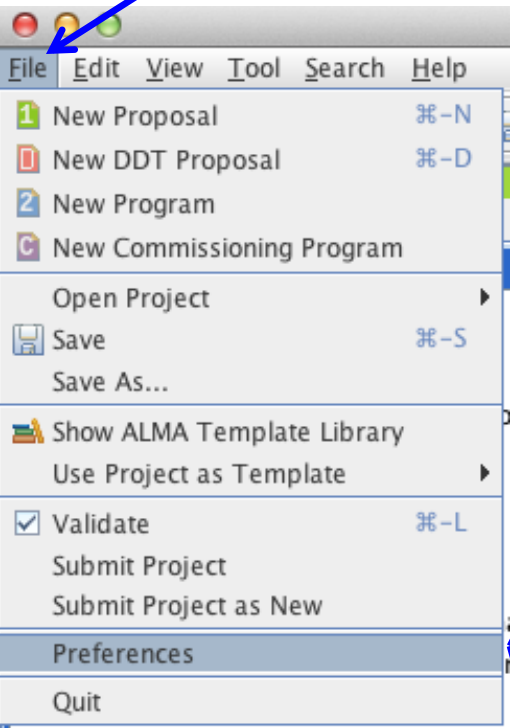
New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

Click on the overview steps to view the contextual help

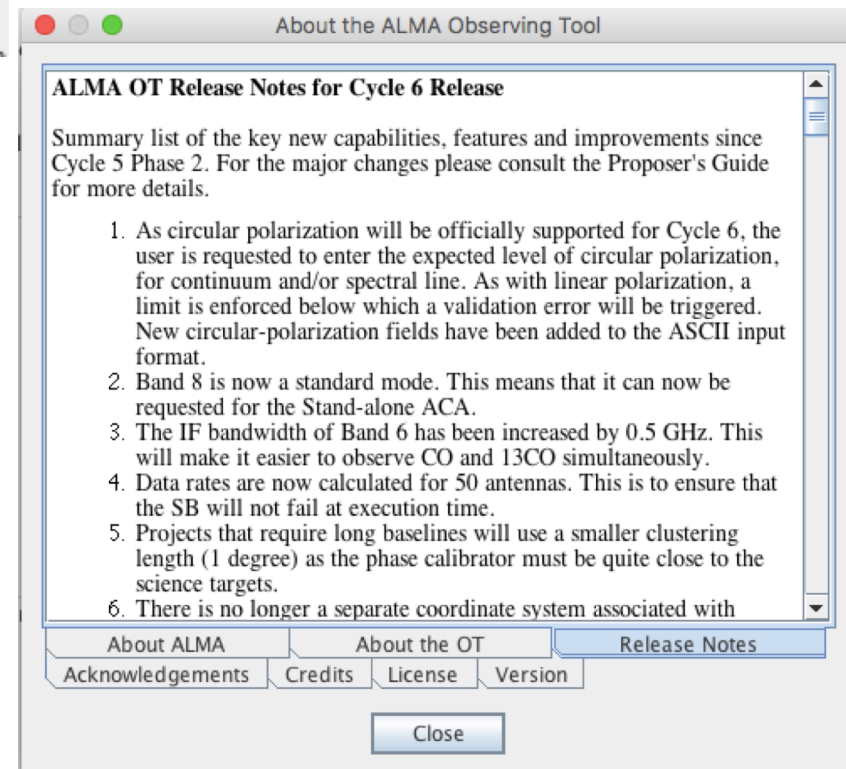
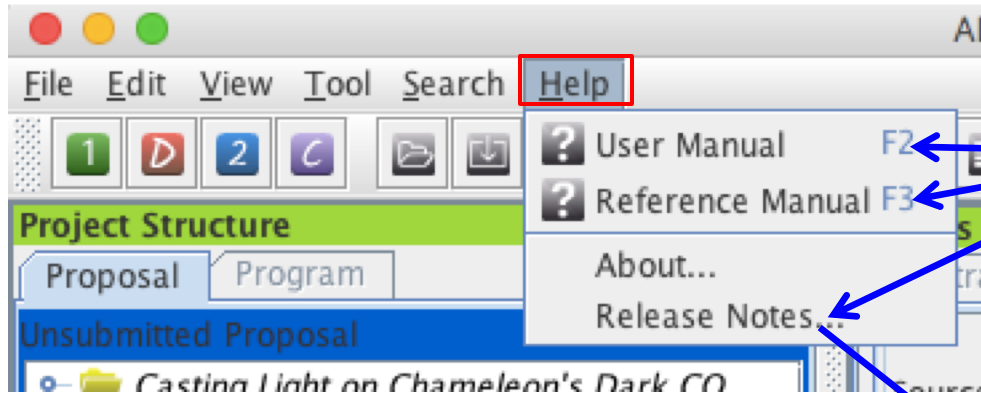
Importing And Exporting Template Library Need More Help? View Phase 2 Steps

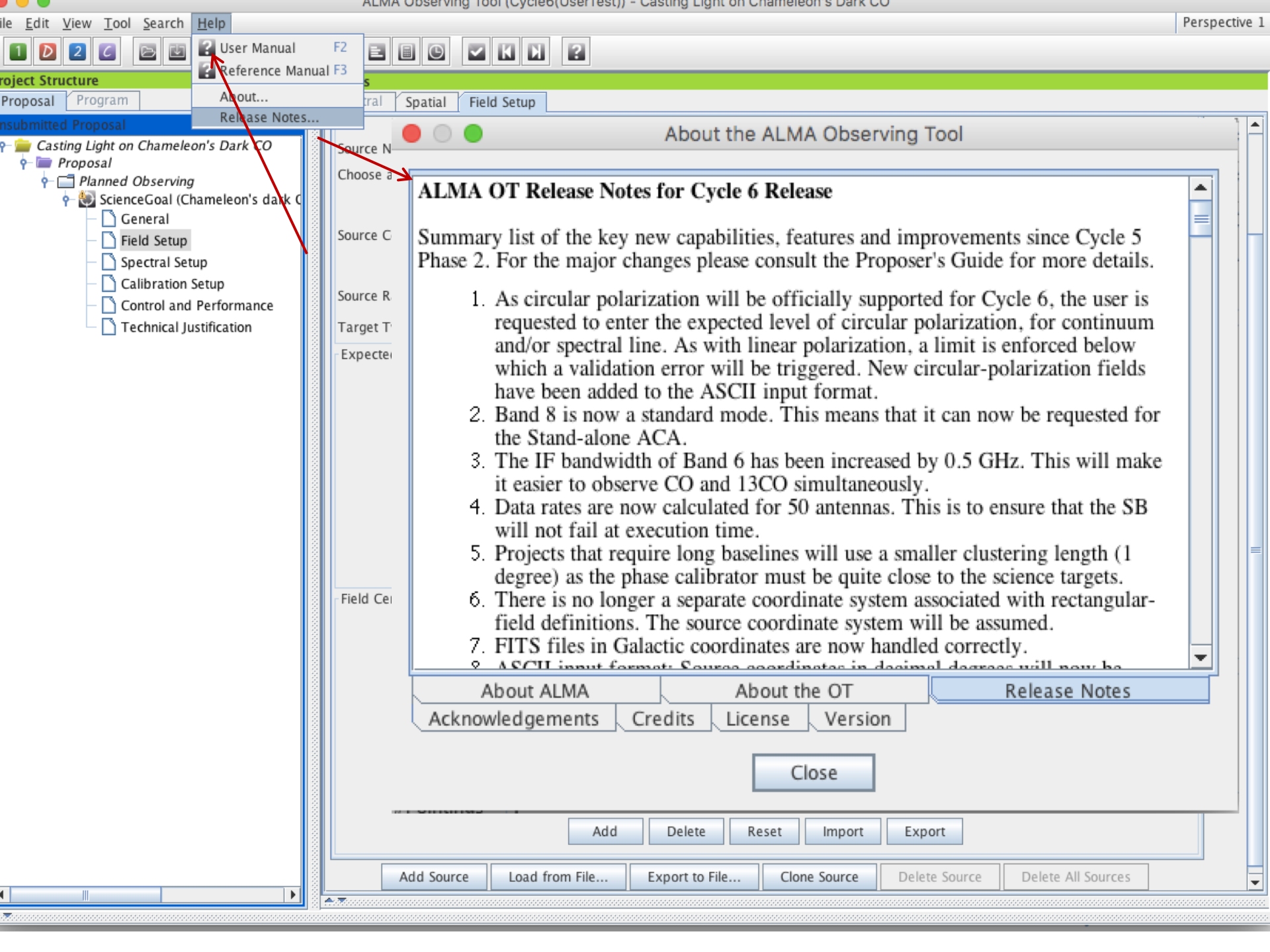


# Use preferences to customize



# Don't be afraid to ask for directions





- The same cut and paste commands you use outside the OT for text also work inside it since Cycle 5
- Ctrl-Z global shortcut will expand out all succeeding items in the J-tree (try it, you'll see what we mean)
- Holding down ALT when making choices in dropdown lists will convert to the unit or type of the new choice
  - Otherwise, only the description changes, not value
- OT does galactic-celestial conversion automatically
  - Cannot convert in other ways, eg not FK5 J2000 to ICRS. FK5 J2000 now deprecated

- **NEW** In the J-tree: Holding down the alt key in combination with the up/down arrows will move from a node in one SG to the same node in the adjacent SG (try it when you have more than one SG)



Observatory News

Announcement of 3mm VLBI in Cycle 7  
Jan 07, 2019

ALMA Cycle 7 Pre-Announcement  
Dec 19, 2018

Job Opening: Head of ALMA Department of Science Operations  
Dec 05, 2018

More...

NRAO News

Multi-Messenger Astrophysics: Insights from Combining Gravity and Radio Waves  
Feb 16, 2019

ALMA Data Reduction Party  
Mar 13, 2019

New Horizons in Planetary Systems  
May 13, 2019

More...

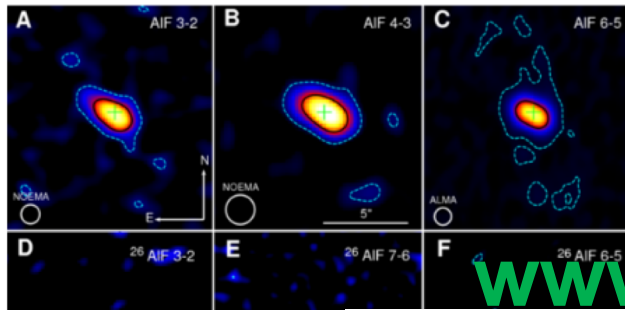
Status

Configuration Schedule  
Cycle 6 Highest Priority Projects

Refereed publications: 1309  
Last observed source:  
Northeast\_Section\_of\_NGC6334  
Current configuration: C43-1

More...

Science Highlights - An ALMA Detection of the Radioactive Molecule <sup>26</sup>AlF in a Stellar Merger Remnant.



Although diffuse Galactic gamma-ray emission from the isotope of aluminum, <sup>26</sup>Al, was first detected in the 1980s, the identification of the source of emission has been hard to pinpoint due to the poor spatial resolution of gamma-ray observations. In a recent [Nature paper](#), a team led by Dr. Kaminski has made use of sensitive, high-resolution observations with Band 6 and the newly commissioned Band 5 on ALMA, as well as observations with NOEMA, to detect millimeter-wave emission from an isotopologue of aluminum monofluoride (<sup>26</sup>AlF) towards the stellar merger remnant CK Vul (aka Nova 1670; see Figure). These observations have provided information about the nature of one of the stars in the merger. I.e., in the case of CK Vul, the <sup>26</sup>Al is likely produced within a star with an initial stellar mass in the range of 0.8-2.5 M<sub>sun</sub> that has already formed, condensed and degenerated. During the merger, the <sup>26</sup>Al from the outer layers of the helium core are ejected. The authors propose that, since there is significant amount of <sup>26</sup>Al in atomic phase, in molecules other than <sup>26</sup>AlF, and in solids.

[www.almascience.org](http://www.almascience.org)

ALMA Science Portal @ NRAO



# I could use a hand...

# ALMA

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- News
- TOO
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TOO



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*We've got nothing to display here*



**For more info:**  
<https://almascience.nrao.edu/>

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership of Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere (ESO), in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC) and the National Science Council of Taiwan (NSC), and in East Asia by the National Institutes of Natural Sciences (NINS) of Japan in cooperation with the Academia Sinica (AS) in Taiwan. ALMA construction and operations are led on behalf of Europe by ESO, on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI), and on behalf of East Asia by the National Astronomical Observatory of Japan (NAOJ). The Joint ALMA Observatory (JAO) provides the unified leadership and management of the construction and operation of ALMA.