

# ALMA Observing Tool hands on session

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



Veronica Allen

Author: Harvey Liszt

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



# ALMA Cycle 8 Planning

<https://almascience.nrao.edu/news/cycle-8-pre-announcement>

19 December 2019	Cycle 8 pre-announcement
17 March 2020	Release of the ALMA Cycle 8 Call for Proposals and Observing Tool, and opening of archive for proposal submission
15 April 2020	Proposal submission deadline <b>Now no earlier than 19 May 2020</b>
End of July 2020	Results of the proposal review sent to proposers
9 September 2020	Deadline for phase 2 submission by PIs or designees
15 September 2020	Release of ACA Supplemental Call for Proposals
30 September 2020	End of Cycle 7 observations
1 October 2020	Start of Cycle 8 observations
8 October 2020	Supplemental Call deadline

# Configurations

- The configuration schedule strongly influences when an object will be observed
- Some combinations of object LST + desired angular resolution may not allow night observing

Start date	Configuration	Longest baseline	LST for best observing conditions
2020 October 1	C-8	8.5 km	~ 22—10 h
2020 October 20	C-7	3.6 km	~ 23—11 h
2020 November 10	C-6	2.5 km	~ 1—13 h
2020 December 1	C-5	1.4 km	~ 2—14 h
2020 December 20	C-4	0.78 km	~ 4—15 h
2021 January 10	C-3	0.50 km	~ 5—17 h
2021 February 1	No observations due to maintenance		
2021 March 1	C-1	0.16 km	~ 8—21 h
2021 March 26	C-2	0.31 km	~ 9—23 h
2021 April 20	C-3	0.50 km	~ 11—0 h
2021 May 10	C-4	0.78 km	~ 12—2 h
2021 May 31	C-5	1.4 km	~ 13—4 h
2021 June 23	C-6	2.5 km	~ 15—6 h
2021 July 28	C-5	1.4 km	~ 17—7 h
2021 August 18	C-4	0.78 km	~ 19—8 h
2021 September 10	C-3	0.50 km	~ 20—9 h

## Cycle 8 Capabilities - I

- **Antennas:** At least 43 antennas in the 12-m Array, ten 7-m antennas (for short baselines) and three 12-m antennas (for single dish spectral line mapping) in the ACA
- **Receiver bands:** 3, 4, 5, 6, 7, 8, 9, 10
  - (wavelengths 3.1, 2.1, 1.5, 1.3, 0.87, 0.74, 0.44, 0.35 mm)
- **Baselines:**
  - **Long baseline configurations 9,10 will not be visited!**
  - Max baselines 3.7 km (Bands 8–10), 8.5 km for (Bands 3–7)
- **Spectral line, continuum, and mosaic observations:**
  - Spectral line and continuum observations with the 12-m and 7-m Arrays in all bands
  - Single field interferometry (all bands) and mosaics (Bands 3 – 9) with both the 12-m and 7-m arrays
    - Single dish (total power) spectral line in Bands 3 – 8



## Cycle 8 Capabilities - II

- **Polarization**

- Single pointing, on-axis, full linear or circular polarization for continuum and full spectral resolution observations in Bands 3–7 on the 12-m Array
- Linear polarization on-axis imaging in continuum and full spectral resolution modes at the level of 0.1% (3 sigma) fractional polarization with the very brightest calibrators, and 0.2% (3 sigma) level for a typical observation
- Minimum detectable degree of circular polarization 1.8% of the peak flux for continuum and full spectral resolution spectral line observing
- Mosaicking of continuum linear polarization observations in Bands 3 to 7 **NEW!**

## New for Cycle 8 - I:

In Cycle 8, the following opportunities will be available to Proposers for the first time:

- Solar observations in Band 5
- VLBI observations of faint science targets (correlated flux density  $< 500$  mJy within an unresolved core on ALMA) on ALMA baselines up to 1 km.
  - In “passive phasing” mode, with a known bright phase calibrator within  $5^\circ$
- HF Band 9 and 10 observing with the standalone 7-m Array
- Mosaicking of linear polarization continuum in Bands 3 to 7
- Spectral scans with the 7-m array including standalone ACA
- No observing mode is described as “non-standard”

# New for Cycle 8 - II:

- The whole-proposal .pdf and printable summary generated by the OT will not show PI or co-I names



## Casting Light on Chameleon's Dark CO

### ABSTRACT

In Cycle 4 proposal 2016.1.00714.S we searched for HCO<sup>+</sup> absorption against 13 QSO-phase calibrators seen toward the Chameleon cloud complex, where the H I - H<sub>2</sub> transition has been extensively studied in H I, CO, dust optical depth, extinction, and gamma-ray emission. The results were delivered in 2017 March. Although CO emission is seen in one or two directions, HCO<sup>+</sup> absorption was present in all directions but one where the QSO flux was very low. Here we propose to observe 2.6mm <sup>12</sup>CO absorption along six of the Chameleon sightlines (two clusters of three sources), to determine whether the CO is dark due to low CO column density or low number density and weak rotational excitation. The 5sigma upper limits on N(CO) derived from this work will be 10 times below those that would be inferred from the upper limits on CO emission alone.

<b>SCIENCE CATEGORY:</b>	ISM, star formation and astrochemistry				
<b>ESTIMATED 12-M TIME:</b>	2.0 h	<b>ESTIMATED 7-M TIME:</b>	0.0 h	<b>ESTIMATED TP TIME:</b>	0.0 h
<b>DUPLICATE OBSERVATION JUSTIFICATION:</b>					

### REPRESENTATIVE SCIENCE GOALS (UP TO FIRST 30)

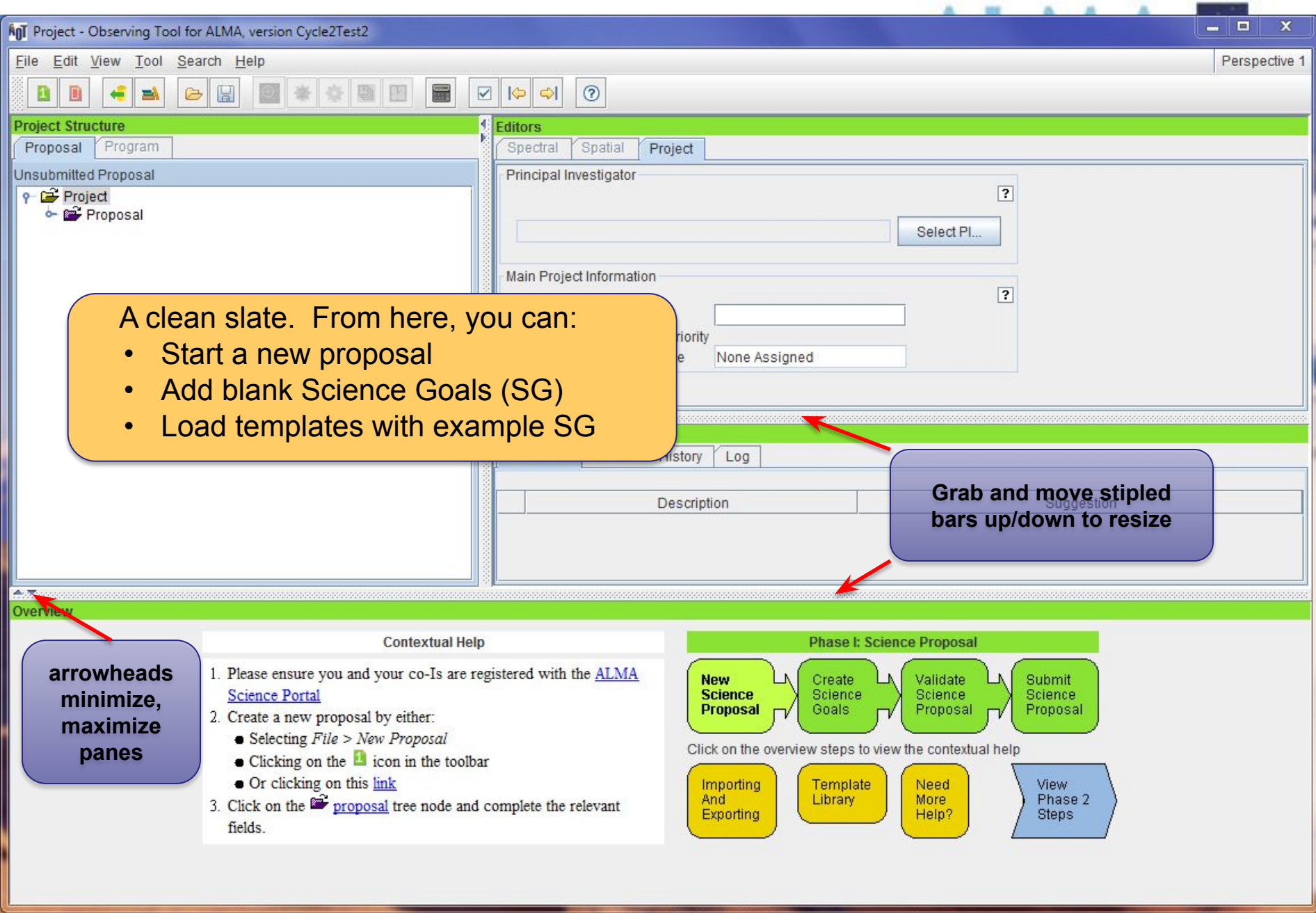
SCIENCE GOAL	POSITION	BAND	ANG.RES.(")	LAS.(")	ACA?
Chameleon's dark CO viewed in 2.6 mm J=1-0 absorption cluster 1	ICRS 11:36:02.0970, -68:27:05.810	3	1.600 - 0.100	0.000	N
Chameleon's dark CO viewed in 2.6 mm J=1-0 absorption cluster 2	ICRS 09:42:42.7520, -77:31:11.840	3	1.600 - 0.100	0.000	N
Total # Science Goals : 2					

<b>SCHEDULING TIME CONSTRAINTS</b>	NONE	<b>TIME ESTIMATES OVERRIDDEN ?</b>	No
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## **New for Cycle 8 - NOTE:**

The 150-hour limit for Standalone ACA Large Programs has been changed such that it now only applies to the 7-m time i.e. the TP time is not counted.







A clean slate. From here, you can:

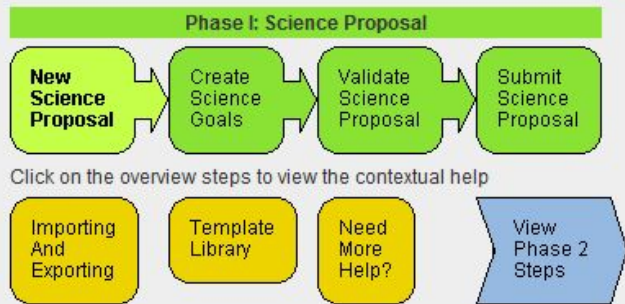
- Start a new proposal
- Add blank Science Goals (SG)
- Load templates with example SG

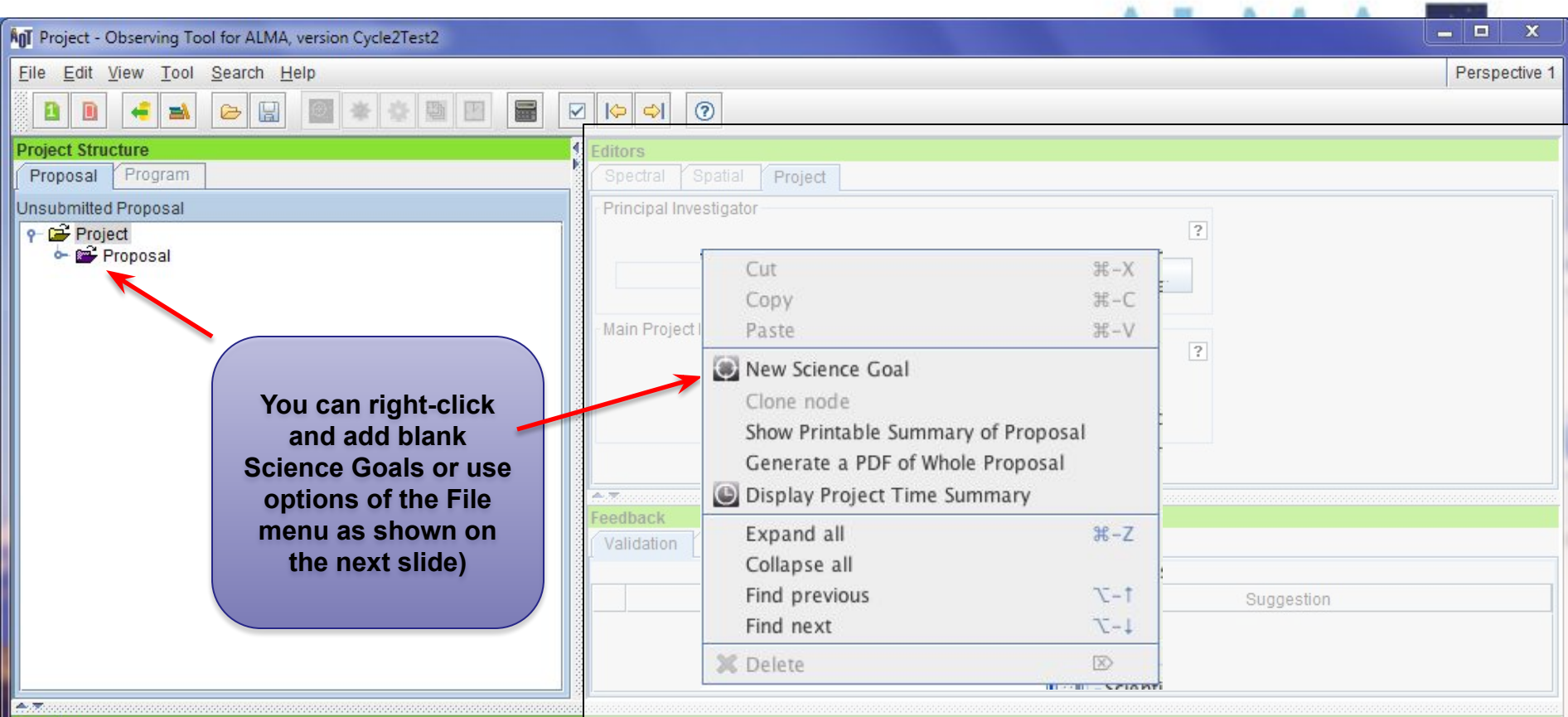
Grab and move stiped bars up/down to resize

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.





You can right-click and add blank Science Goals or use options of the File menu as shown on the next slide)

### 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

[New Science Proposal](#) → [Create Science Goals](#) → [Validate Science Proposal](#) → [Submit Science Proposal](#)

[Importing And Exporting](#)   [Template Library](#)   [Need More Help?](#)   [View Phase 2 Steps](#)



## Project Structure

Proposal Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing

^ v ?

Anticenter Dark Neutral Matter (read-only)

- Anticenter Dark Neutral Matter
  - Proposal
    - Planned Observing
      - ScienceGoal (34 Sources-Dark neutral matter)

- Planned Observing
  - ScienceGoal (34 Sources-Dark neutral matter)
    - General
    - Field Setup
    - Spectral Setup
    - Calibration
    - Control and Monitoring
    - Technical Information

- Cut ⌘-X
- Copy ⌘-C
- Paste ⌘-V
- Clone node
- Show Printable Summary of ScienceGoal
- Generate a PDF of Whole Proposal
- Display Project Time Summary
- Expand all ⌘-Z
- Collapse all
- Find previous ⌘-↑
- Find next ⌘-↓
- Delete ⌘-X

## Editors

Spectral Spatial ScienceGoal (34 Sources-Dark neutral matter in absorption in the Galactic anti-centre )

General (Optional)

Science Goal Name 34 Sources-Dark neutral matter in absorption in the Galactic anti-centre

Narrowband 88 - 98 GHz molecular absorption from gas at the H I → H<sub>2</sub> transition in Galactic anti-center cloud complexes, seen against background point-like QSO; and one broad spectral window for phase cal.

Description

This science goal in the template can be copied whole into new Planned Observing or a sub-node could be copied into a science goal

0211+1051i-547-0.14	aj0510+1800-2990-0.33
029+2756-195-0.20	aj0356+2903-151-0.21
09+1352-413-0.09	aj0213+1820-161-0.13
0+1437i-326-0.68	J0449+1121i-887-0.50
1+1731i-213-0.46	J0433+0521i-2178-0.30
28 J0407+0742i-990-0.26	J0426+0518i-372-0.29
57+2319i-160-0.18	J0400+0550i-217-0.27
21 J0329+3510i-254-0.27	J0334+0800i-331-0.39

J0211+1051i-547-0.14

Resolve

System Object? 

Name of object Unspecified

System ICRS Sexagesimal display? 

Parallax 0.00000 mas

RA 02:11:13.1770

PM RA 0.00000 mas/yr

Dec 10:51:34.799

PM DEC 0.00000 mas/yr

Velocity 0.000 km/s lsrk z 0.000000000 Doppler Type RADIO

 Individual Pointing(s)  1 Rectangular Field

Properties





**Project Structure**

Proposal Program

Unsubmitted Proposal

- Project
- Proposal

**Editors**

Spectral Spatial ScienceGoal (B6 12CO (2-1): NGC3256 mosaic)

General (Optional)

Science Goal Name B6 12CO (2-1): NGC3256 mosaic

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

Description

Launch Editor

NGC3256

Source

Source Name NGC3256

Choose a Solar System Object?

Name of object Unspecified

Sexagesimal Right Ascension 000000

Suggestion

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

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

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





Project Structure

- 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**

# Hands-on Tutorial

## Two practice scenarios

**Milky Way:** Line detection for chemical characterization in Orion KL

Background: The chemical composition of gas surrounding young stars gives some indication of physical conditions. Additionally, the deuterium fraction of a system can be used to determine the age of that system. We will use ALMA to detect multiple lines of  $\text{CH}_3\text{CN}$  and  $\text{CH}_3\text{OH}$  to determine the properties of this region and better understand star formation.

**Extragalactic:** Continuum and CO mapping of NGC 4797

Background: Minor mergers are an important process in galaxy evolution. Whilst major mergers often enhance star formation, minor mergers have been shown to suppress star-formation (Davis et al. 2015). We will use ALMA to determine the underlying physical cause of this intriguing effect.



# Scenario I: ISM & Astrochemistry

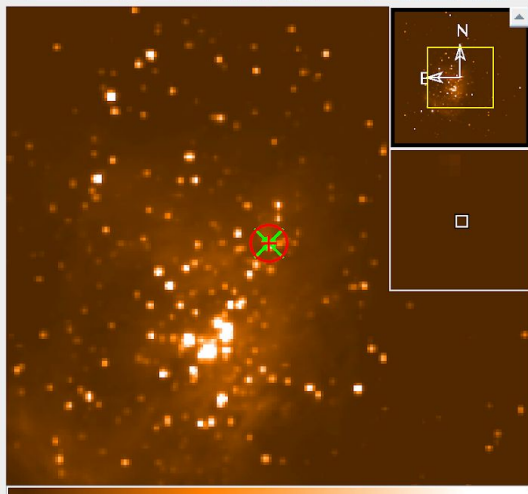
- Science goal: determine the chemical composition and deuterium fraction of star-forming region Orion KL.
- Method: high-resolution mapping of the area to trace variations in composition and D/H for  $\text{CH}_3\text{CN}$  and  $\text{CH}_3\text{OH}$



## Field Setup

- Orion KL is a common object, so press Resolve to input the coordinates. Always check that these are accurate for your object.
- Display your source and the field of view using Image Query
  - For Orion KL, 2MASS works well
- Continuum flux density estimated from SED or existing continuum observations
- Line flux for the weakest line you aim to detect – spectral modeling helps in estimating this

Spatial Image



2x 104.5, 277.5 311.6013  
05:35:23.385, -05:20:09.72 (J2000)  
Image Filename en/.jsky3/cache/jsky219782974819604364.fits

FOV Parameters

Representative Frequency (Sky) 275.715 GHz  
Antenna Diameter  12m  7m  
Antenna Beamsize (HPBW) 21.119 arcsec  
Show Antenna Beamsize

Image Query

Image Server 2MASS-H via SkyView @ NASA/GSFC  
Image Size(arcmin) 10.0 Query

Orion kl

Source

Source Name Orion kl Resolve  
Choose a Solar System Object?  Name of object Unspecified  
System ICRS Sexagesimal display?  Parallax 0.00000 mas  
Source Coordinates RA 05:35:14.1600 PM RA 0.00000 mas/yr  
Dec -05:22:21.504 PM DEC 0.00000 mas/yr  
Source Radial Velocity 5.000 km/s Isrk z 0.000016678 Doppler Type RADIO  
Target Type  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam 300.00000 mJy  
Continuum Linear Polarization 0.0 per cent  
Continuum Circular Polarization 0.0 per cent  
Peak Line Flux Density per Synthesized Beam 0.10000 Jy  
Line Width 5.00000 km/s  
Line Linear Polarization 0.0 per cent  
Line Circular Polarization 0.0 per cent

Field Center Coordinates

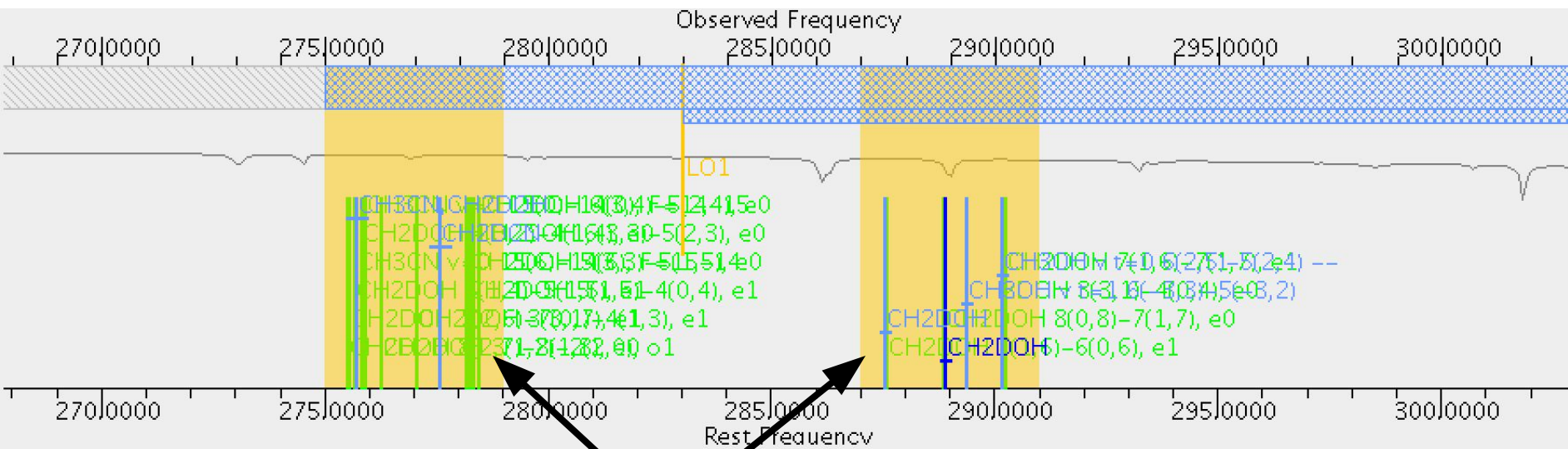
Coord Type  Relative  Absolute  
Offset Unit arcsec  
#Pointings 1  
Table with columns RA [arcsec] and Dec [arcsec], containing values 0.00000 and 0.00000.

Add Delete Reset Import Export

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

# Spectral setup

- Our main science goal involves detecting multiple transitions of  $\text{CH}_3\text{CN}$ ,  $\text{CH}_2\text{DCN}$ ,  $\text{CH}_3\text{OH}$ , and  $\text{CH}_2\text{DOH}$  so the spectral windows are set accordingly.
- Use “Select Lines to Overlay” to set spectral windows covering multiple lines.
- There are 2 basebands per side band but you can subdivide them into as many as 4 spectral windows each

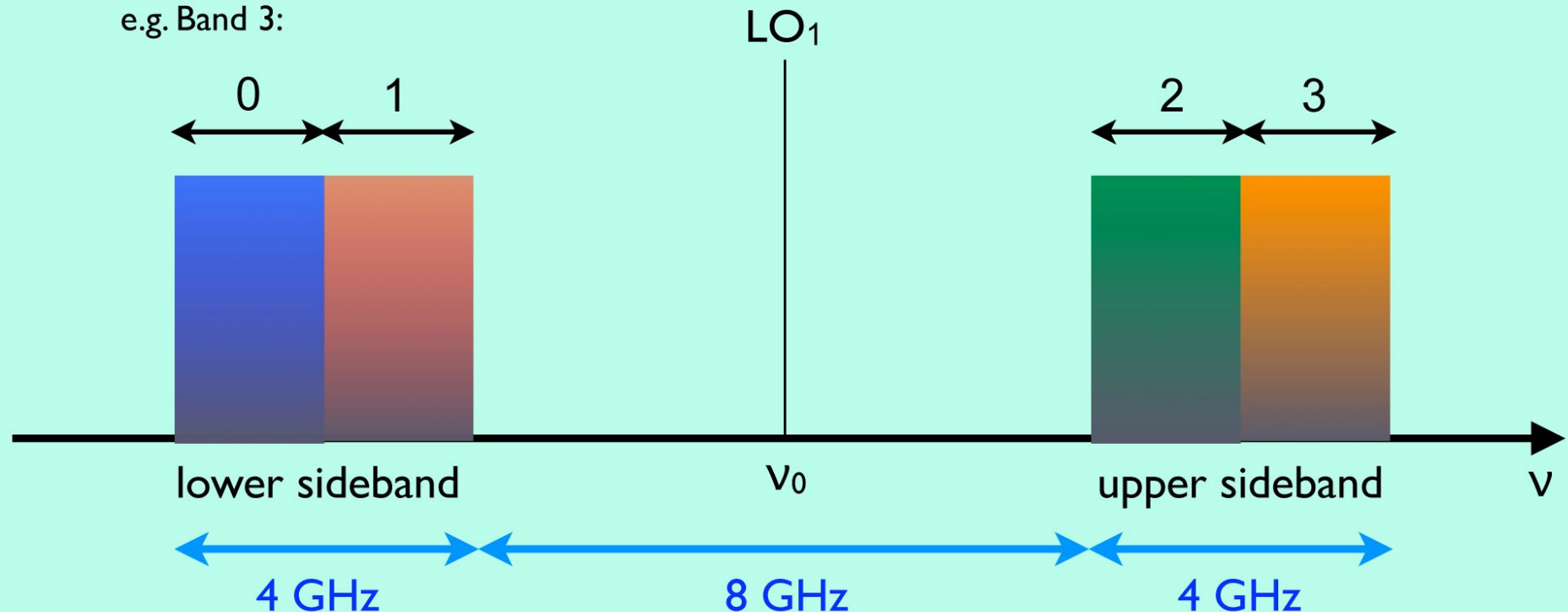




# Correlator

- Your spectral windows are organized into basebands which are set to be 4 GHz wide at  $\pm 4$  GHz from the Local Oscillator frequency. This is mostly automatic in the OT but you can move the LO.

e.g. Band 3:



## Dividing basebands

- The single spectral window used for CH<sub>3</sub>OH does not cover the higher energy lines so we need another smaller spectral window
- Add a spectral window centered on the CH<sub>3</sub>OH v=1 transition at 289.399655 GHz
- Select a correlator mode to match the others and ensure that the other spectral window in this baseband is 1/2
- How wide are the spectral windows now?

## Spectral Line



### Baseband-1

Fraction	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Representative Window
1(Full)	275.72000 GHz	275.69880 GHz	CH3CN,CH2DOH	468.750 MHz( 510 km/s), 282.227 kHz( 0.307 km/s)	2	

Add spectral window centred on a spectral line

Add spectral window manually

Delete

Show image spectral windows

### Baseband-2

1(Full)	277.60000 GHz	277.57866 GHz	CH2DCN	468.750 MHz( 506 km/s), 282.227 kHz( 0.305 km/s)	2	
---------	---------------	---------------	--------	--	---	--

Add spectral window centred on a spectral line

Add spectral window manually

Delete

Show image spectral windows

### Baseband-3

1/2	289.39966 GHz	289.37741 GHz	CH3OH v t=1 ...	234.375 MHz( 243 km/s), 282.227 kHz( 0.292 km/s)	2	
1/2	290.18469 GHz	290.16238 GHz	CH3OH v t=0 ...	234.375 MHz( 242 km/s), 282.227 kHz( 0.292 km/s)	2	

Add spectral window centred on a spectral line

Add spectral window manually

Delete

Show image spectral windows

### Baseband-4

1/2	288.92000 GHz	288.89779 GHz	CH2DOH	234.375 MHz( 243 km/s), 282.227 kHz( 0.293 km/s)	2	
1/2	287.56000 GHz	287.53789 GHz	CH2DOH	234.375 MHz( 244 km/s), 282.227 kHz( 0.294 km/s)	2	

Add spectral window centred on a spectral line

Add spectral window manually

Delete

Show image spectral windows

# Control and Performance

- Setting the desired angular resolution and largest angular structure automatically decides the needed configurations
- Desired sensitivity should give you at least a 3-sigma detection of the line flux density in Field setup
- Our setup includes a full array and an ACA configuration
- An ACA configuration adds  $\sim 4x$  the 12m-array time

## 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.	
Science Goal	1.04 h	23.63 min	-	-	1.04 h	23.63 min	4.85 h	1.84 h	-	-	5.89 h	2.23 h	No
Overall	1.04 h	23.63 min	-	-	1.04 h	23.63 min	4.85 h	1.84 h	-	-	5.89 h	2.23 h	

# Don't be greedy

- If you ask for high spatial resolution, crazy sensitivity, and multiple configurations, your observation will last hundreds of years...

patial Control and Performance

eters are used to control various aspects of the observations, including the required antenna configurations and integration time

Performance

n Information

msize ( $1.13 * \lambda / D$ )

ntennas

eline ( $L_{max}$ )

beamsize ( $\lambda / L_{max}$ )

eline ( $L_{min}$ )

coverable scale ( $0.6\lambda$ )

formance

ular Resolution (Synthe

ilar Structure in source

sitivity per pointing

sed for Sensitivity

est complementary AC

integration time estim

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### Estimated Time

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	0.01044 mJy
Bandwidth used for sensitivity	0.488 MHz
Representative frequency (sky, first source)	340.65 GHz
Precipitable water vapour (all sources)	0.913mm (3rd Octile)

**Time required for largest 12-m array**

Time on source per pointing (first source)	4052.51 d [4052.51 d]
Total number of pointings (all sources)	10
Number of tunings	1
Total time on source	45910.78 d [45242.78 d]
Total calibration time	31202.44 d
Other overheads	6801.60 d
Total time for 1 SB execution	1.55 h
Number of SB executions	1302992
Total time to complete SB	83914.81 d

**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	10.00 min
8 x Phase	4.00 min
4 x Phase reference check source	2.00 min
10 x Atmospheric	6.67 min
Calibration overheads	7.13 min

**Additional Arrays**

Number of additional 12-m configurations	1
Time required for additional 12-m	41957.41 d

**Estimated total time for science goal 125872.22 d**

OK



# Validate & submit

Project - Observing Tool for ALMA, version Cycle2Test2

Perspective 1

Editors

Spectral Spatial Project

Principal Investigator [?]

[ ] Select PI...

Main Project Information [?]

Project [ ]

Assigned Priority [ ]

Project Code None Assigned [ ]

Feedback

Suggestion [ ]

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

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)

## 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

## Feedback

Validation Validation History Log

9 errors, 0 warnings

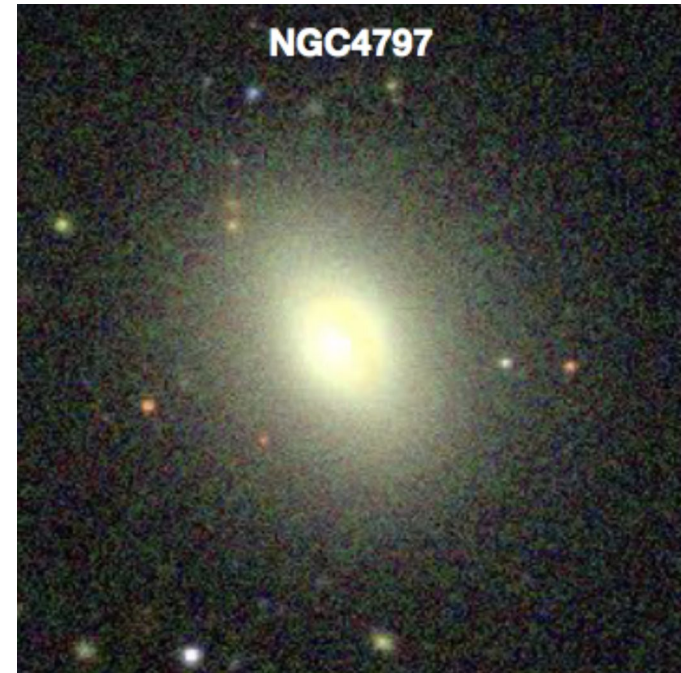
Description	Suggestion
<input checked="" type="checkbox"/> No Principal Investigator specified	Select the top level Project node in the tree and fill in the Principal Investigator field
<input checked="" type="checkbox"/> No scientific category defined	Select Proposal node and set a scientific category
<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

## Scenario 2: Extragalactic

Two separate Science cases

Science case 1: Gas

- Science goal: Study the gas velocity and distribution in a minor merger remnant (NGC 4797), to distinguish between dynamical suppression, gravitational heating and AGN/starburst feedback (van de Voort et al. 2018).
- Method: Spectral line observation of CO (1-0) at 10 km/s resolution. The CO gas traces molecular hydrogen gas and will be used to map the gas velocity and distribution.



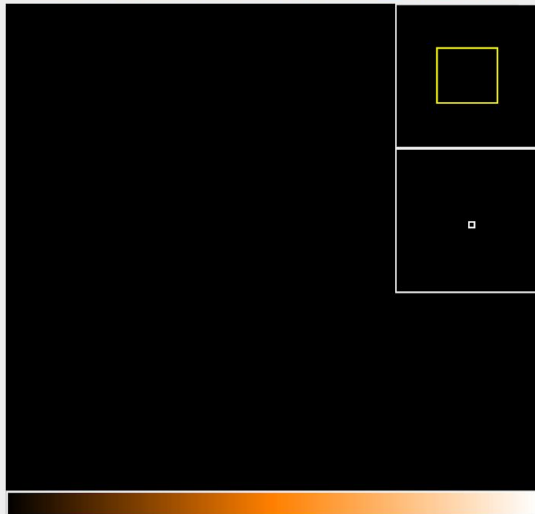


# Field Setup

Editors

Spectral Spatial Field Setup

Spatial Image



1x 584, 623 0.0

Image Filename

FOV Parameters

Representative Frequency (Sky) 112.333 GHz  
Antenna Diameter 12m  
Antenna Beamsize (HPBW) 51.837 arcsec  
Show Antenna Beamsize

Image Query

Image Server Digitized Sky (Version II) at ESO  
Image Size(arcmin) 10.0 Query

NGC 4797

Source

Source Name NGC 4797 Resolve

Choose a Solar System Object?  Name of object Unspecified

System ICRS Sexagesimal display?   
Source Coordinates  
RA 12:54:55.1660 Parallax 0.00000 mas  
Dec 27:24:45.550 PM RA 0.00000 mas/yr  
PM DEC 0.00000 mas/yr

Source Radial Velocity 7740.024 km/s hel z 0.026160000 Doppler Type RELATIVISTIC

Target Type  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam 0.30400 mJy  
Continuum Linear Polarization 0.0 per cent  
Continuum Circular Polarization 0.0 per cent  
Peak Line Flux Density per Synthesized Beam 4.60000 mJy  
Line Width 450.00000 km/s  
Line Linear Polarization 0.0 per cent  
Line Circular Polarization 0.0 per cent

Field Center Coordinates

Coord Type  Relative  Absolute

Offset Unit arcsec

#Pointings 1

RA [arcsec]	Dec [arcsec]
0.00000	0.00000

Add Delete Reset Import Export

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

# Spectral Setup

File Edit View Tool Search Help

Project Structure

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (NGC 4797 gas)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification
      - ScienceGoal (NGC 4797 dust)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

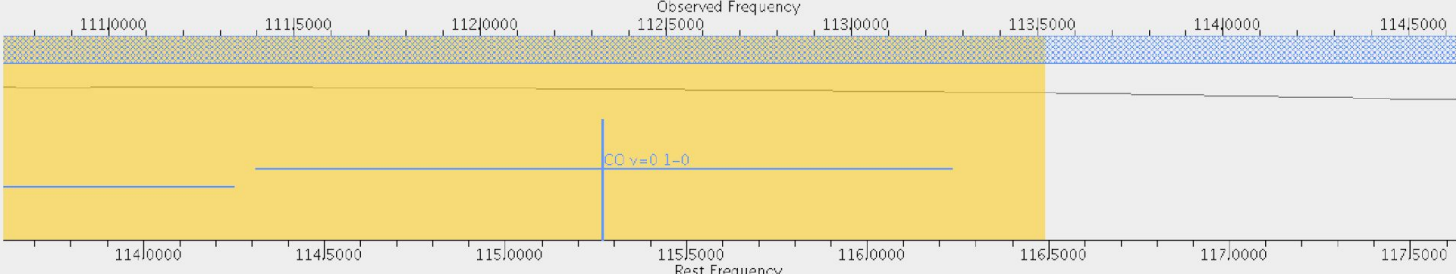
Editors

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 1. 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: 111|0000, 111|5000, 112|0000, 112|5000, 113|0000, 113|5000, 114|0000, 114|5000

Rest Frequency: 114|0000, 114|5000, 115|0000, 115|5000, 116|0000, 116|5000, 117|0000, 117|5000

Overlays:  Receiver Bands  Transmission  DSB Image  Spectral Lines [Select Lines to Overlay](#)

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

Viewport: [Pan to Spectral Window](#) [Zoom to Band](#) [Reset](#)

Spectral Type

Spectral Line  
 Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  XX  DUAL  FULL

Spectral Setup Errors

Spectral Line

Baseband-1

Fraction	Centre Freq (rest, hel)	Centre Freq (sky, hel)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1(Full)	115.27120 GHz	112.33258 GHz	CO v=0 1-0	1875.000 MHz( 5004 km/s), 1.129 MHz( 3.013 km/s)	2	<input checked="" type="radio"/>



# Angular resolution and time estimate

ALMA Observing Tool (Cycle6(Phase2)) - Project

File Edit View Tool Search Help

**Project Structure**

- Unsubmitted Proposal
  - Project
    - Proposal
      - Planned Observing
        - ScienceGoal (NGC 4797 gas)
          - General
          - Field Setup
          - Spectral Setup
          - Calibration Setup
          - Control and Performance
          - Technical Justification
        - ScienceGoal (NGC 4797 dust)
          - 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 integrations.

**Control and Performance**

Configuration Information

Antenna Beamsize (  $1.13 \lambda / D$  ) 12m 51.837 arcsec 7m 88.863 arcsec

Number of Antennas 12m 43 7m 10 TP 3

ACA 7m configuration      Most compact 12m configuration      Most extended 12m configuration

Longest baseline 0.049 km 0.161 km 16.197 km

Synthesized beamsize 13.401 arcsec 3.664 arcsec 0.047 arcsec

Shortest baseline 0.009 km 0.015 km 0.256 km

Maximum recoverable scale 62.989 arcsec 30.980 arcsec 0.531 arcsec

**Desired Performance**

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

1.50000 arcsec

Largest Angular Structure in source 2.00000 arcsec

Desired sensitivity per pointing 920.00000 uJy equivalent to 39.620 mK

Bandwidth used for Sensitivity User Frequency Width 10.00000 kHz

Science goal integration time estimate **Time Estimate**

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

Simultaneous 12-m and ACA observations  Yes  No

Are the observations time-constrained?  Yes  No

**Time Estimate**

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 0.9200 mJy

Bandwidth used for sensitivity 10.000 km/s

Representative frequency (sky, first source) 112.33 GHz

**Estimated Total time for Science Goal 1.15 h**

**Cluster 1**

Source Name	RA	Dec	Velocity
NGC 4797	12:54:55.1660	27:24:45.550	7740.024 km/s

**Possible Configuration Combinations**

12-m (1)	12-m (2)	7-m	TP
C43-3	None	No	No

**Input Parameters**

Precipitable water vapour (all sources) 5.186mm (7th Octile)

**Time required for 12m (1) [C43-3]**

Time on source per pointing (first source) 43.34 min [ 43.16 min]

Total number of pointings (all sources) 1

Number of tunings 1

Total time on source 43.34 min [43.16 min]

Total calibration time 18.63 min

Other overheads 7.15 min

Total time for 1 SB execution 1.15 h

Number of SB executions 1

Total time to complete SB 1.15 h

**Calibration Breakdown per SB execution**

2 x Pointing 4.00 min

1 x Amplitude/bandpass 5.00 min

5 x Phase 2.50 min

6 x Atmospheric 4.00 min

Calibration overheads 3.13 min

Close

## Science Case I Continuum

- Set the peak continuum flux sensitivity per synthesized beam to 0.304 mJy/beam in the field setup (this was estimated from fitting a modified blackbody to fluxes at shorter wavelengths).
- Now add 3 spectral windows to record continuum in band 3. Use the lowest spectral resolution correlator mode, and use the full 7.5 GHz bandwidth.
- What is the continuum flux density S/N? (Hint - use the Technical Justification tab).
- Change the largest angular structure to 20". What is the integration time now, and why is it longer?

## NGC 4797 Science case 2

### Science case 2: dust continuum

- Science goal: Map the dust continuum to look for extended dust emission, and to do radiative transfer modelling to reveal the sources of dust heating.
- Method: Image the dust continuum at high resolution to match the spatial resolution of existing optical data. The dust continuum will be brightest at high frequency (Band 9).

## Setup second Science case

- Copy the science goal and give it a new name.
- Change the spectral setup to observe continuum in band 9. Note the mirror images of the spectral windows.
- Set the peak continuum flux to 0.89 mJy/beam and the peak line flux to zero.
- Set the desired angular resolution to 0.6" and the largest angular scale to 2.0".
- What is the desired sensitivity needed to reach a S/N of 5 for the continuum? (Hint, the integration time is 8.8 hours).

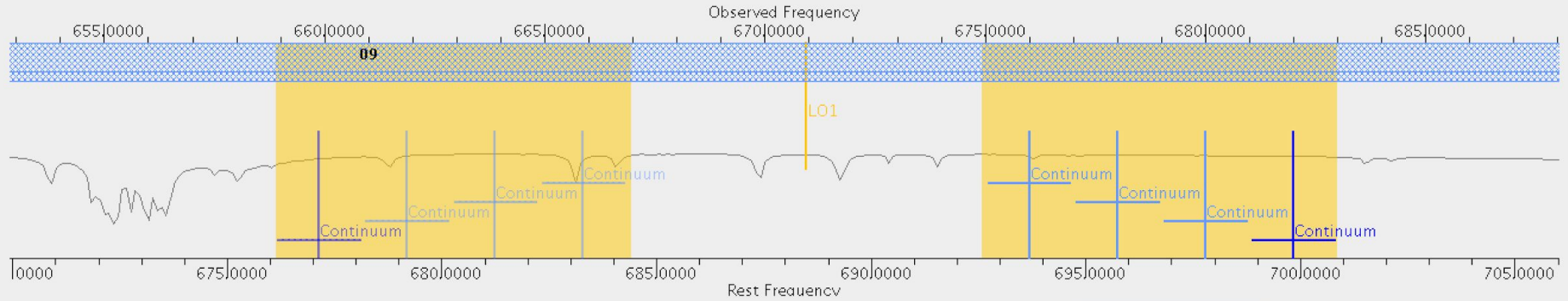


## Editors

Spectral Spatial Spectral Setup

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



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

Water Vapour Column Density:  Automatic Choice  Manual Choice 0.472mm (1st Octile)

Viewport: Pan to Spectral Window Zoom to Band Reset

## Spectral Type

Spectral Type:  Spectral Line  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: 9 [602.0–720.0 GHz]  
Reset to Standard Frequency

Sky Frequency: 679.00000 GHz

Rest Frequency: 696.762640 GHz

### Baseband-1



## Mosaic

- We want to make a map of the dust a larger region than one pointing.
- In field setup, change to a rectangular field and make a 7"x7" mosaic. Use Nyquist spacing (the default) between the pointings.  
This is the spacing of samples on the sky needed to get good imaging of large-scale low surface brightness emission. Use the spatial image tool to help you visualize the pointing positions.
- How long is the integration time now?

12:54:57.236, +27:25:00.12 (J2000)

Image Filename `h:\jsky3/cache/jsky3134876705447496922.fits`

**FOV Parameters**

Representative Frequency (Sky)

Antenna Diameter  12m

Antenna Beamsize (HPBW)

Show Antenna Beamsize

**Image Query**

Image Server

Image Size(arcmin)

**Source**

Source Name

Choose a Solar System Object?  Name of object

System  Sexagesimal display?

Parallax

Source Coordinates  
 RA  PM RA    
 Dec  PM DEC

Source Radial Velocity    z  Doppler Type

Target Type  Individual Pointing(s)  1 Rectangular Field

**Expected Source Properties**

Peak Continuum Flux Density per Synthesized Beam

Continuum Linear Polarization  per cent

Continuum Circular Polarization  per cent

Peak Line Flux Density per Synthesized Beam

Line Width

Line Linear Polarization  per cent

Line Circular Polarization  per cent

**Rectangle**

Coords Type  Relative  Absolute

Field Center Coordinates  
 Offset(Longitude)    
 Offset(Latitude)

p length

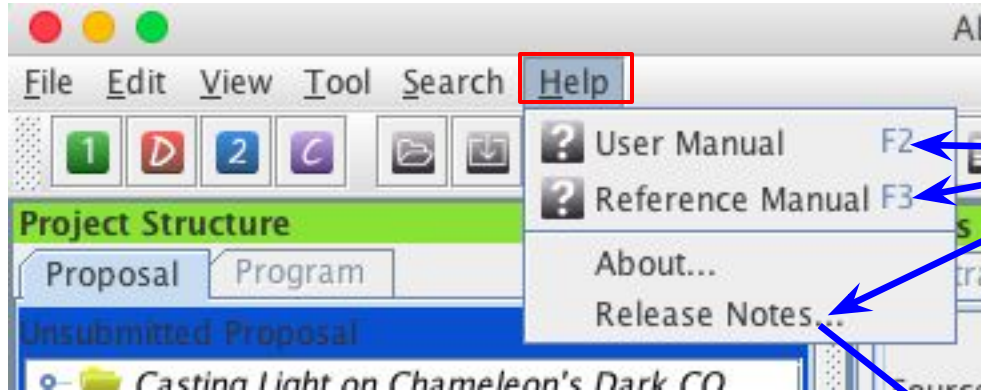
q length

Position Angle

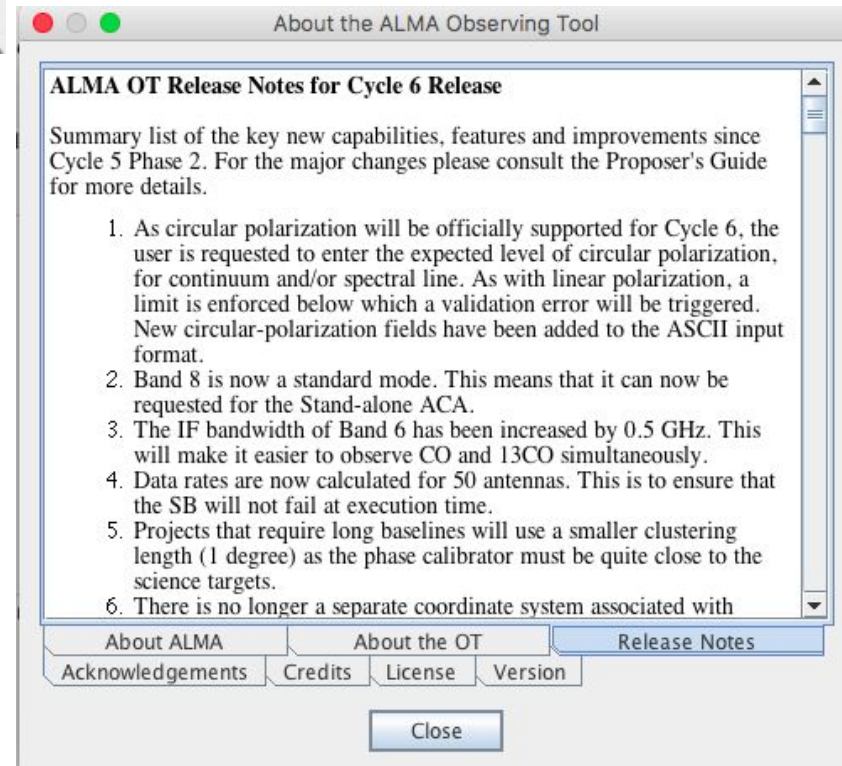
Spacing

#Pointings

# Don't be afraid to ask for directions



Suggestion: input file formats are shown in the help sections that you invoke with the local ?



- 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)





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



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

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### Observatory News

Additional Information for Cycle 5 Proposals  
Feb 01, 2017

Release of a New Installment of Science Verification Data  
Jan 18, 2017

RadioNet: Calls for financial support - OPEN  
Jan 16, 2017

[More news...](#)

### NRAO News

American Astronomical Society Meeting  
Jun 04, 2017

2017 Astrobiology Graduate Conference  
Jun 05, 2017

Women in Astronomy IV: The Many Faces of Women Astronomers  
Jun 09, 2017

[More...](#)

### Status

**ALMA Cycle 5 Pre-Announcement**

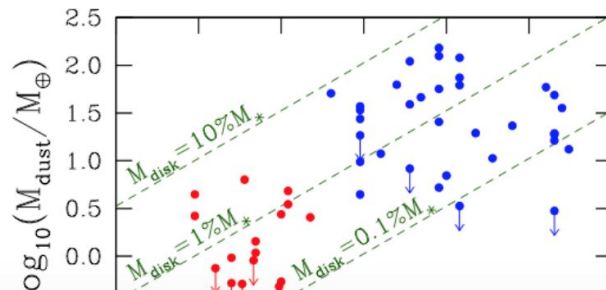
Refereed publications:

Last observed source:

Current configuration: C40-2

[More...](#)

### Science Highlights - Possible Disk Truncation in Ophiuchus Brown Dwarfs



The sensitivity, resolution and the wavelength coverage of ALMA makes it an ideal tool for studying the properties of the cold outer disks of young stars and low mass objects. Such observations can aid us in understanding the formation of their central objects and their likelihood of ultimately hosting planets. In a recent *Astronomy & Astrophysics* [paper](#), Dr. Testi and his collaborators made use of ALMA Band 7 to observe an unbiased sample of spectroscopically confirmed Ophiuchus brown dwarfs with infrared excesses.



[www.almascience.org](http://www.almascience.org)  
**ALMA Science Portal @ NRAO**

# I could use a hand...

Have no fear, the ALMA Helpdesk is here...

# ALMA



<< Science Portal

Home

Knowledgebase

News

English (U.S.)

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Lost password

Login

» Knowledgebase

General ALMA Queries (13)

Early Science - Cycle 1 (31)

Resources & Observer Support (12)

Project Planning (14)

ALMA Observing Tool (OT) (29)

Proposal Handling (5)

Archive & Data Retrieval (4)

Offline Data Reduction and/or CASA (14)

Development Program (1)

Live Chat Software by Kayako

Please type your search query here

SEARCH

## Knowledgebase

### General ALMA Queries (13)

- Can I submit a ticket in Japanese?
- How close can ALMA observe to the Sun?

### Project Planning (14)

- What should I include for the content of the Technical Justification and in what format should I submit it?
- Where can I find the online ALMA observing simulator developed by the University of Manchester?

### Early Science - Cycle 1 (31)

- Can I use "breakpoints" in ALMA cycle 1?
- The Cycle 1 Technical Handbook has some gaps in its discussion of ALMA receivers (SSB, 2SB, DSB). What else can you tell me about them?

### ALMA Observing Tool (OT) (29)

- What do I do if I can't get the OT to work?
- How do I deal with targets with unspecified coordinates in the OT?

### Resources & Observer Support (12)

- How do I arrange a visit to one of the ARCs?
- Where can I find ALMA documentation and manuals?

### Proposal Handling (5)

- May I submit an identical proposal to more than one category, e.g. submitting a proposal on distant galaxies both to cosmology and to galaxy categories?
- Which category should I submit a proposal on distant galaxies: "cosmology/high-z" or "Galaxies/Nudei"?



# Extra OT slides



# Crafting mosaics

The screenshot displays the 'Project - Observing Tool for ALMA, version Cycle2Test2' interface. The 'Editors' panel at the top has three tabs: 'Spectral', 'Spatial', and 'Field Setup'. The 'Spatial' tab is selected and circled in red, showing a graphical visualization of a rectangular field set on a star field image. A red arrow points from a callout box to this tab. The 'Field Setup' tab is also circled in red, with a red arrow pointing to the 'Image Query' section below. The 'Image Query' section includes a dropdown menu for 'Image Server' set to 'Digitized Sky (Version II) at ESO' and a 'Query' button. A red arrow points from a callout box to this section. The 'FOV Parameters' section shows 'Representative Frequency (Sky)' at 231.546 GHz, 'Antenna Diameter' at 12m, and 'Antenna Beamsize (HPBW)' at 26.706 arcsec. The 'Expected Source Properties' section on the right includes fields for 'Source Radial Velocity' (2794.200 km/s), 'Target Type' (1 Rectangular Field), and 'Peak Continuum Flux Density per Beam' (0.17400 Jy). The 'Image Filename' is 'emijan\jsky3\cache\jsky9043341093951517820.fits'. The 'Image Size(arcmin)' is 10.0. The 'Position Angle' is 0.00000 deg. The 'Spacing' is 0.48113. The 'Template library' on the left shows a tree structure with 'Planned Observing' and 'ScienceGoal' nodes. A red arrow points from a callout box to the 'Field Setup' node in this tree. The 'Overview' panel at the bottom shows 'Contextual Help' and 'Phase I: Science Proposal'.

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

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

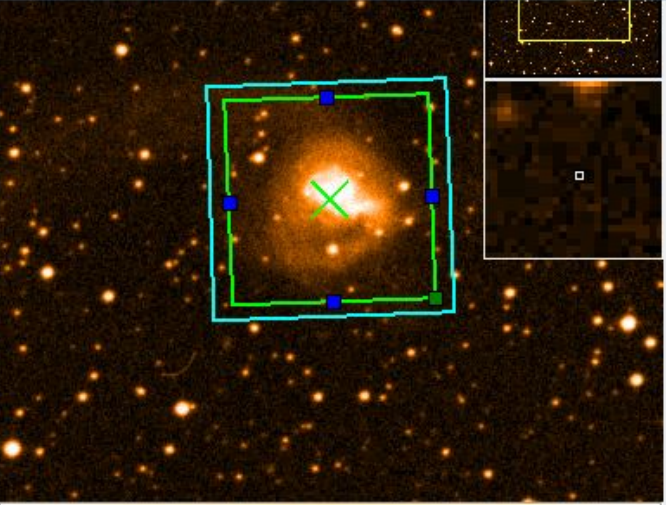
Select a background image from an online image server

# 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 II)

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
-----------	-----	----------	----

Reset to Nyquist

Export

**Estimated number of 7m Array pointings**

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



# Crafting mosaics

The screenshot shows the 'Observing Tool for ALMA' interface. The main window displays a 'Spatial Image' of NGC3256. A green rectangle is drawn over the image, indicating the field of view. A mosaic beam pattern is overlaid on the image. A red arrow points from a callout box to the mosaic beam pattern icon in the toolbar. The toolbar also contains icons for opening files, zooming, and other image manipulation tools. The right panel shows the 'NGC3256' source properties, including coordinates, radial velocity, and expected source properties.

**You can load a local fits image**

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

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

et(Longitude) 0.00000 arcsec

Image Filename emijan\jsky3\cache\jsky9043341093951517820.fits

FOV Parameters

1x 71, -52 0.0

10:28:13.821, -44:00:03.43 (J2000)

Template library. Turn the keys o...

Template library. Turn the

Proposal

Planned Observing

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

ScienceGoal (E

Overview

Contextual Help

Phase I: Science Proposal







# The spectral line picker has new filters

Create spectral windows centred on spectral lines

**Transition Filter**

\*  
e.g. CO<sup>2-1</sup> or <sup>18</sup>O<sup>2-1</sup>

Include description

**Frequency Filters**

ALMA Band

1 2 3 4 5 6 7 8 9 10

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.

**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 $\Delta$	Description	Rest Freque... $\Delta$	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)**

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

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



**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**

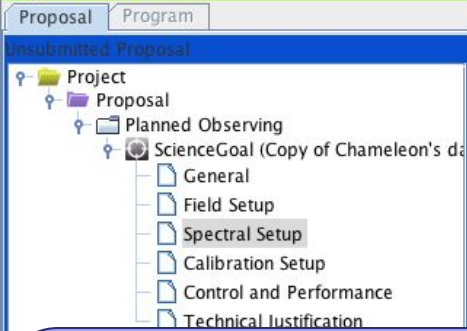
Transition	Description	Rest Frequency	Sky Frequency	Energy	Line Type
CH3NH2 4(1)A2-4(0)A1, F=5-5	Methylamine	86.074729 GHz	86.072693 ...	25.405 K	Offline
CH3NH2 4(1)A2-4(0)A1	Methylamine	86.075367 GHz	86.073331 ...	25.405 K	Offline
CH3NH2 4(1)A2-4(0)A1, F=4-4	Methylamine	86.075367 GHz	86.073331 ...	25.405 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-86259.7	UNIDENTIFIED	86.259700 GHz	86.257660 ...	0.17	Offline

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

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



## Project Structure



## 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	97.99517 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

- Proposed
- Program
- 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

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"/>
<div style="border: 1px solid black; padding: 5px;">           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         </div>						
<input type="button" value="Add spectral window centred on a spectral line"/> <input type="button" value="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"/>



 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"/>

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

Failing to rename a new spw brings a validation error





# Full Continuum & Polarization

ALMA Observing Tool (FEB2017) - Project

File Edit View Tool Search Help

Perspective 1

Project Structure

Proposed Program

Submitted Proposal

Project

Proposal

Planned Observing

ScienceGoal (Copy of Chameleon's d

General

Field Setup

Spectral Setup

Calibration Setup

Control p

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]

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 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

Show image s

Baseband-2

1(Full) | 140.0000

Show image s

Baseband-3

1(Full) | 150.000000

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 |







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

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

File Edit View Tool Search Help

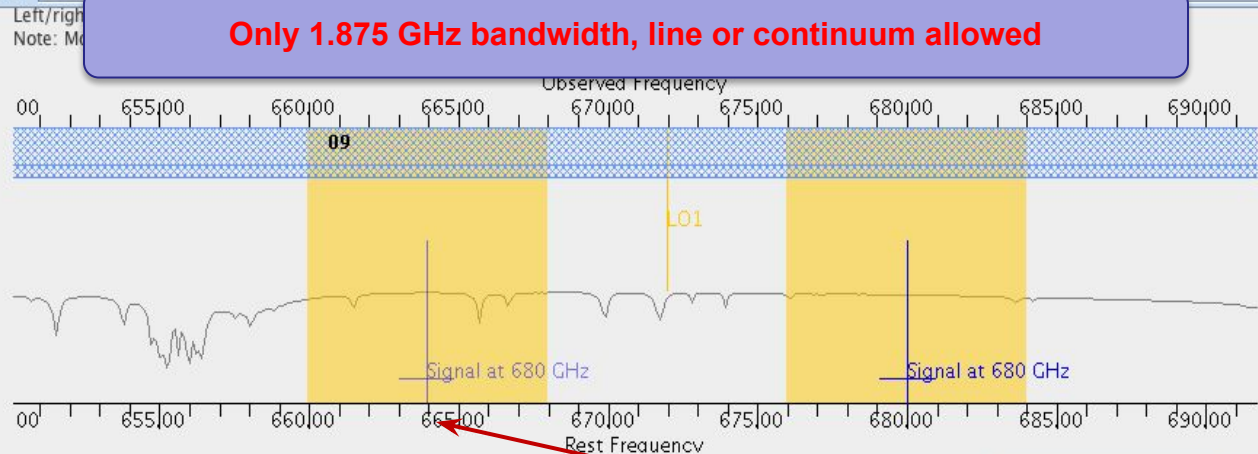
Perspective 1

Project Structure

Proposal Program  
Unsubmitted Proposal  
Cycle 5 Kelvin Sensitivity Test  
Prop

Editors

Spectral Spatial Spectral Setup



Only 1.875 GHz bandwidth, line or continuum allowed

Bands 9,10 have double sideband receivers 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.

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

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

Viewport:

Spectral Type

Spectral Line  
 Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  XX  DUAL  FULL

Spectral Setup Errors

Spectral Line

Baseband-1

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)	2 <input checked="" type="checkbox"/>	<input checked="" type="radio"/>

Only 1.875 GHz bandwidth, line or continuum allowed



# 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

- Debris Disk Structure around Nearby Sun-like Stars
  - Science Plan
    - ScienceGoal (HD 10647) - general
      - 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

Time Estimate

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





File Edit View **Tool** Search Help

- ALMA Calibrator Selection Tool...
- ALMA LO Configuration Tool...
- Sensitivity Calculator...
- Generate SBs from the Selected Goal
- Display Project Time Summary**
- 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

Project Structure

- Proposal
- Planned Observing
- ScienceGoal (MSXiiiRA16b1)
- ScienceGoal (MSXiiiRA16b2)

Bulge Asymm

(lsjouwer@nra

**Use 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

Do you request complementary ACA Observations?  Yes  No

Suggest

Time Estimate

Are the observations time-constrained?  Yes  No

Number of time windows specified : 1

Start Date/Time (UTC) End Date/Time (UTC)

2013-10-02 13:17 2013-10-02 13:18

October 2013

S M T W T F S

29 30 1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31 1 2

3 4 5 6 7 8 9

Add Delete

Feedback

Contextual Help Phase I: Science Proposal









# Tech Justification



## 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

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

- 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 lin
  - ScienceGoal (B9 spectral lin
  - ScienceGoal (B3 continuum
  - ScienceGoal (B6 continuum

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

Note the spiffy new icons!

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

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

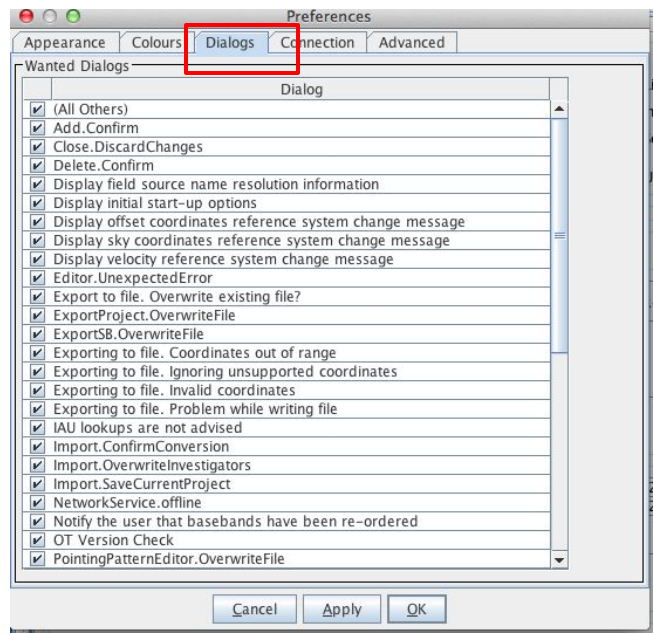
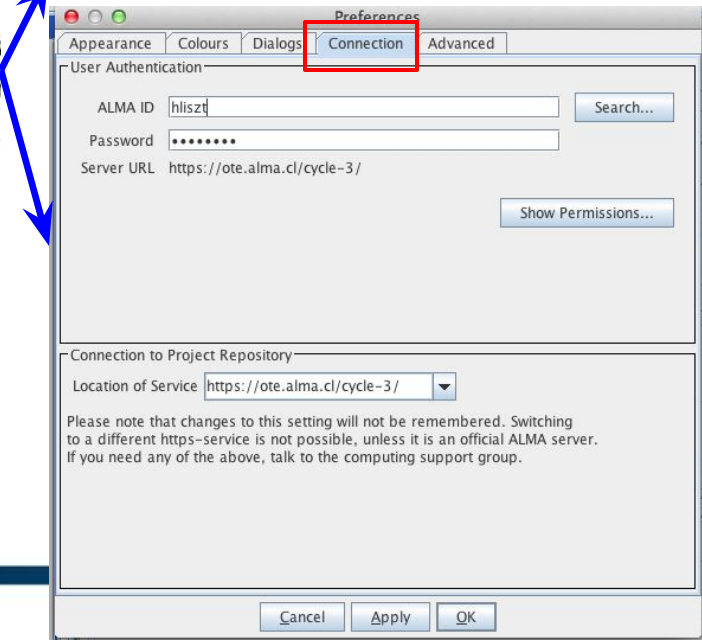
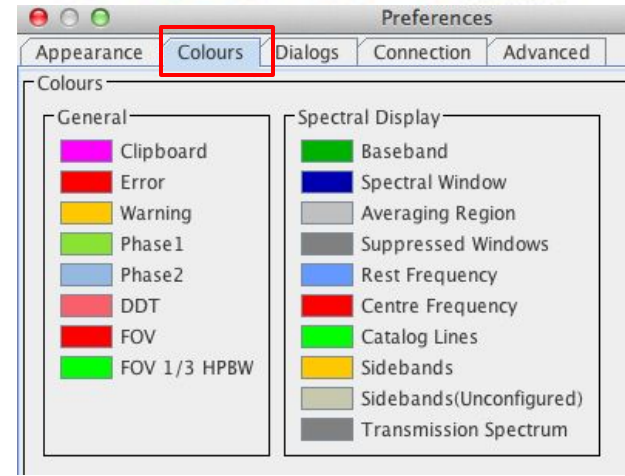
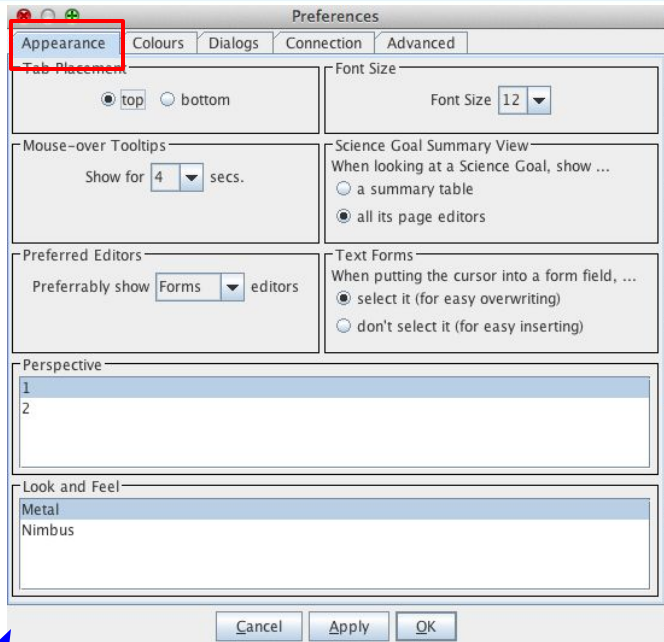
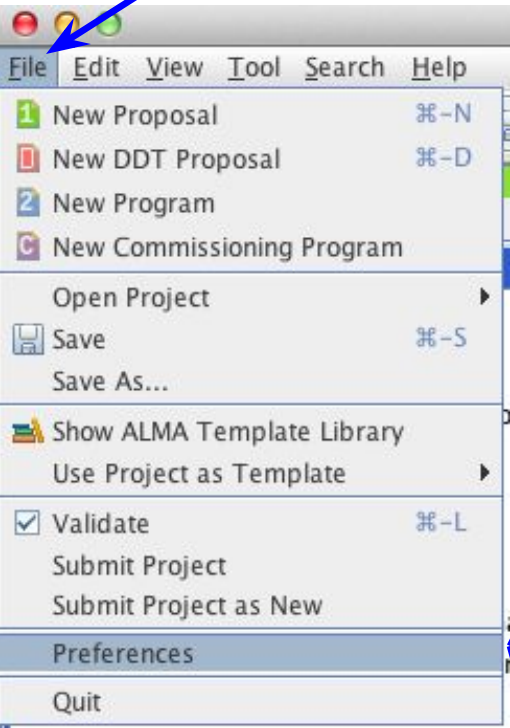
New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

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<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.