

An Introduction to the ALMA Observing Tool

How to turn that great idea into ALMA data ...



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Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array



On a Personal note

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MEET GILLIAN WRIGHT: EUROPEAN PRINCIPAL INVESTIGATOR FOR THE MID-INFRARED INSTRUMENT (MIRI) INSTRUMENT FOR THE WEBB TELESCOPE



Gillian Wright is the European principal investigator for the Mid-Infrared instrument (MIRI) on the James Webb Space Telescope. Wright leads the nationally funded European consortium of institutes that have developed the MIRI instrument in a partnership with NASA's Jet Propulsion Laboratory in Pasadena, Calif.

Gillian's husband Alan Bridger is the OT developer

Professor Wright is also a research astronomer, who specializes in infrared observatories and astronomical instrumentation as well as studies of star formation and dust in interacting galaxies. Wright serves as the Director of the U.K. Astronomy Technology Centre in Edinburgh, Scotland and a member of the Webb telescope Science Working Group. She's the present co-Investigator for Herschel, a recent European Space Agency mission, for the Spectral and Photometric Imaging Receiver instrument.

Very Long Baseline Array 

Cycle 3 Capabilities

- At least **36 x 12-m** antennas, plus **10 x 7-m** antennas (for short baselines) and **2 x 12-m** antennas (for zero-spacing aka Total Power™)
- Receiver bands 3, 4, 6, 7, 8, 9, & 10 (wavelengths of about 3.5 to 0.32 mm)
- Baselines up to **2 km** for **Bands 8, 9 and 10 (high frequency)**
 - up to **5 km** for **Band 7**, and
 - up to **10 km** for **Bands 3, 4, & 6 (lower frequency)**
- Both single field interferometry and **mosaics** of up to **150 pointings**
- Spectral-line observations with all arrays and continuum observations with the 12-m Array and the 7-m Array. Single dish use will be limited to spectral line observations in Bands 3 to 8 (no singledish continuum, no standalone singledish spectral line)
- Linear polarization (on-axis, continuum in Band 3, 6 and 7, no ACA, no mosaics, no spectral line, no circular polarization)
- Mixed correlator modes and multiple spectral windows (both high and low frequency resolution in the same observation if not on the same baseband)
- The **maximum** observing **time** per proposal, as estimated by the OT, is **100 hrs.**

Be aware of the configuration schedule

	Start Dates	Configuration	Night LST	Not recommended
extended	2015 October 1	C36-8	~17h - 9h	High frequency projects especially during day time (LST ~10h-16h)
compact	2015 November 10	C36-7	~19h - 11h	High frequency projects especially during day time (LST ~12h-18h)
	2015 December 29 (Maintenance in February)	C36-1	~00h - 16h	High frequency projects any time , specially during day time (LST ~17h-23h)
	2016 March 22	C36-2	~04h - 20h	High frequency projects day time (LST ~21h-03h)
	2016 April 19	C36-3	~07h - 23h	High frequency projects day time (LST ~00h-06h)
	2016 May 10	C36-4	~08h - 00h	High frequency projects day time (LST ~01h-07h)
	2016 May 31	C36-5	~10h - 02h	High frequency projects day time (LST ~03h-09h)
	2016 July 5	C36-6	~13h - 05h	High frequency projects especially during day time (LST ~06h-12h)
	2016 August 30	C36-7	~16h - 08h	High frequency projects especially during day time (LST ~09h-15h)

Notes for Table 3: Dates include relocation time at the end of every configuration

AgI Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure

Proposal Program

Unsubmitted Proposal

- Project
 - Proposal

Editors

Spectral Spatial Project

Principal Investigator

Main Project Information

Project

Assigned Priority

Project Code

Validation History Log

Description	Suggestion
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Overview

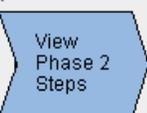
Contextual Help

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

You can click to add blank Science Goals or use "Edit->Add ..."

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

The screenshot shows the 'Agt Project - Observing Tool for ALMA, version Cycle2Test2' application window. The 'File' menu is open, showing options like 'New Proposal', 'New DDT Proposal', 'Open Project', 'Save', 'Show ALMA Template Library', 'Validate', and 'Submit Project'. Two callout boxes provide instructions: one pointing to 'Show ALMA Template Library' and another pointing to 'Validate'. The main workspace contains a 'Main Project Information' form with fields for 'Project', 'Assigned Priority', and 'Project Code'. Below this is a 'Feedback' section with tabs for 'Validation', 'Validation History', and 'Log'. At the bottom, there is an 'Overview' section with 'Contextual Help' and a 'Phase I: Science Proposal' flowchart.

Click here to load the standard templates that are distributed with the OT

Or click here to load another project (perhaps on old one of yours) as a template

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

ALMA Observing Tool (Cycle3-RC2) - Really catchy title here

File Edit View Tool Search Help Perspective 1

Project Structure

- Proposal
- Program
- Unsubmitted Proposal
 - Really catchy title here
 - Proposal
 - Planned Observing

Editors

Spectral Spatial Proposal

Proposal Information

Proposal Title → Really catchy title here

Proposal Cycle → C3UT.1

Abstract (max. 1200 characters) → Not too abstract, please

Launch Editor

Proposal Type → Standard Target Of Opportunity

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

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)

Student project Continuation

The upper part of the proposal cover page is where you define the proposal: Title, Abstract, Category, Keywords, note related/previous proposals ...

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

...ing Tool (Cycle3-RC2) - Really catchy title here

Perspective 1



Unsubmitted Proposals

- Really catchy title here
 - Proposal
 - Planned Observing

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)

Student project Continuation

Related Proposals

Previous Proposals

Investigators

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

Science Case will be a PDF with a max of 4 pages, including figures.

Investigator search constraints

ALMA ID is hliszt

Find Investigators

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

Select PI Cancel

Select PI... Add Col... Remove Col Add from Proposal...

Science Case (Mandatory, PDF, 4 pages max.) Attach... Detach View...

ALMA Observing Tool (Cycle3) - Project

File Edit View Tool Search Help Perspective 1

Project Structure

Proposal Program

Unsubmitted Proposal

- Project
 - Proposal
 - Planned Observing

Cycle3 Template Library (read-only)

- Cycle3 Template Library
 - Proposal
 - Planned Observing
 - ScienceGoal (B10 12CO, HCO+)
 - ScienceGoal (B3 CO, CN, C17O)
 - ScienceGoal (B3 90 GHz gas kinematics ensemble)
 - ScienceGoal (B3 single-point spectral sweep of Sgr)
 - ScienceGoal (B4 TOO_GRB)
 - ScienceGoal (B6 CO, 13CO, C18O (all J=2-1) cont)
 - ScienceGoal (B6 12CO (2-1): NGC3256 mosaic)
 - ScienceGoal (B7 12CO, HCO+, HCN)
 - ScienceGoal (Comet B7 CO, HCN, CH3OH, NH2D, H)
 - ScienceGoal (B7 Continuum: Pluto/Charon)
 - ScienceGoal (B7 Polarisation observations of Centau
 - ScienceGoal (B8 Double mosaic)
 - ScienceGoal (B8continuum: Cosmic Eyelash (z=2.32

Put a Science Goal into the Planned Observing node in the J-tree (wonkish 😊), either creating it from scratch or cloning as shown below

Abstract (max. 1200 characters)

Launch Editor

Proposal Type

Standard Target Of Opportunity

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

Related Proposals

Drag one SG you'd like to modify, from here up to your Proposal folder. Remember saving to disk!

Project Structure

Proposal Program

Unsubmitted Proposal

- Project
 - 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 JTree below & read the descriptions - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help

Perspective 1

You're now ready to modify the Science Goal (SG)

give a brief, descriptive name.

A description is useful for you, for the technical assessors, and for your Contact Scientist after your project is approved.

Project Structure

Proposal Program

Unsubmitted Proposal

- Project
 - Proposal
 - Planned Observing
 - ScienceGoal (Science Goal)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

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 emission line of 12CO (2-1). As the source is extended, a mosaic will be used to cover the 30x30 arcsec area of interest.

Launch Editor

NGC3256

Source

NGC3256

System Object? Name of object Unspecified

Sexagesimal Resolution 0.00000

Description	Suggestion

Overview

Contextual Help Phase I: Science Proposal

The screenshot shows the 'Field Setup' tab in the APT Project - Observing tool. The interface includes a 'Source Name' field with 'NGC3256', 'Source Coordinates' (RA: 10:27:51.6000, Dec: -43:54:18.000), and 'Expected Source Properties' (Peak Continuum Flux Density per Beam: 0.17400 Jy, etc.). A 'Target Type' section has '1 Rectangular Field' selected. A 'Feedback' section at the bottom has 'Validation' selected. Annotations include a red oval around the 'Source Name' and 'Source Coordinates' fields, a blue oval around the 'Target Type' section, and a green oval around the 'Expected Source Properties' section. Arrows point from text boxes to these elements.

If you resolve a name, carefully check all the returned info

New: Cycle 3 OT calls this FK5 J2000 (to distinguish from ICRS)

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

New: more than one field source can have a mosaic but it's all mosaics or none, make sure your 1st source is a mosaic if you want several

Rectangular mosaic or 1/more 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

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

New: Put a mosaic around more than one field source

The screenshot displays the 'Observing Tool for ALMA' software interface. The 'Editors' panel is active, with the 'Spatial' tab selected and circled in red. The main window shows a star field with a green rectangular field of view (FOV) overlaid. A red arrow points from the 'Spatial' tab to a callout box. Another red arrow points from the 'Image Query' section to a second callout box. The 'Image Query' section shows 'Digitized Sky (Version II) at ESO' selected as the image server. The 'FOV Parameters' section includes fields for Representative Frequency (231.546 GHz), Antenna Diameter (12m), and Antenna Beamsize (26.706 arcsec). The 'Expected Source Properties' section lists parameters like Peak Continuum Flux Density per Beam (0.17400 Jy) and Line Width (0.00000 km/s). The 'Rectangle' section shows 'Coords Type' set to 'RELATIVE' and 'System' set to 'J2000'. The 'Image Filename' is 'remijan\jsky3\cache\jsky9043341093951517820.fits'. The 'Image Size (arcmin)' is 10.0. The 'Position Angle' is 0.00000 deg and 'Spacing' is 0.48113. The 'Project Structure' panel on the left shows a tree view with 'Planned Observing' and 'ScienceGoal' folders. The 'Template library' panel at the bottom left shows a list of 'ScienceGoal' templates. The 'Overview' panel at the bottom shows 'Contextual Help' and 'Phase I: Science Proposal'.

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

Select a background image from an online image server to enable visualization. Images aren't persistent in the .aot.

New: Put a mosaic around more than one field source

The screenshot displays the 'Observing Tool for ALMA' interface. The main window shows a 'Spatial Image' of a star field with a red mosaic beam pattern overlaid on a central region. A toolbar above the image contains various icons, with a red circle highlighting a specific icon. A red arrow points from this icon to a text box. Another red arrow points from the text box to a second text box. The right side of the interface shows a 'Properties' panel for 'NGC3256' with various parameters like Source Name, Source Coordinates, and Expected Source Properties.

Or load a local fits image

You can turn "on/off" the mosaic beam pattern using this button. Each circle is the size of the primary beam, centered on the field center

Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help

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 J2000 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 remijan\jsky3\cache\jsky9043341093951517820.fits

FOV Parameters

1x 388,468 13678.0

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

Overview

New: Put a mosaic around more than one field source



Editors
Spectral Spatial **Field Setup**

System J2000 Sexagesimal display? Parallax 0.00000

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).

Line Width 0.00000 km/s
Line Polarization Percentage 0.0 %

Rectangle

Coords Type ABSOLUTE RELATIVE
System J2000
Offset(Longitude) 0.00000
Offset(Latitude) 0.00000

Field Center Coordinates

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

Estimated number of 7m Array pointings

No more than 150 12m Array pointings.

Image Filename: emijan\jsky3\cache\jsky9043341093951517820.fits
FOV Parameters: Representative Frequency (Sky) 231.546 GHz, Antenna Diameter 12m, Antenna Beamsize (HPBW) 26.706 arcsec
Image Query: Image Server Digitized Sky (Version I), Image Size(arcmin) 10.0

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 **Field Setup**

anti-bllac

Source

Source Name: anti-bllac [Resolve]

Choose a Solar System Object? Name of object: Unspecified

System: J2000 Sexagesimal display? Parallax: 0.0 mas

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

Source Radial Velocity: 0.00000 mas/yr Doppler Type: RELATIVISTIC

Target Type: Individual Pointing(s) 1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Beam: 0.10000 Jy

Continuum Polarization Percentage: 0.0 %

Continuum Polarization Position Angle: 0.03000 Jy

Continuum Polarization Position Angle Rate: 0.00000 km/s

Continuum Polarization Position Angle Rate Rate: 0.0 %

Custom Mosaic:

PointingPattern: Offset

Offset Unit: arcsec

#Pointings: 2

RA	Dec
22:02:44.2910	-42:16:39.978
22:02:43.2910	-42:16:39.978

Add Delete Import Export

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

The NON-MOSAIC CASE

Custom Mosaics use *individual overlapped pointings specified as offsets*. If pointings aren't contiguous, uncheck

Offsets or absolute positions. The OT will go back/forth if you check/uncheck "Offset" Quirk: to access this, uncheck "custom mosaic"

New: You can use the ACA and Total Power with individual pointings

New: you can read/write the pointings from/to a text file

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 of B6 12CO (2-1): NGC32
 - General
 - Field Setup
 - Spectral Setup**
 - Calibration Setup
 - Control and Performance
 - Technical Justification

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type

Spectral Line
 Single Continuum
 Spectral Scan

Polarization products desired XX DUAL FULL

Spectral Setup Errors

Spectral Line

Baseband-1

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Rep
1(Full)	230.53800 GHz	230.53800 GHz	CO v=0 2-1	1875.000 MHz(2438 km/s), 976.563 kHz(1.270 km/s)	1	<input checked="" type="radio"/>

Select Lines to Observe in Baseband-1... Add Delete

Baseband-2

Select Lines to Observe in Baseband-2... Add Delete

Feedback

Validation Validation History Log

Description Suggestion

Define the spectral setup.

#1 Add windows in ≤ 4 basebands of width ≤ 1.875 GHz

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 of B6 12CO (2-1): NGC32) (Spectral Setup)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type

Spectral Line
 Single Continuum
 Spectral Scan

Polarization products desired XX DUAL FULL

Spectral Setup Errors

Spectral Line

Fraction	Center Freq (Rest)	Center Freq (Sky)	Trans	Avg. Resol
1 (Full)	230.53800 GHz	230.53800 GHz	CO v=0 2-1	1875.000 MHz(2438 km/s), 976.563 kHz(1.270 km/s)

Select Lines to Observe in Baseband-1... Add Delete

Baseband-2

Select Lines to Observe in Baseband-2... Add Delete

Define the spectral setup.

Rest frequency can be entered manually, OT will show sky freq

#1 Add windows in ≤ 4 basebands of width ≤ 1.875 GHz

Feedback

Validation Validation History Log

Description	Suggestion
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AgI 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 of B6 12CO (2-1): NGC322)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type

- Spectral Line
- Single Continuum
- Spectral Scan

Polarization products desired XX YY XY

Spectral Setup Errors

Spectral Line

Baseband-1

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth	Resolution	Rep
1(Full)	230.53800 GHz	230.53800 GHz	CO v=0 2-1	1875.000 MHz(2438 km/s), 976.563 kHz(1.270 km/s)		1

Select Lines to Observe in Baseband-1... Add Delete

Baseband-2

Select Lines to Observe in Baseband-2... Add Delete

Define the spectral setup.

Click here to get a Splatologue window to select a particular spectral line.

Template library. Turn the keys on the JTree below & r...

Proposal

- Planned Observing
 - ScienceGoal (B3 spectral sweep CO)
 - ScienceGoal (B7 continuum: COSMO)
 - ScienceGoal (B7 CO(9-8): Cosmic Eye)
 - ScienceGoal (B9 continuum: Cosmic Eye)
 - ScienceGoal (B3 spectral sweep: PK)
 - ScienceGoal (B3 continuum: GRB To)
 - ScienceGoal (B6 continuum: GRB To)
 - ScienceGoal (B7 continuum: GRB To)
 - ScienceGoal (B6 continuum: GRB To)
 - ScienceGoal (B3 continuum: GRB To)
 - ScienceGoal (B6 12CO (2-1): NGC322)
 - ScienceGoal (B6 13CO (2-1): NGC322)
 - ScienceGoal (B6 spectral line: Massive Star)
 - ScienceGoal (B9 spectral line: Massive Star)
 - ScienceGoal (B3 continuum: Protostar)
 - ScienceGoal (B6 continuum: Protostar)

Feedback

Validation Validation History Log

Description	Suggestion
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Transition Filter

CO*

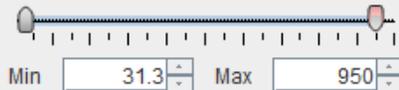
Include description

Frequency Filters

ALMA Band



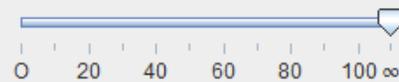
Sky Frequency (GHz)



Receiver/Back End Configuration

Hide unobservable lines
 Filtering unobservable lines

Maximum Upper-state Energy (K)



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.

Find More...

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 sorted columns.)

Transition \triangle	Description	Rest Frequency \triangle	Sky Frequency	Upper-state Energy	Lovas Intensity
CO v=2 1-0	Carbon Monoxide	113.172 GHz	113.172 GHz	6134.675 K	0.01
CO v=1 1-0	Carbon Monoxide	114.222 GHz	114.222 GHz	3089.154 K	0.01
CO v=0 1-0	Carbon Monoxide	115.271 GHz	115.271 GHz	5.532 K	60 0.01
CO v=2 2-1	Carbon Monoxide	226.34 GHz	226.34 GHz	6145.538 K	0.02
CO v=1 2-1	Carbon Monoxide	228.439 GHz	228.439 GHz	3100.118 K	0.62 0.02
CO v=0 2-1	Carbon Monoxide	230.538 GHz	230.538 GHz	16.596 K	70 0.02
CO+ J=2-1, F=3/2-1/2	Carbon Monoxide Ion	235.70 GHz	235.70 GHz		0.1 0.66
CO+ J=2-1, F=5/2-3/2	Carbon Monoxide Ion	236.063 GHz	236.063 GHz		0.1 1.21
CO v=2 3-2	Carbon Monoxide	339.5 GHz	339.5 GHz	6161.831 K	0.03
CO v=1 3-2	Carbon Monoxide	342.648 GHz	342.648 GHz	3116.561 K	0.71 0.03
CO v=0 3-2	Carbon Monoxide	345.796 GHz	345.796 GHz	33.192 K	70 0.03
CO+ J=3-2	Carbon Monoxide Ion	353.741 GHz	353.741 GHz		0.1 1.21
CO+ J=3-2, F=11/2-5/2	Carbon Monoxide Ion	354.014 GHz	354.014 GHz		0.18 1.71
CO v=2 4-3	Carbon Monoxide	452.645 GHz	452.645 GHz	6183.555 K	0.04
CO v=1 4-3	Carbon Monoxide	456.843 GHz	456.843 GHz	3138.486 K	0.04
CO v=0 4-3	Carbon Monoxide	461.041 GHz	461.041 GHz	55.317 K	60 0.04
CO v=2 5-4	Carbon Monoxide	565.774 GHz	565.774 GHz	6210.707 K	0.06
CO v=1 5-4	Carbon Monoxide	571.021 GHz	571.021 GHz	3165.891 K	0.06
CO v=0 5-4	Carbon Monoxide	576.268 GHz	576.268 GHz	82.974 K	0.06
CO v=2 6-5	Carbon Monoxide	678.88 GHz	678.88 GHz	6243.288 K	0.07
CO v=1 6-5	Carbon Monoxide	685.176 GHz	685.176 GHz	3198.774 K	0.07
CO v=0 6-5	Carbon Monoxide	691.473 GHz	691.473 GHz	116.159 K	100 0.07
CO v=2 7-6	Carbon Monoxide	799.306 GHz	799.306 GHz	6281.296 K	0.08
CO v=1 7-6	Carbon Monoxide	799.306 GHz	799.306 GHz	3237.134 K	0.08
CO v=0 7-6	Carbon Monoxide	806.652 GHz	806.652 GHz	154.872 K	110 0.08
CO v=2 8-7	Carbon Monoxide	905.009 GHz	905.009 GHz	6324.729 K	0.09

Select a line from the list

Filters can be used to narrow the search

Add to Selected Transitions

Selected transitions

Transition \triangle	Description	Rest Frequency \triangle	Sky Frequency
CO v=0 2-1		230.538 GHz	230.538 GHz

Remove from Selected Transitions

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 of B6 12CO (2-1): N...
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type

Spectral Line
 Single Continuum
 Spectral Scan

Polarization products desired XX DUAL FULL

Spectral Setup Errors

Spectral Line

Baseband-1

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth	Resolution (smoothed)	Spec Avg	Representative Window
1(Full)	230.53800 GHz	230.53800 GHz	CO J=1-0	1875.000 MHz (2438 km/s)	976.563 kHz (1.270 km/s)	1	0
	58.594 MHz (76 km/s)	30.518 kHz (0.040 km/s)					
	117.188 MHz (152 km/s)	61.035 kHz (0.079 km/s)					
	234.375 MHz (305 km/s)	122.070 kHz (0.159 km/s)					
	468.750 MHz (610 km/s)	244.141 kHz (0.317 km/s)					
	937.500 MHz (1219 km/s)	488.281 kHz (0.635 km/s)					
	1875.000 MHz (2438 km/s)	976.563 kHz (1.270 km/s)					
	2000.000 MHz (2438 km/s)	31.250 MHz (40.638 km/s)					

Select Lines to Observe in Baseband-1... Add

Baseband-2

Feedback

Validation Validation History Log

Description Suggestion

Overview

Contextual Help Phase I: Science Proposal

Double click this field to select the desired bandwidth/resolution

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 Setup
 - Control and Performance
 - Technical Justification

Editors

Spectral Spatial Spectral Setup

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type

Spectral Line
 Single
 Spectral Line

Spectral specs share a baseband, sum of shares can't exceed 1

Multiple spectral specs, spectral averaging

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Representative Window
1/4	230.30000 GHz	228.16341 GHz	...Enter Name ...	117.188 MHz(154 km/s), 244.141 kHz(0.321 km/s)	1	<input type="radio"/>
1/4	231.10000 GHz	228.95599 GHz	...Enter Name ...	117.188 MHz(153 km/s), 244.141 kHz(0.320 km/s)	1	<input type="radio"/>
1/2	230.53800 GHz	228.39920 GHz	CO v=0 2-1	234.375 MHz(308 km/s), 484.619 kHz(0.636 km/s)	1	<input checked="" type="radio"/>

Select Lines to Observe in Baseband-1... Add Delete

Feedback

Validation Validation History Log

15 errors, 0 warnings

Description
no science case: a science and technical case is a mandatory part of the proposal
Must select a minimum of 1 science keywords
Largest scale is not achievable with the 12m array configuration
Spectral Window name is invalid
Spectral Window name is invalid

Failing to rename a spectral window is a validation error. Please give useful names.

Contextual Help Phase I: Science Proposal

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 Setup
 - Control and Performance
 - Technical Justification

Editors

Spectral Spatial Spectral Setup

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, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Spectral Type Spectral Line Single Spectral Window

Polarization products desired XX None

Spectral Setup Errors

Spectral Line

Baseband-1

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Representative Window
1/4	230.30000 GHz	228.16341 GHz	...Enter Name ...	117.188 MHz(154 km/s), 244.141 kHz(0.320 km/s)	1	<input type="radio"/>
1/4	231.10000 GHz	228.95599 GHz	...Enter Name ...	117.188 MHz(153 km/s), 244.141 kHz(0.320 km/s)	1	<input type="radio"/>
1/2	230.53800 GHz	228.39920 GHz	CO v=0 2-1	234.375 MHz(308 km/s), 484.619 kHz(0.636 km/s)	1	<input checked="" type="radio"/>

Select Lines to Observe in Baseband-1... Add Delete

Feedback

Validation Validation History Log

15 errors, 0 warnings

Description	Suggestion
no science case: a science and technical case is a mandatory	Select the proposal node in the Proposal tab and add a science case
Must select a minimum of 1 science keywords	Select the Proposal node and then add some science keywords (minimum 1 keywords)
Largest scale is not achievable with the 12m array configurations	Select the Control Parameters in the Science Goal and reduce the value or check the
Spectral Window name is invalid	Change the name to something more meaningful
Spectral Window name is invalid	Change the name to something more meaningful

Overview

Contextual Help Phase I: Science Proposal

New: spectral windows can have different total width but still must have the same resolution

Spectral averaging reduces resolution and data rate



Spectral

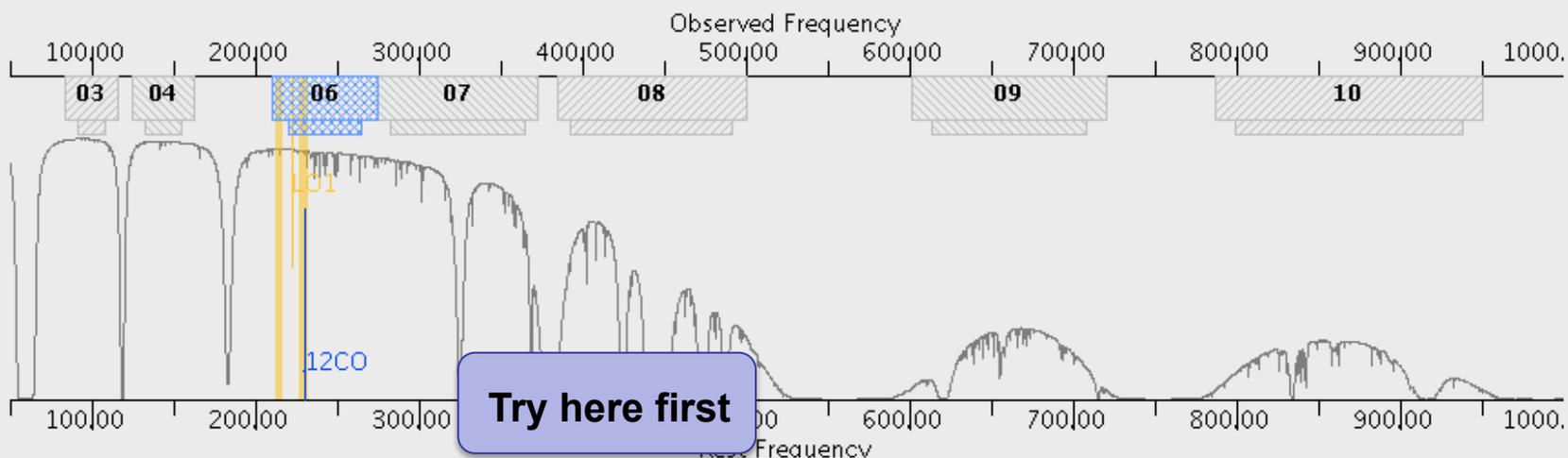
Spectral Setup

Visualisation

In the table below, it is possible to define up to 16 spectral windows, 4 per baseband. Each baseband is 2GHz wide and can be separately configured i.e. each spectral window. Note that for bands 3, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband.

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



Try here first

Overlays:

Receiver Bands Transmission Overlay Lines DSB Image

Select Lines to Overlay

Water Vapour Column Density: Automatic Choice Manual Choice

1.262mm (4th Octile)

Viewport:

Pan to Line

Zoom to Band

Reset

The spectral tab gives you a graphical visualization of the spectral setup. The orange vertical bars are the upper and lower sidebands.



The screenshot shows a software interface for spectral setup. On the left is a 'Project Structure' tree with folders like 'Proposal' and 'Planned Observing'. The main area is titled 'Editors' and contains a 'Spectral' tab. Below the tab is a 'Visualisation' section with a plot of 'Observed Frequency' vs 'Rest Frequency'. The plot shows a green bar for the observed frequency range (approx. 210,000 to 230,000) and a blue hatched area for the rest frequency range. Two yellow vertical bars represent sidebands. A green slider is at the bottom of the plot. A yellow vertical line is labeled 'LO1'. A magnifying glass icon is over the plot. Below the plot are controls for 'Overlays' (Receiver Bands, Transmission, Overlay Lines, DSB Image), 'Water Vapour Column Density' (Automatic Choice, Manual Choice), and 'Viewport' (Pan to Line, Zoom to Band, Reset). A 'Feedback' section is at the bottom with 'Validation', 'Validation History', and 'Log' tabs. A table with 'Description' and 'Suggestion' columns is at the very bottom.

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

Drag the green slider to slide the whole VIEW

Drag the yellow vertical to move the first LO but you probably don't want to

Click in the yellow area to MAGNIFY

When all hope seems lost

Full Continuum & Polarization

ALMA Observing Tool (2014.6) - Proposal test of OT TJ

File Edit View Tool Search Help Perspective 1

Project Structure

- Unsubmitted Proposal
 - Proposal test of OT TJ
 - Proposal
 - Planned Observing
 - ScienceGoal (Science Goal)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration
 - Contrast
 - Technical

Editors

Spectral Spatial Spectral Setup

Spectral Type

Spectral Type

- Spectral Line
- Single Continuum
- Spectral Scan

Polarization products desired

- XX
- DUAL
- FULL

Receiver Band: 10 [787.0-950.0 GHz]

Sky Frequency: 8 [385.0-500.0 GHz]

Rest Frequency: 10 [787.0-950.0 GHz]

Baseband-1

Fractio	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Representativ Window
1(Full)	866.25000 G...	866.25000 G...	Single Continuu...	1875.000 MHz(649 km/s), 31.250 MHz(10.815 km/s)	1	<input type="radio"/>

Baseband-2

1(Full)	868.25000 G...	868.25000 G...	Single Continuu...	1875.000 MHz(646 km/s), 31.250 MHz(10.765 km/s)	1	<input type="radio"/>
---------	----------------	----------------	--------------------	--	---	-----------------------

Baseband-4

1(Full)	872.25000 G...	872.25000 G...	Single Continuu...	1875.000 MHz(644 km/s), 31.250 MHz(10.741 km/s)	1	<input checked="" type="radio"/>
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Template library. Turn the keys on the JTr...

- 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

Standard single continuum setups; new: can be modified with justification

Full Stokes (linear pol) for Bands 3, 6 and 7
New: User can edit frequencies used for full polarization

New: Band 10!

NEW: Width of TDM (time-domain multiplexing pseudo-continuum) windows is shown as 1.875 GHz, results are not changed

Jargon:
Narrower spectral line windows are FDM frequency-domain multiplexing

Automated spectral scan - I



Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure: Proposal, Program

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

Requested end frequency (sky): 107.0 GHz

Requested range (rest): 95.8896 GHz - 108.0020 GHz

Achieved scan range (sky): 95.0 GHz - 110.0 GHz

Bandwidth, Resolution (Hanning smoothed): 1875.000 MHz, 976.563 kHz

Spectral averaging: 1

Representative frequency (sky): 102.50000 GHz

Automated Spectral Scan mode and tunings

There are "issues" with OT time estimates for spectral scans

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

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

File Edit View Tool Search Help

Project Structure

- 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 **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 7m

Number of Antennas 12m 7m TP

Most compact 12m configuration Most extended 12m configuration

Longest baseline (L_{max})

Synthesized beamsize (λ/L_{max})

Shortest baseline (L_{min})

Maximum recoverable scale ($0.6\lambda/L_{min}$)

Desired Performance

Desired Angular Resolution

Largest Angular Structure in source

Desired sensitivity per pointing Jy equivalent to K

Bandwidth used for Sensitivity Frequency Width

Do you request complementary ACA Observations? Yes No

Science goal integration time estimate

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

Are the observations time-constrained? Yes No

Feedback

Validation Validation History Log

Description	Suggestion

Control and Performance defines the required angular resolution, sensitivity, largest angular scale, etc. In conjunction with expected source properties defines dynamic range, S/N, integration times, array configurations

Array properties summarized
New: Varies with declination

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

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 **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 17.276 arcsec 7m 29.615 arcsec

Number of Antennas 12m 36 7m 10 TP 2

Most compact 12m configuration. Most extended 12m configuration.

Longest baseline (L_{max})

Synthesized beamsize (λ/L_{max})

Shortest baseline (L_{min})

Maximum recoverable scale ($0.6\lambda/L_{min}$)

Desired Performance

Desired Angular Resolution 0.00000 arcsec

Largest Angular Structure in source Undefined arcsec

Desired sensitivity per pointing 0.00000 Jy equivalent

Bandwidth used for Sensitivity RepresentativeWindowResolution

Do you request complementary ACA Observations? Yes No

Science goal integration time estimate

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

Are the observations time-constrained? Yes No

Feedback

Validation Validation History Log

Description	Suggestion

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

Specify the desired angular resolution and the largest structure in the map area

New: Use 0 for a true point source. There is no default!

New: LAS = 0" isn't "I don't want to resolve the source," it's "the source can not be resolved by ALMA"

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

File Edit View Tool Search Help

Project Structure

- 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 **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	17.276 arcsec	7m	29.615 arcsec
Number of Antennas	12m	36	7m	10
		Most compact 12m configuration	Most extended 12m configuration	
Longest baseline (L_{max})		0.185 km		5.499 km
Synthesized beamsize (λ/L_{max})		0.994 arcsec		0.033 arcsec
Shortest baseline (L_{min})		0.015 km		0.212 km
Maximum recoverable scale ($0.6\lambda/L_{min}$)		8.123 arcsec		0.541 arcsec

Desired Performance

Desired Angular Resolution: 0.12000 arcsec

Largest Angular Structure in source: 12.0 arcsec

Desired sensitivity per pointing: 0.00000 Jy equivalent to 0.00000 Jy

Bandwidth used for Sensitivity: RepresentativeWindowResolution Frequency

Do you request complementary ACA Observations? Yes No **Suggest**

Science goal integration time: []

Override OT's sensitivity-based ACA recommendation: Yes No

Are the observations time-critical? Yes No

ACA Necessity Estimator

ACA use is recommended

The ALMA Observing Tool suggests this observation *needs* the ACA because the desired largest scale 12.0[arcsec] is large enough relative to the main array recoverable scale.

OK Cancel

Feedback

Description	Suggestion

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

Some combinations of angular scale and resolution require the ACA and/or give 2 12m array configs

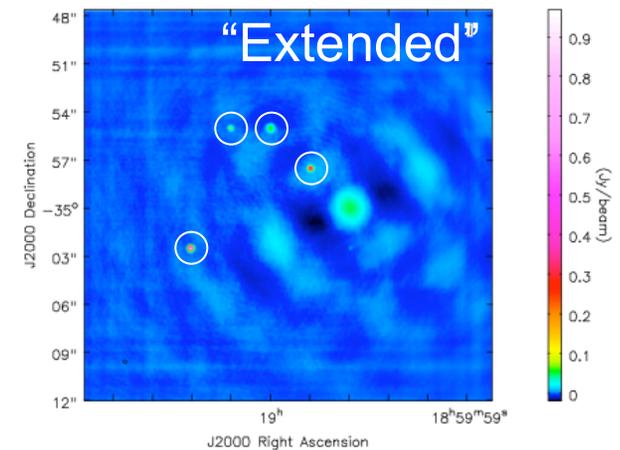
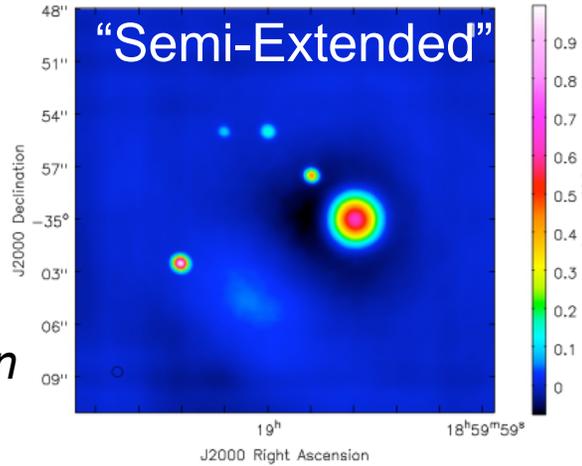
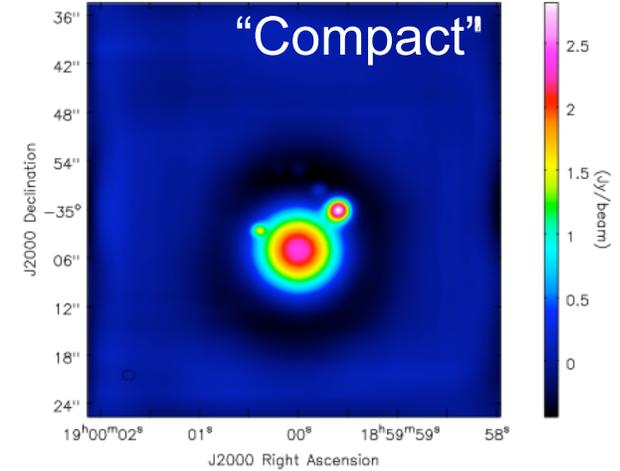
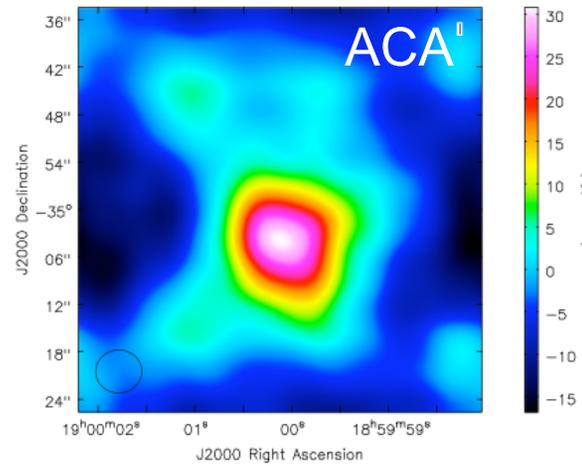
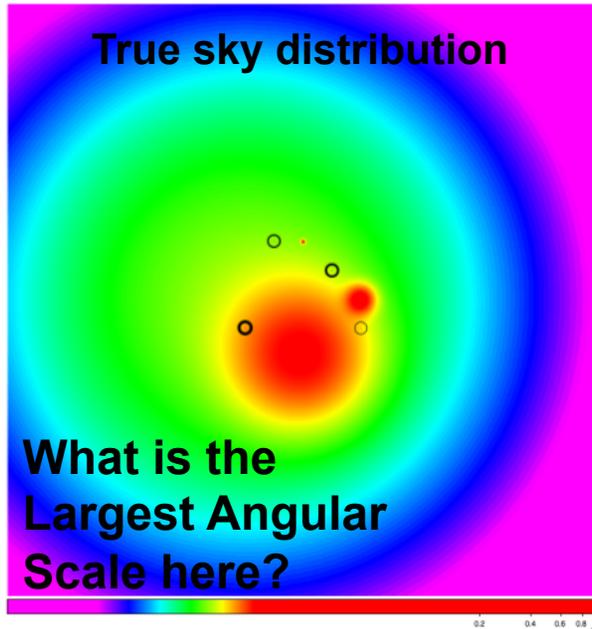
New: Can have 7m ACA without 12m TP

The "Suggest" button will tell you when the ACA is needed

Think about your target...



→ Observed with different ALMA configurations



Credit: Allegro group in Leiden



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

The screenshot shows the 'ALMA LO Configuration Tool' interface. The 'Tool' menu is circled in red, and a red arrow points to the 'Sensitivity Calculator' dialog box. The dialog box is titled 'Sensitivity Calculator' and is divided into several sections:

- Configuration Information:** Includes fields for 'Antenna Beamsize (1.2 * λ / D)', 'Number of Antennas', 'Longest baseline (L_{max})', 'Synthesized beamsize (NL_{max})', 'Shortest baseline (L_{min})', and 'Maximum recoverable scale (0)'. The 'Control and Performance' tab is selected.
- Common Parameters:** Includes fields for 'Dec' (00:00:00.000), 'Polarization' (Dual), 'Observing Frequency' (345.00000 GHz), 'Bandwidth per Polarization' (0.00000 GHz), 'Water Vapour' (Automatic Choice), 'Column Density' (0.913mm (3rd Octile)), 'tau/Tsky' (tau=0.158, Tsky=44.400 K), and 'Tsys' (153.577 K).
- Individual Parameters:** A table with columns for '12m Array', '7m Array', and 'Total Power Array'.

	12m Array	7m Array	Total Power Array
Number of Antennas	34	9	2
Resolution	0.00000 arcsec	5.974554 arcsec	17.923662 arcsec
Sensitivity(rms) (equivalent to)	0.00000 Jy	0.00000 Jy	0.00000 Jy
Integration Time	Infinity K	0.00000 K	0.00000 K
- Buttons:** 'Calculate Integration Time', 'Calculate Sensitivity', and 'Close'.

The background shows a tree view of the 'Unsubmitted Proposal' and a 'Template library'.

Time estimates - I

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

File Edit View Tool Search Help Perspective 1

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	10.00 mJy
Bandwidth used for sensitivity	0.122 MHz
Representative frequency (sky, first source)	337.06 GHz
Precipitable water vapour (all sources)	0.658mm (2nd Octile)

Time required for largest 12-m array

Time on source per pointing (first source)	22.17 min [22.08 min]
Total number of pointings (all sources)	1
Number of tunings	1
Total time on source	22.17 min [22.08 min]
Calibration time	27.98 min
Other overheads	20.10 min
Total time for 1 SB execution	1.17 h
Number of SB executions	1
Total time to complete SB	1.17 h

Calibration Breakdown per SB execution

3 x Pointing	54.00 s
1 x SidebandRatio	1.68 min
1 x Amplitude	2.60 min
2 x Bandpass	15.20 min
4 x Phase	2.40 min
2 x Phase reference check source	1.20 min
6 x Atmospheric	4.00 min

Additional Arrays

Number of additional 12-m configurations	1
Time required for additional 12-m	35.13 min
ACA 7-m time (t_12m x 2)	2.34 h
Total ACA time (max[t_7-m,t_TP])	2.34 h

Estimated total time for science goal 4.10 h

OK

Observations, including the required antenna configurations and integration times.

7m 29.615 arcsec

7m 10 TP 2

Configuration Most extended 12m configuration

5.499 km

0.033 arcsec

0.212 km

0.541 arcsec

0.12000 arcsec

12.00000 arcsec

0.01 Jy equivalent to 7.47375

RepresentativeWindowResolution Frequency Wid

Yes No

Yes No

Yes No

New: Total power will not be scheduled when 12m+7m synthesis suffice

Suggestion

You can see how much time you need and get a breakdown

Time estimates - II



Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

ALMA OT - Information

Estimated time

Requested sensitivity	2.4640 mJy
Bandwidth used for sensitivity	0.977 MHz
Representative frequency (sky, first source)	102.50 GHz
Precipitable water vapour (all sources)	5.186mm (7th Octile)

ALMA 12m Array - 34 antennas

Time on source per pointing (first source)	4.83 min
Total number of pointings (all sources)	23
Estimated number of tunings required	4
Total time on source	7.41 h
Total time on calibrators	4.46 h
Total overheads	105.60 min
Total 12m array time (inc. calibration & overheads)	13.63 h

Calibration Breakdown

16 x SidebandRatio	26.93 min
12 x Pointing	3.60 min
16 x Amplitude (inc. AtmosphericCal)	52.27 min
16 x Bandpass (inc. AtmosphericCal)	1.54 h
48 x Phase (inc. AtmosphericCal)	1.01 h
48 x Atmospheric	32.00 min
Additional calibration overheads	1.45 h

Additional 12M Array Configurations

No of 12M Array Configurations	2
Additional overhead for extra configurations	6.82 h

Estimated total time for science goal 20.45 h

OK

... aspects of the observations, including the required antenna configurations and integration times.

60.328 arcsec 7m 103.420 a

34 7m 9

Most compact 12m

508 km 0.166 km

400 arcsec 3.642 arcsec

041 km 0.014 km

913 arcsec 25.511 arcsec

0.22674 K equivalent to 0.00246 Jy

FinestResolution Frequency Width 0.976563 MHz

Yes No Suggest

Time Estimate

...sues? (must be justified) Yes No

Multiple array configuration time estimates based on resolution and largest angular scale.



Time constrained observing



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 Control and Performance

Do you request complementary ACA Observations? Yes No Suggest

Science goal integration time estimate Time Estimate

Is more time required due to u,v coverage issues? (must be justified) Yes No

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

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

Feedback

Overview

Contextual Help Phase I: Science Proposal

Tech Justification New for Cycle 3



File Edit View Tool Search Help Perspective 1

Project Structure

- Proposal
- Program
- Unsubmitted Proposal
 - Observing Tool for ALMA Cycle3 Ground Station
 - 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

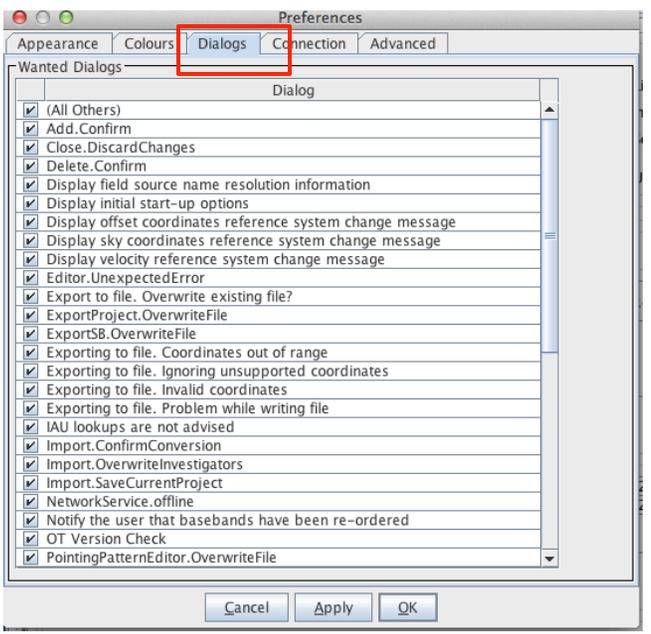
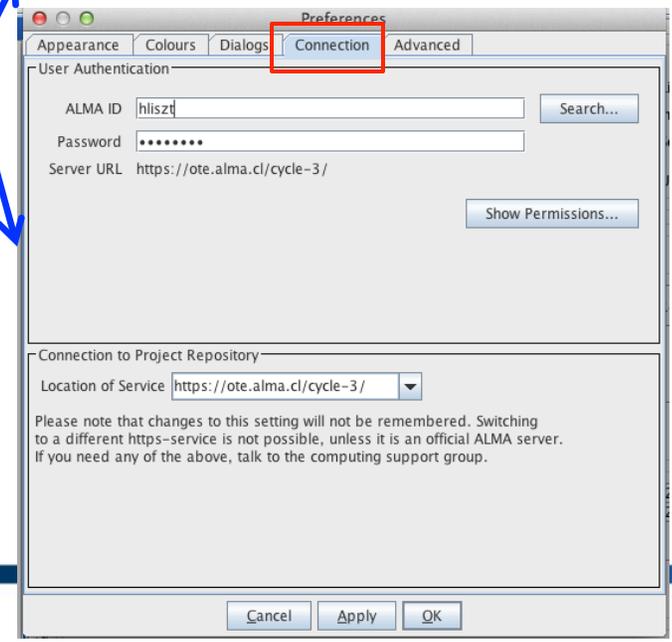
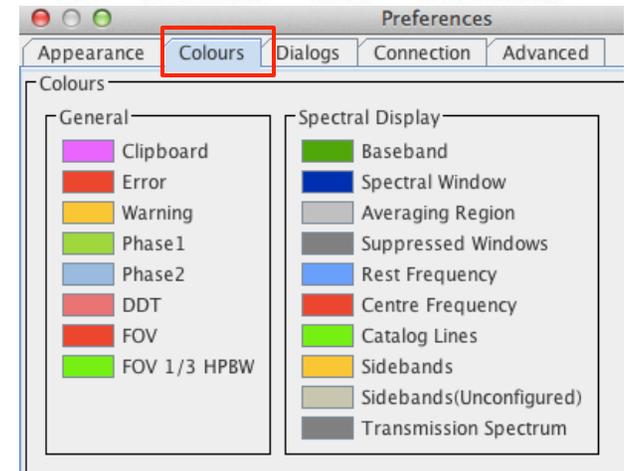
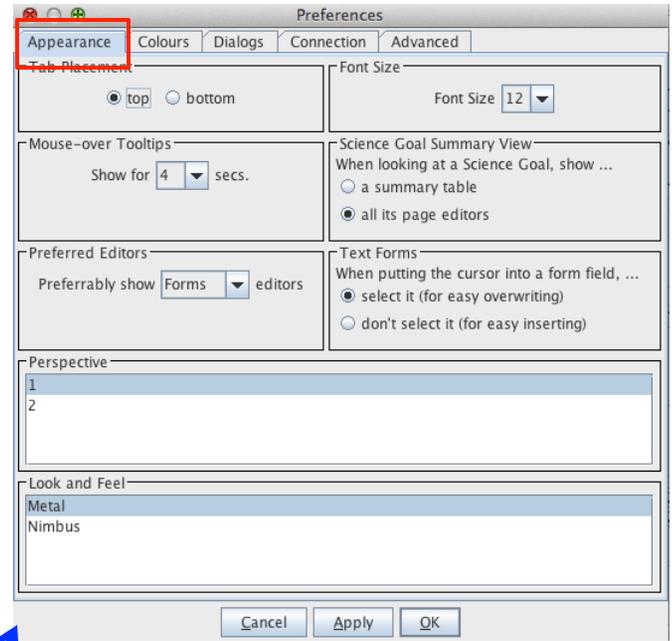
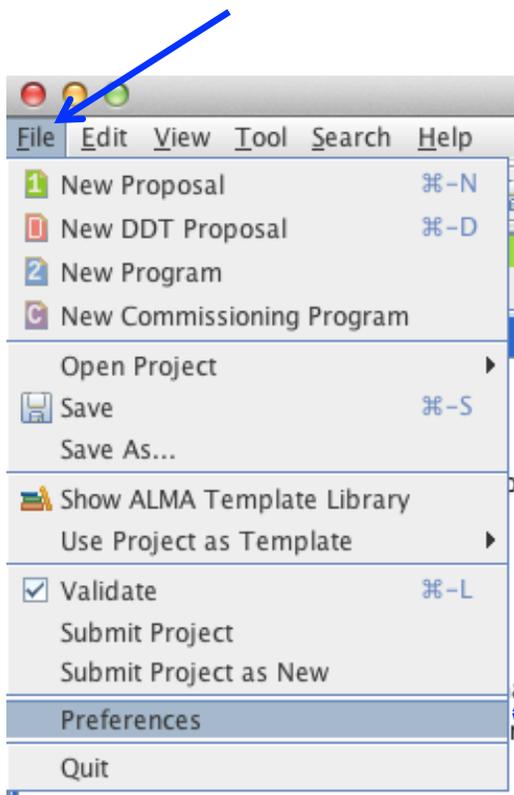
Justify your correlator set-up with particular reference to the number of spectral resolution elements per line width. You may want to consider spectral averaging to lower the data rate

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)

Use preferences to customize



ALMA Observing Tool (2014.6) - Bulge Asymmetries and Dynamical Evolution (BAaDE) (2013.1.01180.S last submitted 2014-11-14 17:52:31)

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 (lsjouwer@nrao.edu)
Export selected Scheduling
Generate a PDF of Whole P
Disable Edit Protect

Display Project Time Summary

New: Project-level Total Time and Data Volume Summary can also be seen after right-click on Proposal

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	

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

The screenshot shows the 'Project - Observing Tool for ALMA, version Cycle2Test2' window. The 'File' menu is open, highlighting the 'Validate' option. A blue callout box points to 'Validate' with the text: 'Click here to make sure that your project can be validated by the OT. If it won't, you will not be able to submit (submission also validates)'. Another blue callout box points to 'Submit Project' with the text: 'When you are satisfied that your proposal is complete, click here to submit your project to the ALMA Archive'. A red-bordered box on the right contains a note: 'NOTE: Projects submitted to the archive are indelibly watermarked with the Cycle # and CAN'T be submitted in other cycles. They can be used as templates but you might wish to save a "pristine copy"'. The 'Overview' section at the bottom left contains a list of instructions: 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. The 'Overview' section at the bottom right features a workflow diagram: 'New Science Proposal' (green arrow) → 'Create Science Goals' (green arrow) → 'Validate Science Proposal' (green arrow) → 'Submit Science Proposal' (green arrow). Below this, it says 'Click on the overview steps to view the contextual help'. There are also buttons for 'Importing And Exporting', 'Template Library', 'Need More Help?', and 'View Phase 2 Steps'.

Click here to make sure that your project can be validated by the OT. If it won't, you will not be able to submit (submission also validates)

NOTE: Projects submitted to the archive are indelibly watermarked with the Cycle # and CAN'T be submitted in other cycles. They can be used as templates but you might wish to save a "pristine copy"

When you are satisfied that your proposal is complete, click here to submit your project to the ALMA Archive

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3. Click on the **proposal tree node and complete the relevant fields.**

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

Summary: New for Cycle 3 OT



For Cycle 3, there are a relatively small number of *major* new "ALMA" features:

- + Band 10 (780 – 950 GHz)
- + Free choice of TDM frequency for continuum/polarization (with justification)
- + 36 12-m array, 10 7-m array, 2 TP (use of ACA w/o TP)

There are more new "OT" features:

- + *Sesame* is now used to query source information (*but still check all returned info!!*)
- + A Science Goal can contain multiple sources with rectangular field definitions
- + The TP mapping area is automatically calculated for custom mosaics or single pointings
- + Import/export of pointing positions has been updated slightly
- + Absolute positions can be used for pointing centers
- + "Point source" button has been removed, use 0 for LAS, *there is no default*

- + Various improvements to time-constrained interface
- + Technical Justification node completely overhauled
- + Total time for a proposal can be displayed in the main OT GUI – Under "Tool" in menu bar





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.

