

# ALMA Observing Tool [OT]:

*How to turn your great idea into an ALMA proposal*



**Megan Ansdell**  
UC Berkeley

Atacama Large Millimeter/submillimeter Array  
Karl G. Jansky Very Large Array  
Very Long Baseline Array



Thank you to Arielle Moullet & Harvey Liszt & Ian Czekala

# Downloading the ALMA OT

**Use the Web Start version  
[will update automatically]**

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

NRAO Associated Universities, Inc. NSF

Log in

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

Search Site

### Observing Tool

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

### Download & Installation

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

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

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

Webstart Tarball

### Documentation

Extensive documentation is available to help you work with the OT and optimally prepare your proposal:

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

[<https://almascience.nrao.edu/proposing/observing-tool>]



# Information You'll Need to Get Started

**Source(s):** Coordinates, RVs, PMs (for nearby sources), ephemerides (for Solar System objects)  
*[your responsibility to make sure these are correct]*

**Frequency/spectral:** frequency, bandwidth, spectral resolution needed to achieve science  
*[you must set up the correlator; templates available but spectral setups can get complicated for many lines]*

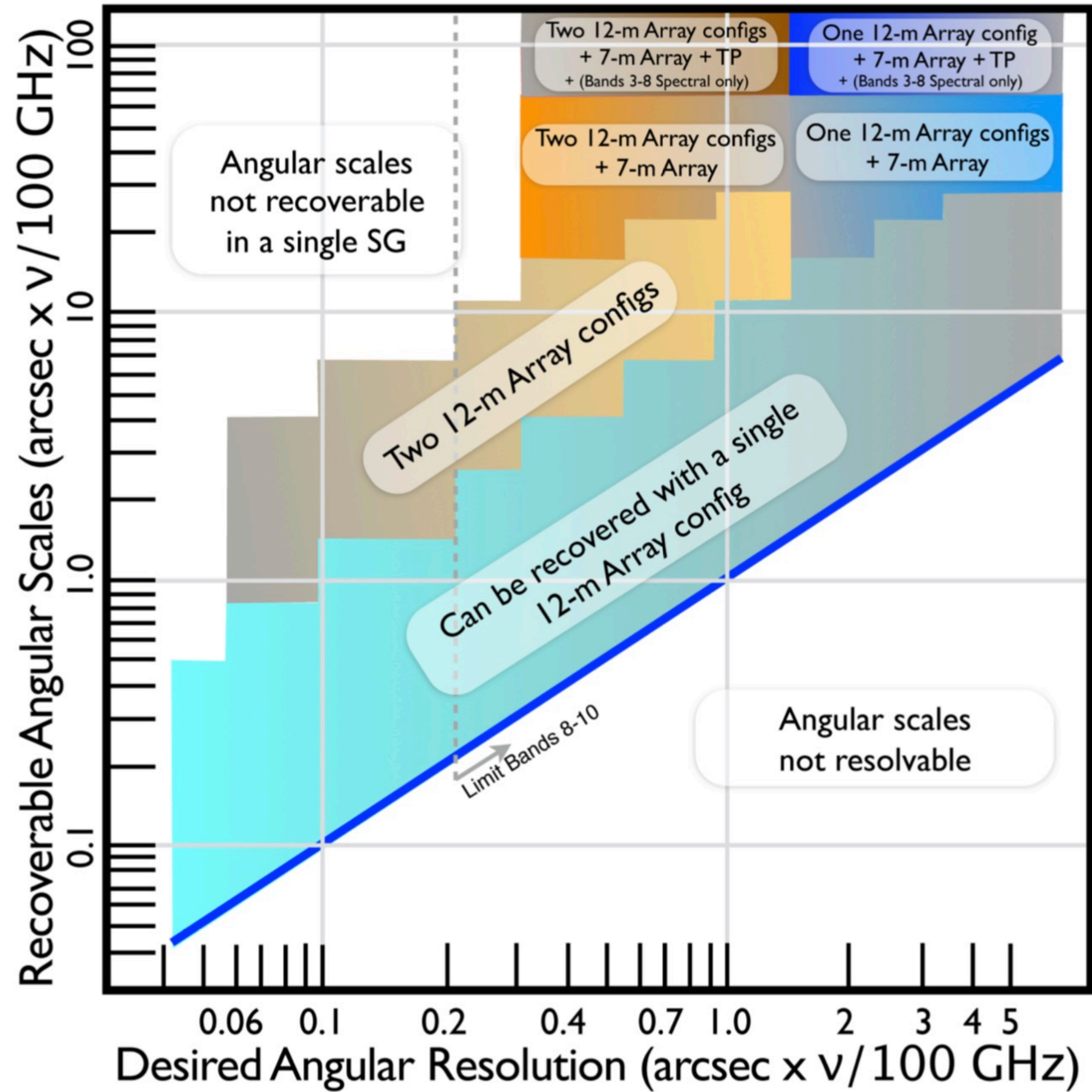
**Resolution/scales:** angular resolution (largest baselines), largest angular scale (shortest baselines)  
*[OT decides required baselines automatically; can require multiple array configurations to recover all scales]*

**Mapping area:** if desired FOV larger than primary beam, will need mosaic  
*[sensitivity of primary beam decreases w/distance from field center; mosaic if source  $> 1/3$  primary beam]*

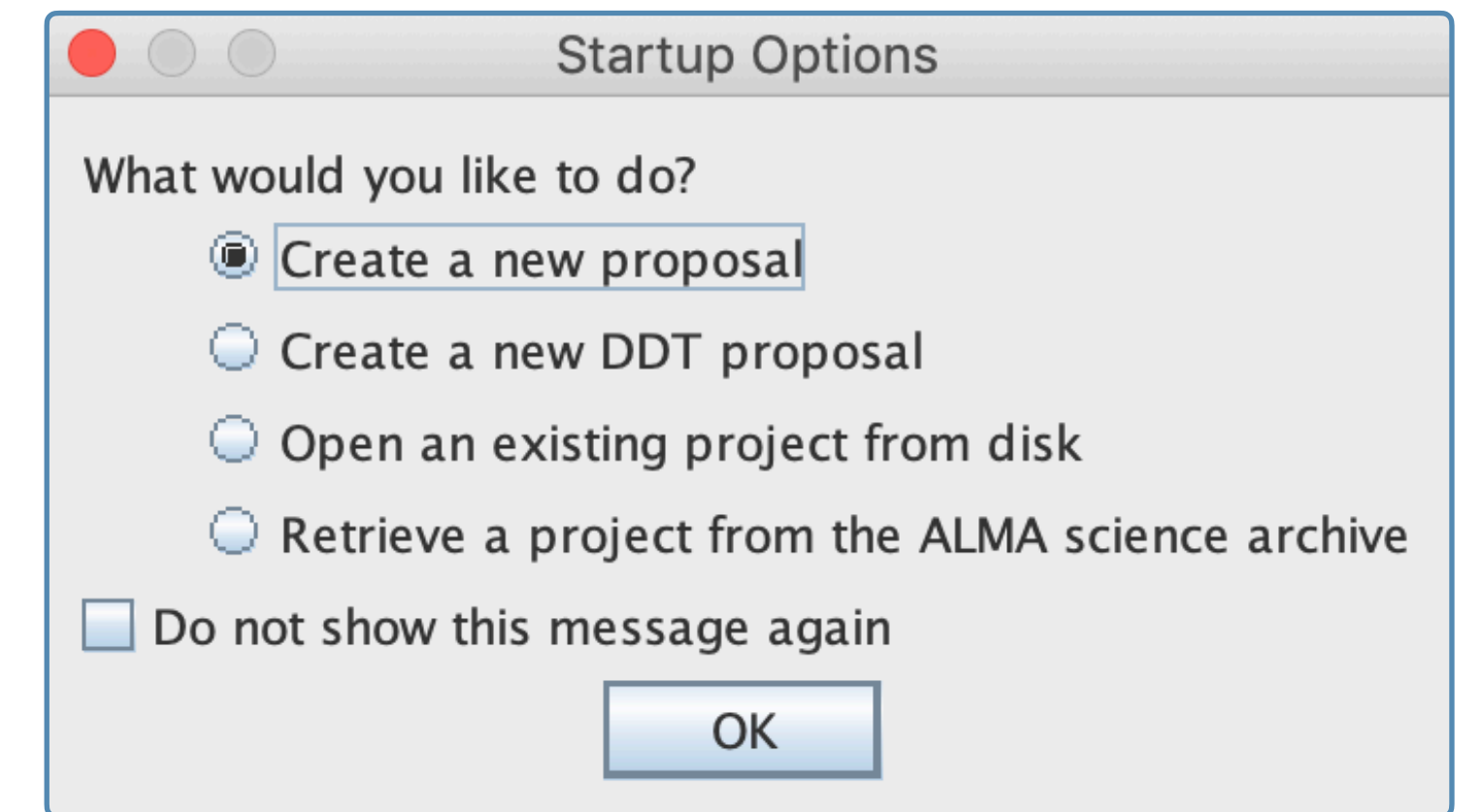
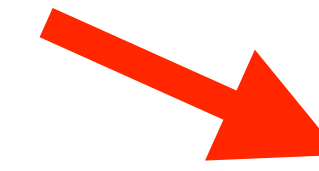
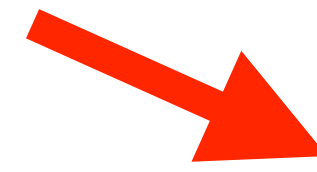
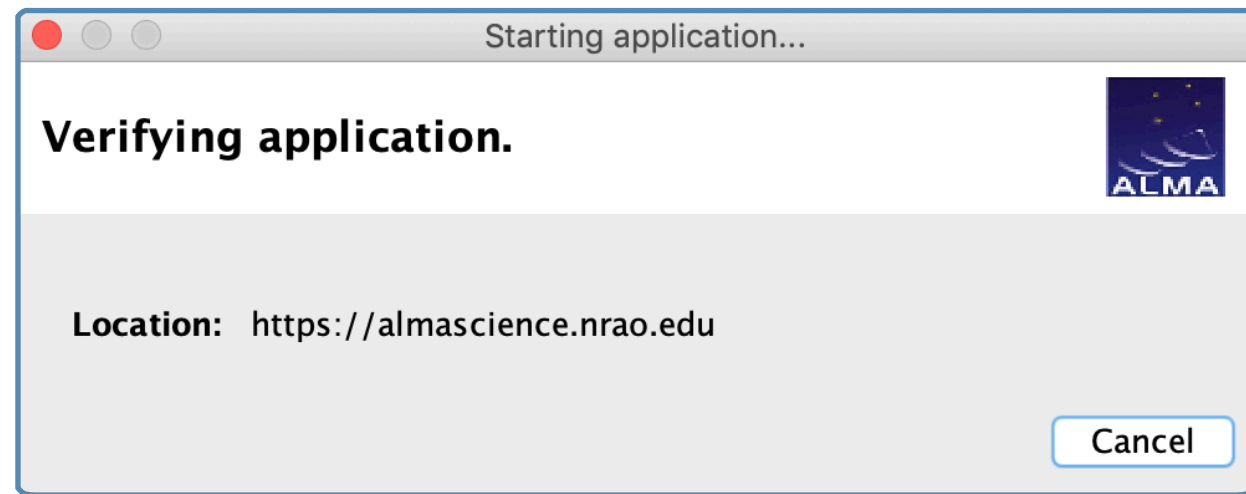
**Sensitivity:** required sensitivity (per synthesized beam!) to detect source  
*[beware: source that appears bright in large beam may be faint in smaller beam if source size unknown]*

**Dynamic Range:** ratio of brightest to faintest emission (achievable rms suffers when  $> 50-100$ )  
*[becomes a problem with nearby bright sources when target is faint; use ALMA simulator + self-calibration]*

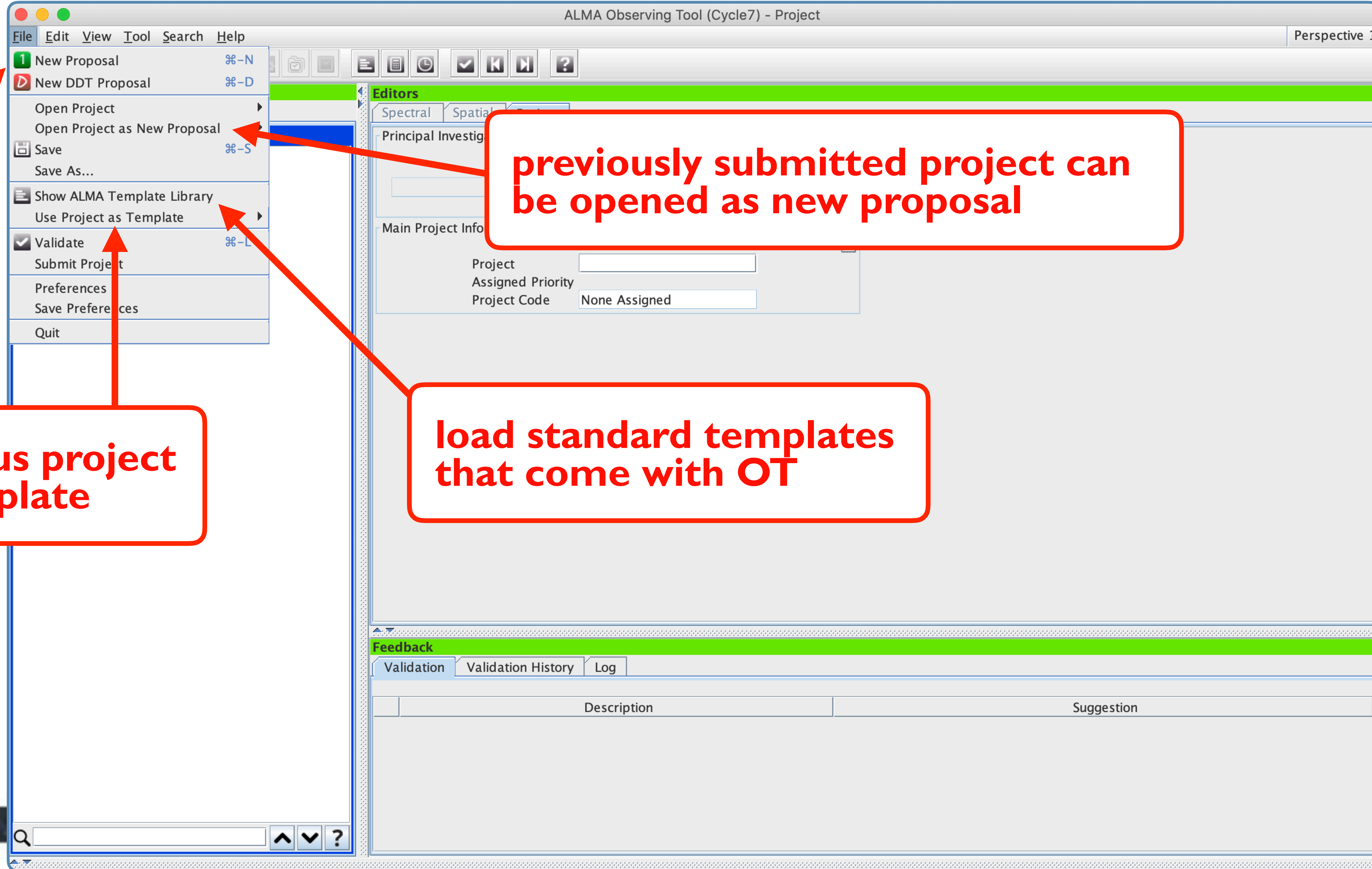




# Starting up the OT



# Setting up a New Project



Start fresh with empty proposal

load previous project as new template

previously submitted project can be opened as new proposal

load standard templates that come with OT



# Setting up a New Project

click here

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help

Perspective 1

**Project Structure**

Proposal Program

Unsubmitted Proposal

- Megan's Awesome Proposal
  - Proposal

**Editors**

Spectral Spatial Proposal

Proposal Information

Proposal Title: Megan's Awesome Proposal

Proposal Cycle: 2019.1

Abstract (max. 1200 characters)

Proposal Type

Regular  Target Of Opportunity  
 VLBI  Large Program

Scientific Category

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

Please select one or two keywords

- Debris disks
- Disks around low-mass stars
- Disks around high-mass stars
- Exo-planets
- Solar system - Comets

Student project

Related Proposals

Previous Proposals



# Setting up a New Project

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help Perspective 1

**Project Structure**

Proposal Program

Unsubmitted Proposal

Megan's Awesome Proposal

Proposal

**Editors**

Spectral Spatial Proposal

Previous Proposals

Investigators

Type	Full name	Email	Affiliation	ALMA ID	Executive
PI	Megan Ansdell	ansdell@berkeley.edu	Department of Astro...	mansdell	North America

Investigator search constraints

Name contains Megan Ansdell

Find Investigators

Full name	Email	Affiliation	ALMA ID
Megan Ansdell	ansdell@berkeley.edu	Department of Astr...	mansdell

Select PI Add CoPI Add Col Remove Collaborator Add from Proposal

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

**Duplicate observations**

Briefly justify any new observations that duplicate archival data or accepted programs. Information regarding the ALMA Duplication Policy and how to search archival data and accepted programs can be found at: <http://almascience.org/proposing/duplications>.

Observatory Use Only

Scroll down to select PI / CoIs from registered ALMA users

Need to justify any duplicate observations!





# Uploading Your Science Case

The screenshot shows the ALMA Observing Tool interface for 'Megan's Awesome Proposal'. The 'Proposals' section is active, displaying a table of investigators. A search dialog is open, showing search constraints for 'Megan Ansdell'. The 'Science Case' field is highlighted with a red box, indicating it is a mandatory PDF upload.

Type	Full name	Email	Affiliation	ALMA ID	Executive
PI	Megan Ansdell	ansdell@berkeley.edu	Department of Astro...	mansdell	North America

Investigator search constraints:

Name contains

Find Investigators

Full name	Email	Affiliation	ALMA ID
Megan Ansdell	ansdell@berkeley.edu	Department of Astr...	mansdell

Select PI Cancel

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

Duplicate observations

Briefly justify any new observations that duplicate archival data or accepted programs. Information regarding the ALMA Duplication Policy and how to search archival data and accepted programs can be found at: <http://almascience.org/proposing/duplications>.

Observatory Use Only

**Highly recommended to use proposal template as-is!**



# Uploading Your Science Case

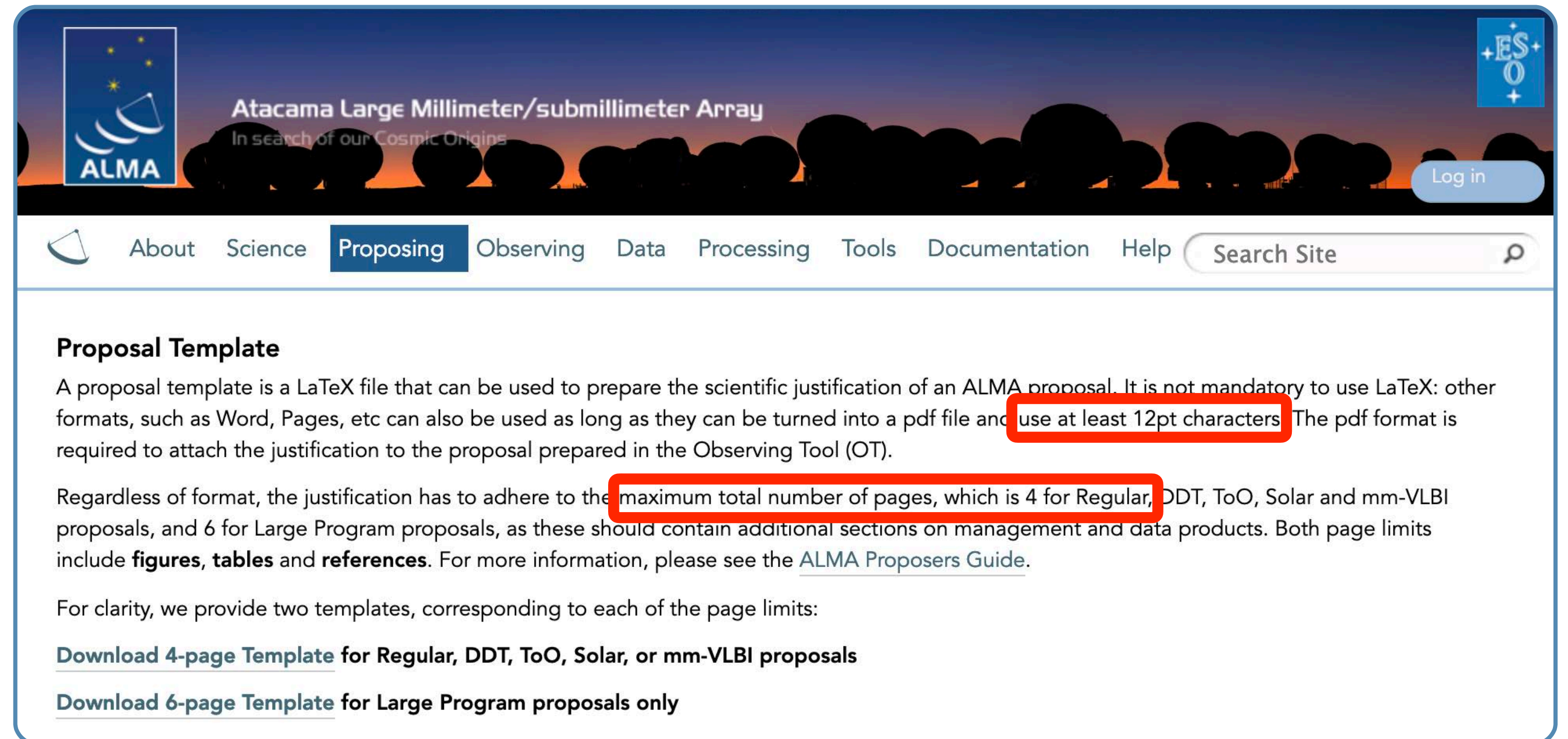
## You **MUST** include:

- *Astronomical importance*
- *Estimate of intensity of targets*
- *Justification of requested SNR*
- *Size of target sample*

## You may include:

- *Figures & tables*
- *References (must be self-contained)*
- *Simulations (see afternoon tutorial)*

*Using proposal template (as-is!) is strongly encouraged*



The screenshot shows the ALMA Science website's 'Proposing' page. The header includes the ALMA logo, the text 'Atacama Large Millimeter/submillimeter Array' and 'In search of our Cosmic Origins', and the ESO logo. A navigation menu contains 'About', 'Science', 'Proposing', 'Observing', 'Data', 'Processing', 'Tools', 'Documentation', and 'Help'. A search bar is labeled 'Search Site'. The main content area is titled 'Proposal Template' and contains the following text:

A proposal template is a LaTeX file that can be used to prepare the scientific justification of an ALMA proposal. It is not mandatory to use LaTeX: other formats, such as Word, Pages, etc can also be used as long as they can be turned into a pdf file and **use at least 12pt characters**. The pdf format is required to attach the justification to the proposal prepared in the Observing Tool (OT).

Regardless of format, the justification has to adhere to the **maximum total number of pages, which is 4 for Regular, DDT, ToO, Solar and mm-VLBI proposals, and 6 for Large Program proposals**, as these should contain additional sections on management and data products. Both page limits include **figures, tables and references**. For more information, please see the [ALMA Proposers Guide](#).

For clarity, we provide two templates, corresponding to each of the page limits:

- [Download 4-page Template for Regular, DDT, ToO, Solar, or mm-VLBI proposals](#)
- [Download 6-page Template for Large Program proposals only](#)

[<https://almascience.eso.org/documents-and-tools/proposing/proposal-template>]

# Setting up a Science Goal

brief description of SG  
(not seen by reviewer)

click to make  
a new SG

Scroll down to see summary  
of all the SG components

drag & drop  
SG templates

The screenshot shows the ALMA Observing Tool (Cycle7) interface for 'Megan's Awesome Proposal'. The interface is divided into several panes:

- Project Structure:** A tree view on the left showing the proposal hierarchy. Under 'Planned Observing', a 'ScienceGoal (Megan's Awesome Science Goal)' is highlighted. Below it, sub-items like 'General', 'Field Setup', 'Spectral Setup', 'Calibration Setup', 'Control and Performance', and 'Technical Justification' are visible.
- Editors:** A central pane with tabs for 'Spectral', 'Spatial', and 'ScienceGoal (Megan's Awesome Science Goal)'. The 'ScienceGoal' tab is active, showing a 'General (Optional)' section with a 'Science Goal Name' field containing 'Megan's Awesome Science Goal' and a 'Description' field with the text 'This project will do awesome science.'.
- Cycle5 Template Library (read-only):** A pane at the bottom left showing a list of ScienceGoal templates. One template, 'ScienceGoal (B7 Continuum: Pluto/Charon)', is highlighted. An arrow points from this template to the 'ScienceGoal' entry in the Project Structure pane.
- Object Properties:** A pane on the right showing details for the object 'IM Lup'. It includes fields for 'System' (ICRS), 'Name of object' (Unspecified), 'Source Coordinates' (RA: 15:56:09.1765, Dec: -37:56:06.119), 'Source Radial Velocity' (-1.000 km/s), and 'Target Type' (Individual Pointing(s)).



# Inputting Your Targets

General target info can be resolved;  
Solar System objects can be selected

click to add/  
edit targets

The screenshot shows the ALMA Observing Tool (OT) interface. On the left is the 'Project Structure' pane with a tree view under 'Unsubmitted Proposal' containing 'Megan's Awesome Proposal' and 'ScienceGoal (Copy of B7 Continuum: Pluto/Charon)'. The 'Field Setup' sub-item is selected. The main 'Editors' pane is in the 'Field Setup' tab, showing fields for 'Source Name' (IM Lup), 'Source Coordinates' (RA: 15:56:09.1765, Dec: -37:56:06.119), 'Source Radial Velocity' (-1.000 km/s), and 'Target Type' (Individual Pointing(s)). A 'Resolve' button is next to the source name. Below these are 'Expected Source Properties' and 'Field Center Coordinates' sections. At the bottom are buttons for 'Add Source', 'Load from File...', 'Export to File...', 'Clone Source', 'Delete Source', and 'Delete All Sources'.

Used throughout OT  
(e.g. to calculate SNR,  
dynamic range in TJ)

Add, clone, import,  
delete sources

mosaic?



# Correlator / Spectral Window Setup

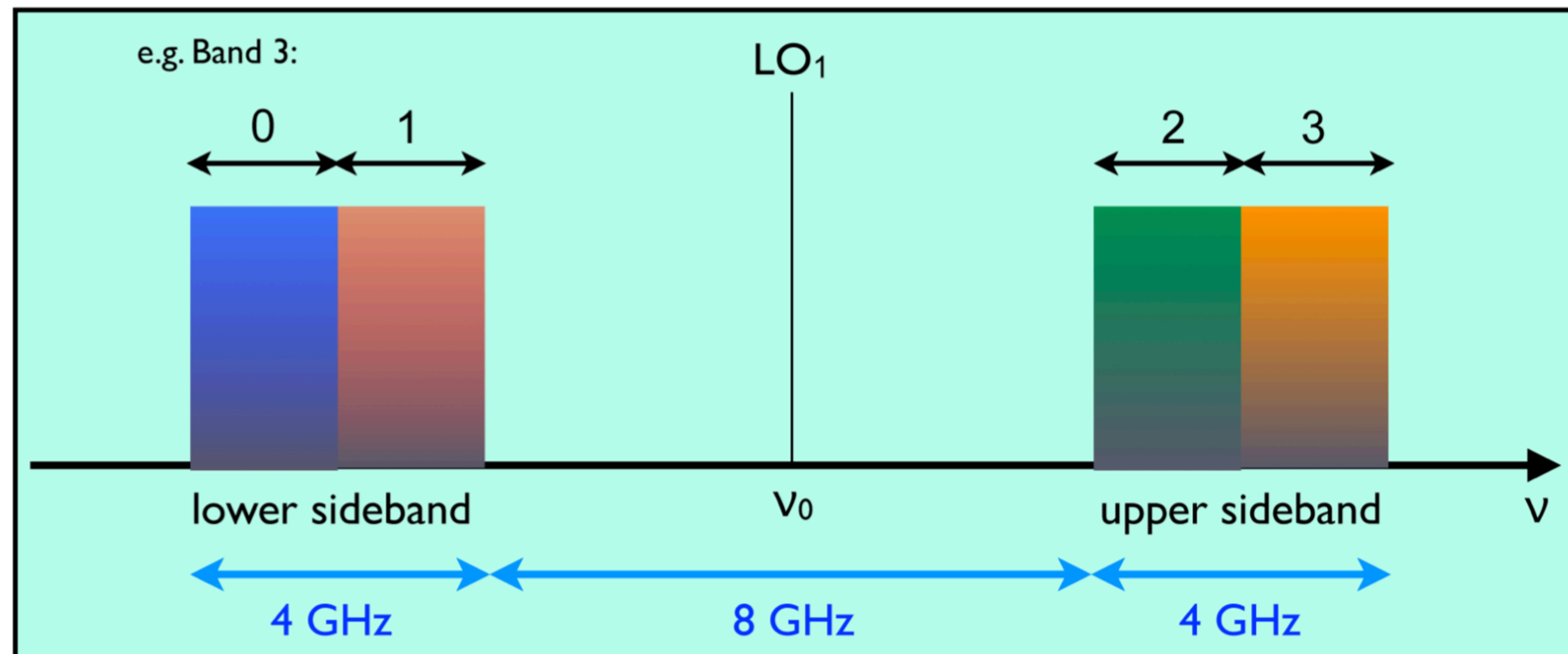


Figure 31: A graphical view of basebands and sidebands. Basebands may be tuned to overlap if the user wishes, or may be located so as to maximize the total bandwidth (as shown). Each baseband may be further subdivided into as many as 8 spectral windows. Up to four spectral windows per baseband will be available during Cycle 7.

Each antenna's receiver outputs 4x2GHz basebands in each polarization, which are fed into the correlators that combine the signals from individual antennas



**Table 2: Spectral Capabilities per baseband for observations in dual polarization**

Mode	Polarization*	Band width (MHz)	Nchan	Chan. Spacing (MHz)	Spectral Resolution <sup>†</sup> 300 GHz (km/s)
FDM	Dual	1875	3840	0.488	0.98
FDM	Dual	938	3840	0.244	0.49
FDM	Dual	469	3840	0.122	0.24
FDM	Dual	234	3840	0.061	0.12
FDM	Dual	117	3840	0.0305	0.061
FDM	Dual	58.6	3840	0.0153	0.031
TDM	Dual	2000 <sup>‡</sup>	128	15.625	31.2

The correlators sample each baseband according to a correlator mode that determines the total bandwidth, number of channels, and spectral resolution

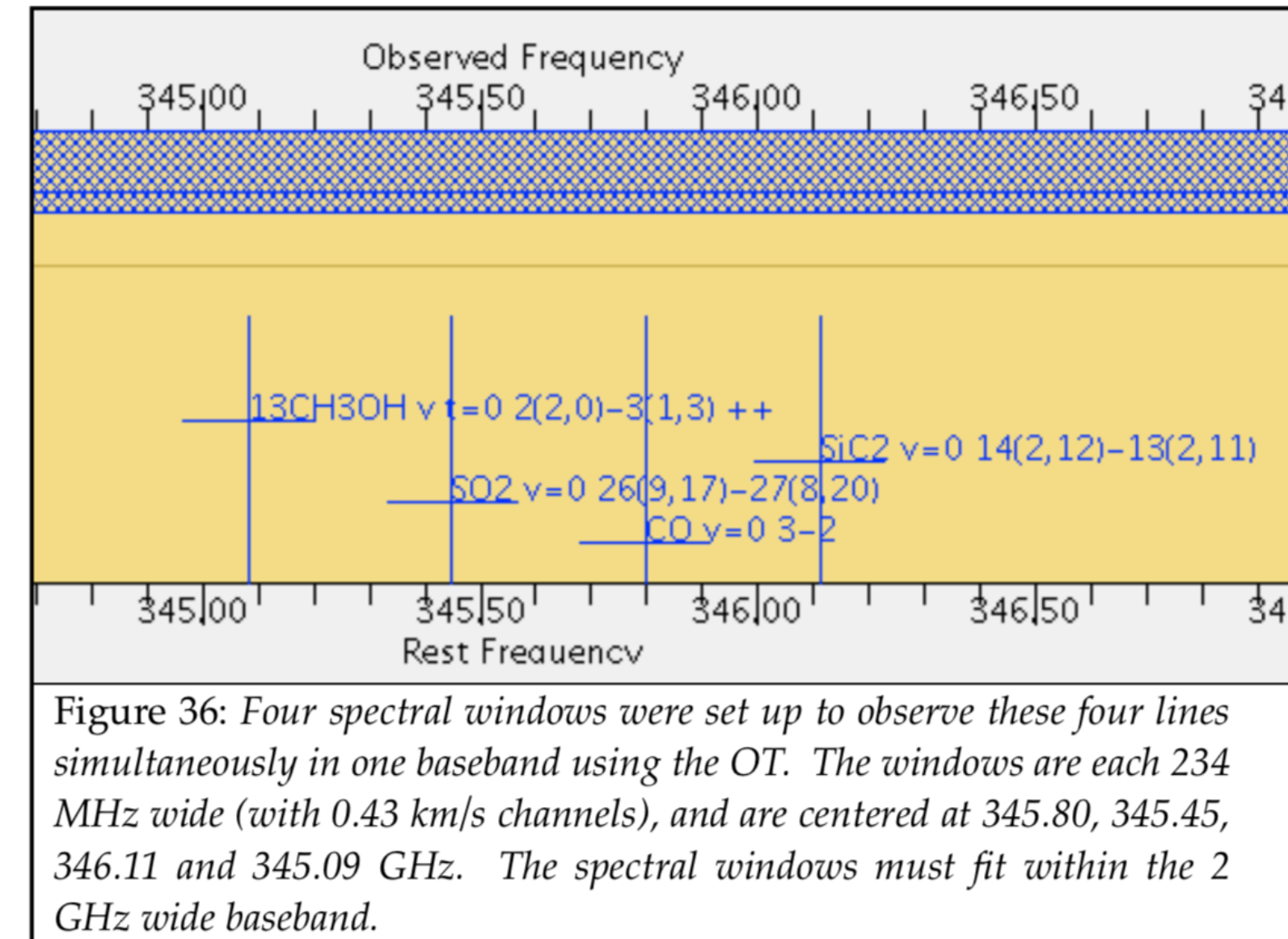


Figure 36: Four spectral windows were set up to observe these four lines simultaneously in one baseband using the OT. The windows are each 234 MHz wide (with 0.43 km/s channels), and are centered at 345.80, 345.45, 346.11 and 345.09 GHz. The spectral windows must fit within the 2 GHz wide baseband.

Basebands can be divided into up to 8 spectral windows; useful for observing multiple spectral lines

# Correlator / Spectral Window Setup

The screenshot shows the ALMA Observing Tool (Cycle7) interface for 'Megan's Awesome Proposal'. The 'Project Structure' pane on the left shows a tree view with 'Spectral Setup' highlighted. The main 'Editors' pane is set to 'Spectral Setup' and displays a spectral plot with 'Observed Frequency' and 'Rest Frequency' axes. The plot shows a continuum signal with several absorption lines. A red box labeled 'useful visualizer' points to the plot area. Below the plot are controls for 'Overlays' (Receiver Bands, Transmission, DSB Image, Spectral Lines), 'Water Vapour Column Density' (Automatic Choice, Manual Choice), and 'Viewport' (Pan to Spectral Window, Zoom to Band, Reset). The 'Spectral Type' section has radio buttons for 'Spectral Line', 'Single Continuum' (selected), and 'Spectral Scan'. Other options include 'Produce image sidebands (Bands 9 and 10 only)' and 'Polarization products desired' (XX, DUAL, FULL). The 'Receiver Band' is set to 7 [275.0-373.0 GHz], 'Sky Frequency' is 343.50000 GHz, and 'Rest Frequency' is 343.498854 GHz.

click to setup spectral windows

useful visualizer

simplest case: continuum only (optimized atm. transparency)



# Correlator / Spectral Window Setup

**Click to add spectral lines**

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help

Project Structure

- Unsubmitted Proposal
  - Megan's Awesome Proposal
    - Proposal
      - Planned Observing
        - ScienceGoal (Megan's Awesome Science Goal)
          - General
          - Field Setup
          - Spectral Setup**
          - Calibration Setup
          - Control and Performance
          - Technical Justification
        - ScienceGoal (Copy of B7 Continuum: Pluto/Charon)

Editors

Spectral Spatial Spectral Setup

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  
**No spectral window in the list. No suitable receiver band for the range :[0.0 GHz, 0.0 GHz]**

Spectral Line

Fraction	Centre Freq (rest, hel)	Centre Freq (sky, hel)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window

Baseband-1

Baseband-2

Baseband-3

Baseband-4

Buttons: Add spectral window centred on a spectral line, Add spectral window manually, Delete, Show image spectral windows

**Opens Splatalogue line picker**

**Or add manually (useful for cont.)**



# Splatalogue: spectral line picker

Create spectral windows centred on spectral lines

**Transition Filter**  
C180\*2-1\*  
e.g. CO\*2-1\* or \*oxide\*  
 Include description

**Frequency Filters**  
ALMA Band: 1-10  
Sky Frequency (GHz):  
Min: 31.3 Max: 950

**Receiver/Back End Configuration**  
 All lines  
 Potentially selectable lines  
 Lines in defined spws  
 Filtering unobservable lines

**Upper-state Energy (K)**  
Min: 0 Max: 0

**Molecule Filter / Environment**  
Show: all atoms and molecules

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

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

Transition ^	Description	Rest Frequency ^	Sky Frequency	Upper-state Energy	Lovas Intensity	Sij $\mu^2$	Catalog
C180 2-1	Carbon Monoxide	219.560358 GHz	219.561090 GHz	15.806 K	3.5	0.025 D <sup>2</sup>	Offline

**Search for line & double click to add to baseband (max. 4)**

[Add to spectral window list](#)

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

Transition ^	Description	Rest Frequency ^	Sky Frequency
C180 2-1	Carbon Monoxide	219.560358 GHz	219.561090 GHz
13CO v=0 2-1		220.398684 GHz	220.399419 GHz

[Remove spectral window\(s\)](#)

Cancel Ok





# Correlator / Spectral Window Setup

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help

Project Structure: Unsubmitted Proposal, Megan's Awesome Proposal, Proposal, Planned Observing, ScienceGoal (Megan's Awesome Science Goal), General, Field Setup

Editors: Spectral, Spatial, Spectral Setup

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: Baseband-1 : Bandwidth and channel spacing must be set to all spectral windows.

Fraction	Centre Freq (rest, hel)	Centre Freq (sky, hel)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1(Full)	219.56036 GHz	219.56109 GHz	C18O 2-1	58.594 MHz ( 80 km/s), 30.518 kHz ( 0.042 km/s)	1	<input checked="" type="radio"/>
				58.594 MHz ( 80 km/s), 30.518 kHz ( 0.042 km/s)		
				117.188 MHz ( 160 km/s), 61.035 kHz ( 0.083 km/s)		
				234.375 MHz ( 320 km/s), 122.070 kHz ( 0.167 km/s)		
				468.750 MHz ( 640 km/s), 244.141 kHz ( 0.333 km/s)		
				937.500 MHz ( 1280 km/s), 488.281 kHz ( 0.667 km/s)		
				1875.000 MHz ( 2560 km/s), 976.563 kHz ( 1.333 km/s)		
				1875.000 MHz ( 2560 km/s), 31.250 MHz (42.669 km/s)		

Divide baseband into up to 4 spectral windows for multiple spectral lines

Choose correlator mode (bandwidth & resolution)

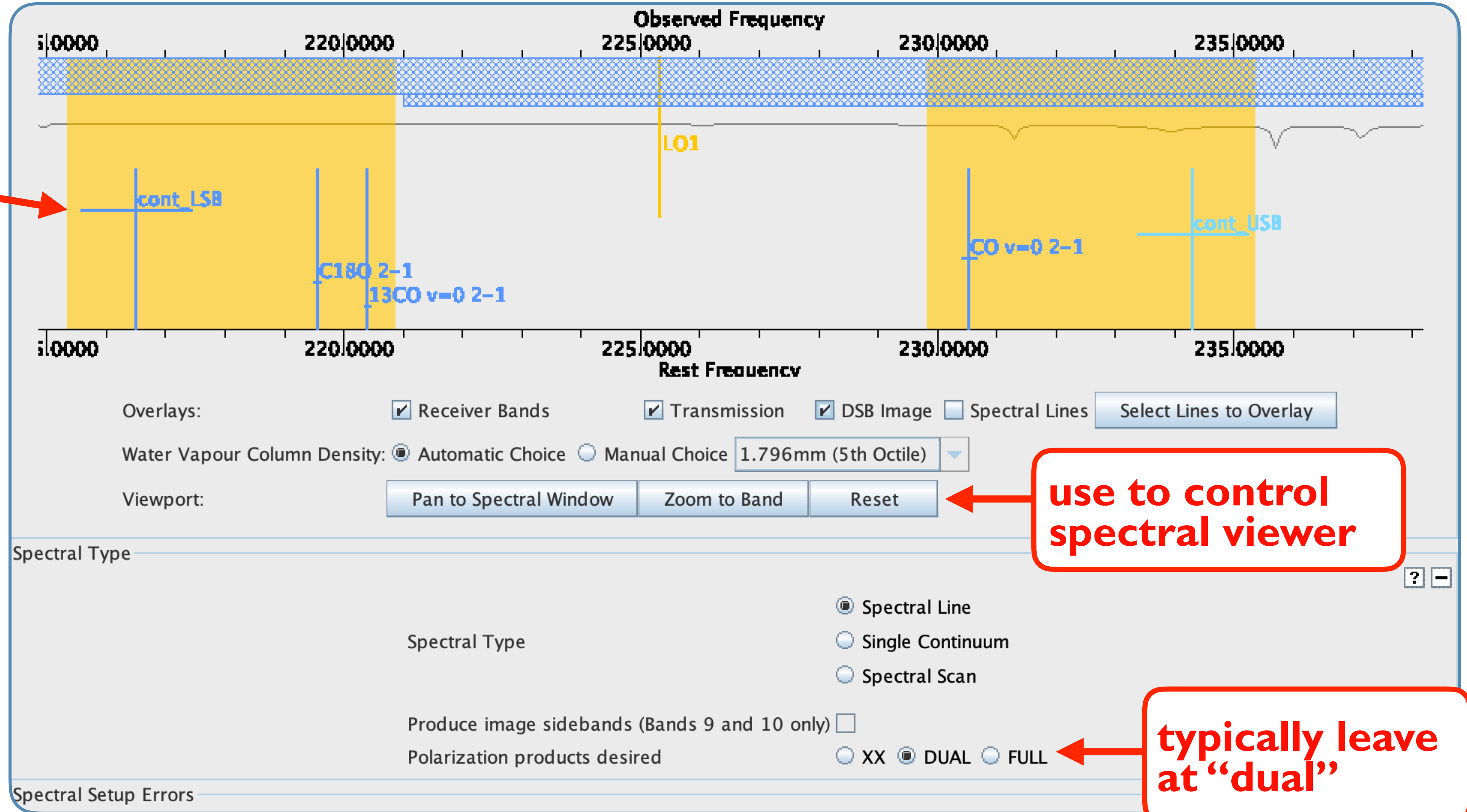
channel averaging (e.g., to reduce data rate/volume)

Leave as "dual" in most cases



# Correlator / Spectral Window Setup

fill basebands with continuum for calibrations



use to control spectral viewer

typically leave at "dual"



# Angular Resolution & Sensitivity

The screenshot shows the 'Control and Performance' configuration page in the NRAO proposal software. The interface includes a 'Project Structure' tree on the left and a main configuration area on the right. The configuration area is divided into sections: 'Configuration Information', 'Desired Performance', and 'Bandwidth used for Sensitivity'. The 'Desired Performance' section contains fields for angular resolution and sensitivity, with radio buttons for 'Single', 'Range', 'Any', and 'Standalone ACA'. The 'Bandwidth used for Sensitivity' section includes a dropdown for 'AggregateBandWidth' and a 'Frequency Width' field. A 'Time Estimate' button is located at the bottom of the configuration area.

**click for resolution & sensitivity** →

**Any = useful for point sources**  
**Range = many acceptable values**

**specify smallest and largest angular scales** →

**specify sensitivity (Jy/beam noise)** →

**Finally, click to get time estimate** →

**For lines, bandwidth for sensitivity  $\geq$  channel spacing in spectral window** →



**[https://science.nrao.edu/opportunities/courses/  
alma-instructional-videos/alma-single-dish](https://science.nrao.edu/opportunities/courses/alma-instructional-videos/alma-single-dish)**



# Observing 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	0.1000 mJy
Bandwidth used for sensitivity	4.219 GHz
Representative frequency (sky, first source)	219.565 GHz

**Estimated Total time for Science Goal** 1.14 h

Cluster 1 Cluster 2

Source Name	RA	Dec	Velocity
IM Lupi	15:56:09.1765	-37:56:06.119	-1.000 km/s
RU Lupi	15:56:42.3109	-37:49:15.473	-6.400 km/s

**Possible Configuration Combinations**

12-m (1)	12-m (2)	7-m	TP	Nominal Beam(")	Max expected axial ratio
C43-4	C43-1	No	No	0.403 x 0.448	1.5

**Input Parameters**

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

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

Time on source per pointing (first source)	2.52 min [ 2.24 min]
Total number of pointings (all sources)	2
Number of tunings	1
Total time on source	5.04 min [4.47 min]
Total calibration time	13.17 min
Other overheads	1.92 min
Total time for 1 SB execution	20.12 min
Number of SB executions	1
Total time to complete SB	20.12 min

**Calibration Breakdown per SB execution**

2 x Pointing	4.00 min
1 x Amplitude/bandpass	5.00 min

Close

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	0.1000 mJy
Bandwidth used for sensitivity	4.219 GHz
Representative frequency (sky, first source)	219.565 GHz

**Estimated Total time for Science Goal** 1.14 h

Cluster 1 Cluster 2

**Input Parameters**

Precipitable water vapour (all sources)	1.796mm (5th Octile)
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Total number of pointings (all sources)	2
Number of tunings	1
Total time on source	5.04 min [4.47 min]
Total calibration time	13.17 min
Other overheads	1.92 min
Total time for 1 SB execution	20.12 min
Number of SB executions	1
Total time to complete SB	20.12 min

**Calibration Breakdown per SB execution**

2 x Pointing	4.00 min
1 x Amplitude/bandpass	5.00 min
2 x Phase	60.00 s
2 x Atmospheric	1.33 min
Calibration overheads	1.83 min

**Additional Arrays**

Time required for additional 12-m	14.10 min
-----------------------------------	-----------

**Estimated total time for cluster 2** 34.22 min

Close

**Total SG time can change drastically with small amount of on-source time if new execution required!**

**OT will group targets within 10 deg into single scheduling block**

**and decide needed or available configurations**

**OT will calculate required calibrations**

**and total observing time per cluster, broken down by arrays**



# Technical Justification

OT automatically calculates SNR, dynamic range, etc.

click to add/edit tech. justification

Separate sections for sensitivity imaging, correlator

OT highlights potential issues

Make sure to justify what is requested

ALMA Observing Tool (Cycle7) - Visualizing protoplanetary disk evolution (2018.1.00519.S last submitted 2018-0

File Edit View Tool Search Help

Project Structure

Proposal Program

SUBMITTED

- Visualizing protoplanetary disk evolution
  - Proposal
    - Planned Observing
      - ScienceGoal (Bright targets)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification
      - ScienceGoal (Moderate targets)
      - ScienceGoal (Faint targets)

Editors

Spectral Spatial Technical Justification

Sensitivity

Requested RMS over 7.500 GHz is 90.00 uJy For a peak flux density of 10.00 mJy, the S/N is 111.1

Achieved RMS over the total 7.500 GHz bandwidth is 84.05 uJy For a continuum flux density of 10.00 mJy, the achieved S/N is 119.0

For a peak line flux of 50.00 mJy, the achieved S/N over 1/3 of the source line width ( 4.00 km/s / 3 = 1.33 km/s ) is 6.8

Line width / bandwidth used for sensitivity ( 4.00 km/s / 10267.81 km/s ) = 0.0004

Note that the bandwidth used for sensitivity is larger than 1/3 of the linewidth.  
The S/N achieved for a resolution element that allows the line to be resolved will be lower than that reported.

Spectral Dynamic Range (continuum flux / line rms): 1.36

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

For line observations also justify the bandwidth used for the sensitivity calculation.  
We require a continuum rms of 90 microJy per beam in the aggregate 7.5 GHz bandwidth to detect dust emission from our targets with at least SNR=10 when resolved in the requested 0.1" beam. The sources have been marginally resolved in previous ALMA observations at 0.3" resolution (Ansdell et al. 2017), thus their outer dust radii are well constrained. We include the 12CO line at 1.27 km/s bandwidth to look for trace amounts of molecular CO without any cost in continuum sensitivity; these sources have already been detected and resolved in 12CO (Ansdell et al., in prep) thus we do not request to repeat those observations here.

Imaging

Requested angular resolution 100.00 mas

Requested Largest Angular Scale 1.20 arcsec

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

Our primary goal is to compare the structure of young and nearby Lupus disks to those of older and more distant sigma Orionis disks. Our previous ALMA Band 6 survey of Lupus disks had an angular resolution of 0.3" (Ansdell et al. 2018), which equates to 20 AU radial scales at the 150 pc distance of the Lupus clouds. We therefore choose an angular resolution of 0.1" for our proposed observations, as this corresponds to the same disk radial scales (20 AU) at the 400 pc distance of sigma Orionis. Our largest angular scale of 1.2" translates to 240 AU radial scales for sigma Orionis disks, which is sufficient to cover the expected disk sizes in the continuum, as our previous ALMA observations at 0.3" resolution (Ansdell et al. 2017) marginally resolved these disks and constrained their sizes to << 1.0".



# Validating & Submitting Your Proposal

**Projects must be validated before they are submitted**

*Validation can take a while for large/complicated projects!*

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help

- New Proposal ⌘-N
- New DDT Proposal ⌘-D
- Open Project
- Open Project as New Proposal
- Save ⌘-S
- Save As...
- Show ALMA Template Library
- Use Project as Template
- Validate ⌘-L**
- Submit Project
- Preferences
- Save Preferences
- Quit

Editors

Spectral Spatial Project

Principal Investigator [?]  
Megan Ansdell (ansdell@berkeley.edu) Select PI...

Main Project Information [?]  
Project Megan's Awesome Proposal  
Assigned Priority  
Project Code None Assigned

Feedback

Validation Validation History Log

Description	Suggestion
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# Validating & Submitting Your Proposal

**Submit proposal early! Do not wait until last minute.**

*You can submit as often as needed [server gets busy near deadline]*

ALMA Observing Tool (Cycle7) - Megan's Awesome Proposal

File Edit View Tool Search Help

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Editors

Spectral Spatial Project

Principal Investigator

Megan Ansdell (ansdell@berkeley.edu) Select PI...

Main Project Information

Project Megan's Awesome Proposal

Assigned Priority

Project Code None Assigned

Feedback

Validation Validation History Log

Description	Suggestion
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# OT Resources

## ALMA Help Desk

Questions answered within 48 hours (faster on week of deadline)  
[<https://help.almascience.org/>]

## Documentation

OT User Manual, OT Reference Manual, OT trouble-shooting page  
[<https://almascience.nrao.edu/documents-and-tools>]

## Video Tutorials

Visual demonstrations of OT usage (produced in Cycle 6)  
[<https://almascience.eso.org/proposing/observing-tool/video-tutorials>]

## Simulation Tutorials

Check that your observations are feasible in chosen configuration  
[<https://casaguides.nrao.edu/index.php/ALMAguides>]

