

# ALMA Proposal Preparation: The Observing Tool

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*In collaboration with ARC's Team*

ASTROCHEMISTRY WITH ALMA  
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# Outline

- ◆ Early Science Cycle-0: **Capabilities**
- ◆ Glossary
- ◆ Early Science Cycle-0: **Constraints**
- ◆ Phases of Proposal Submission (Phase I and Phase II)
- ◆ ALMA SCIENCE PORTAL
- ◆ ALMA Observing Tool Structure

# ALMA Early Science (ES) Cycle 0

## Timeline

- ◆ Call Cycle 0: 30 March 2011
- ◆ Deadline: 30 June 2011 (~2 weeks)
- ◆ Start of ALMA Cycle 0 observing: Autumn 2011
- ◆ End of ALMA Cycle 0: 30 June 2012

## ES Capabilities

- ◆ 16 antennas
- ◆ 2 Configurations: compact (18m - 125m) -- extended (36m - 400m)
- ◆ Single field interferometry plus mosaics with up to 50 pointings
- ◆ 4 Bands: B3 (3mm), B6 (1mm), B7 (0.85mm), and B9 (0.45mm)
- ◆ 14 spectral/continuum correlator modes available for Cycle 0
- ◆ The ~30% of the available time for the first call, ~500-600 hrs
- ◆ Typical ES project should be 4-10 hrs and delivers results

# ES-Cycle 0 Properties

R. Neri's Lectures for definitions of Angular Resolution, FOV, ...

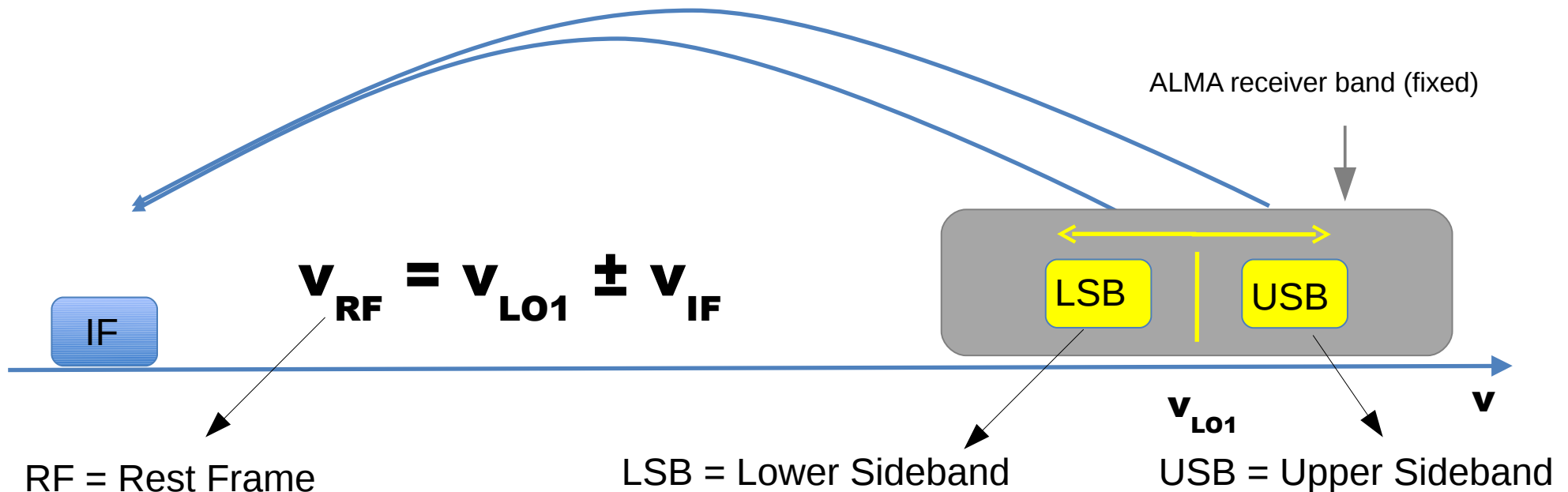
5 $\sigma$ , 1h, Continuum,  
8 GHz per Pol, Dual Pol.

3 $\sigma$ , 4h, Line, 1 km/s  
Sp. Res., Dual Pol.

Band	Frequency [GHz]	Angular Resolution ["]	Maximum Scale ["]	$T_{bc}$ [mK]	Flux [mJy]	$T_{bl}$ [K]	Field of View ["]
Properties of the Compact Configuration (baselines of ~18 m to ~125 m)							
3	100	5.3	21	0.65	0.14	0.030	62
6	230	2.3	9	1.0	0.20	0.029	27
7	345	1.55	6	1.8	0.37	0.043	18
9	675	0.80	3	15	3.2	0.27	9
Properties of the Extended Configuration (baselines of ~36 m to ~400 m)							
3	100	1.56	10.5	7.6	0.14	0.35	62
6	230	0.68	4.5	11	0.20	0.34	27
7	345	0.45	3.0	20	0.37	0.50	18
9	675	0.23	1.5	175	3.2	3.1	9

# Sidebands

- Most radio astronomy receivers have 2 sidebands: caused by mixing the sky signal with a local oscillator (LO)
- Sidebands are mapped to a lower frequency band
  - IF (Intermediate Frequency) range sets width and separation of sidebands
  - Differs for different bands
- Varying LO1 causes the sidebands to move
- 8 GHz bandwidth is available**

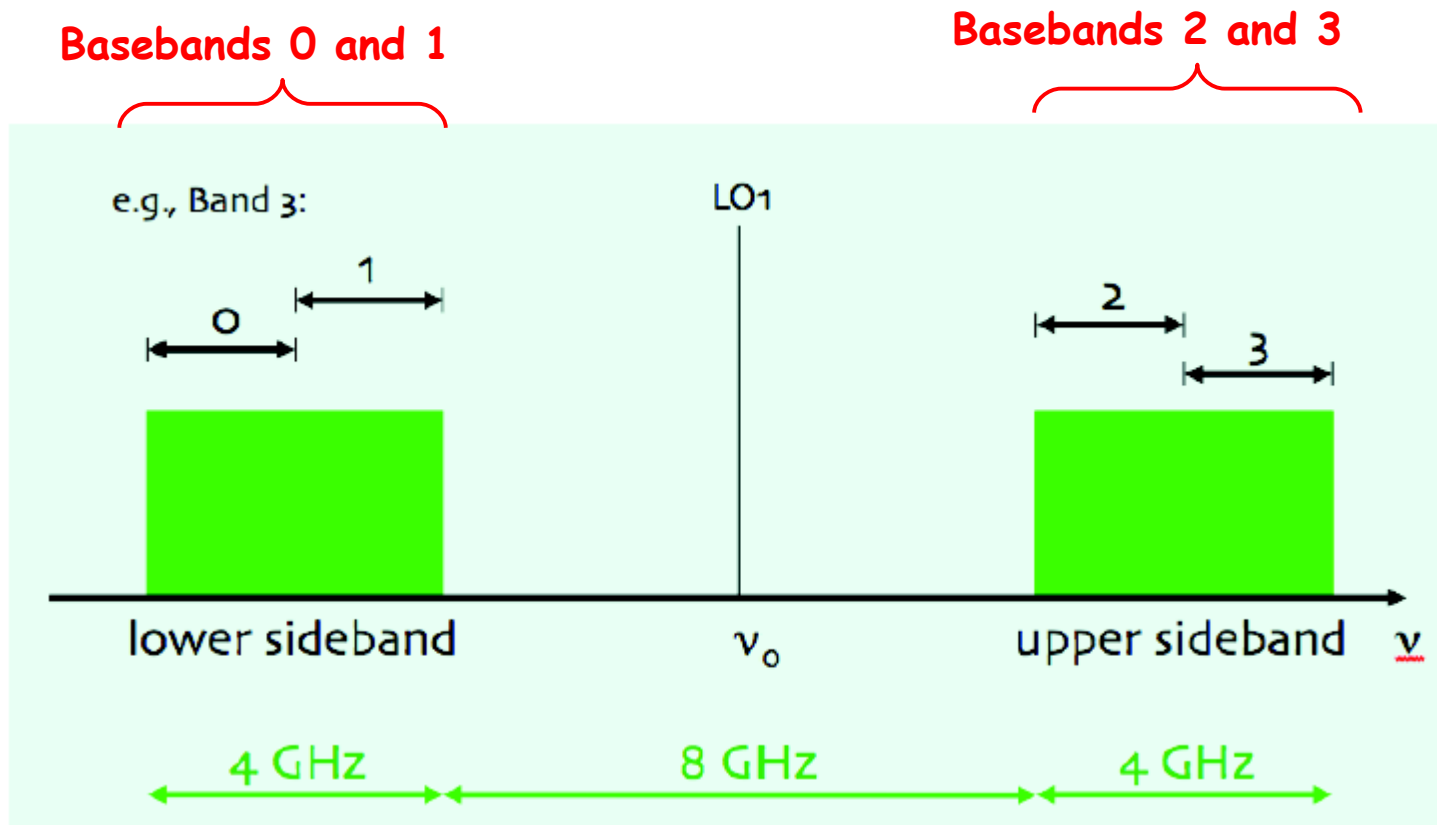


# Sidebands

- ◆ ALMA usually allows both sidebands (LSB & USB) to be used
  
- ◆ ALMA has two kinds of receivers with two sidebands
  - i. Sidebands Separating (2SB - from B3 to B8)
  - ii. Double Sideband (DSB, B9 and B10)
  - iii. Both are present at ES-Cycle 0

# Basebands

- ◆ A **2 GHz** wide portion of the available signal which is digitized at the antenna
- ◆ The **4 available Basebands** (0, 1, 2, and 3) can be placed in one sideband or distributed between the 2 Sidebands
- ◆ The **maximum available 8 GHz bandwidth** is achieved when the 4 basebands are chosen not to overlap



# Spectral Window (SPW)

- ❖ A Spectral Window is a frequency subrange of a Baseband
- ❖ The Spectral Windows are the “the data” (e.g., molecular lines)
- ❖ In **Early Science**, only **one Spectral Window per Baseband** is available and all of the Spectral Windows in all Basebands must use the **same Bandwidth and Resolution**

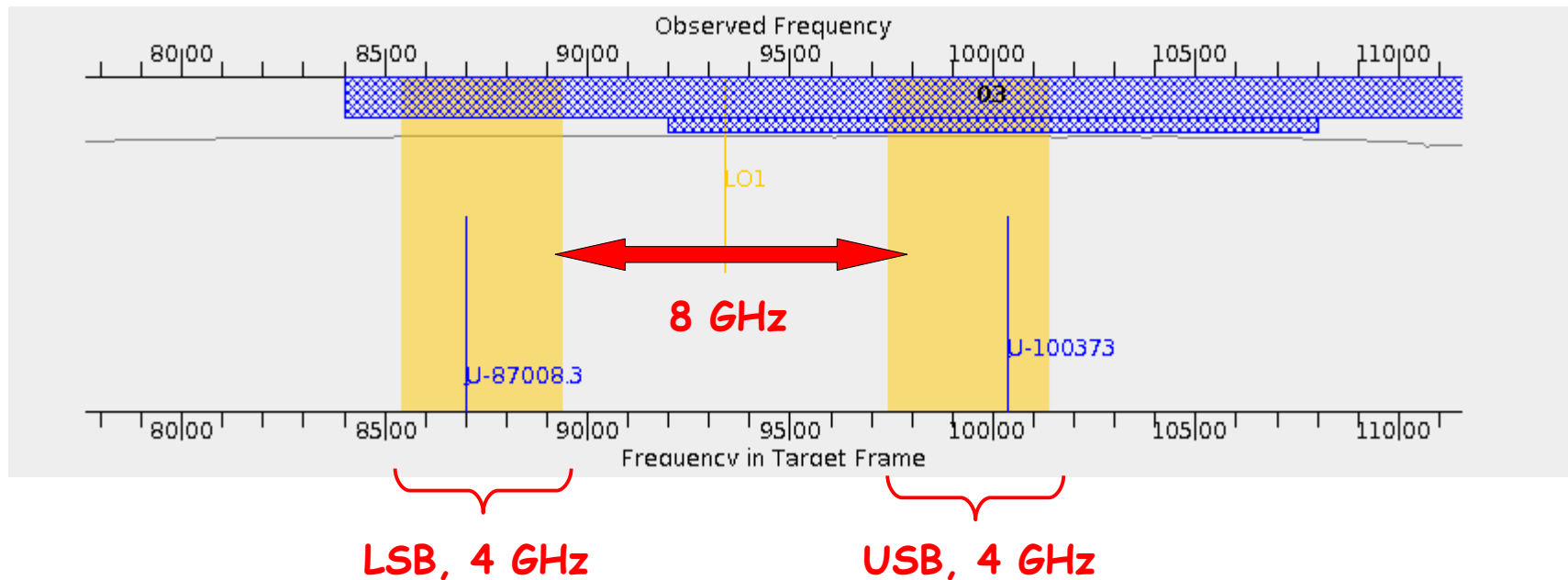


# 2SB receivers (B3-B8)

For ES B3, B6, and B7

- ◆ Sidebands are separated in the receiver
- ◆ Sidebands are generally 4 GHz wide and separated by 8 GHz

## B3 (84-116 GHz)

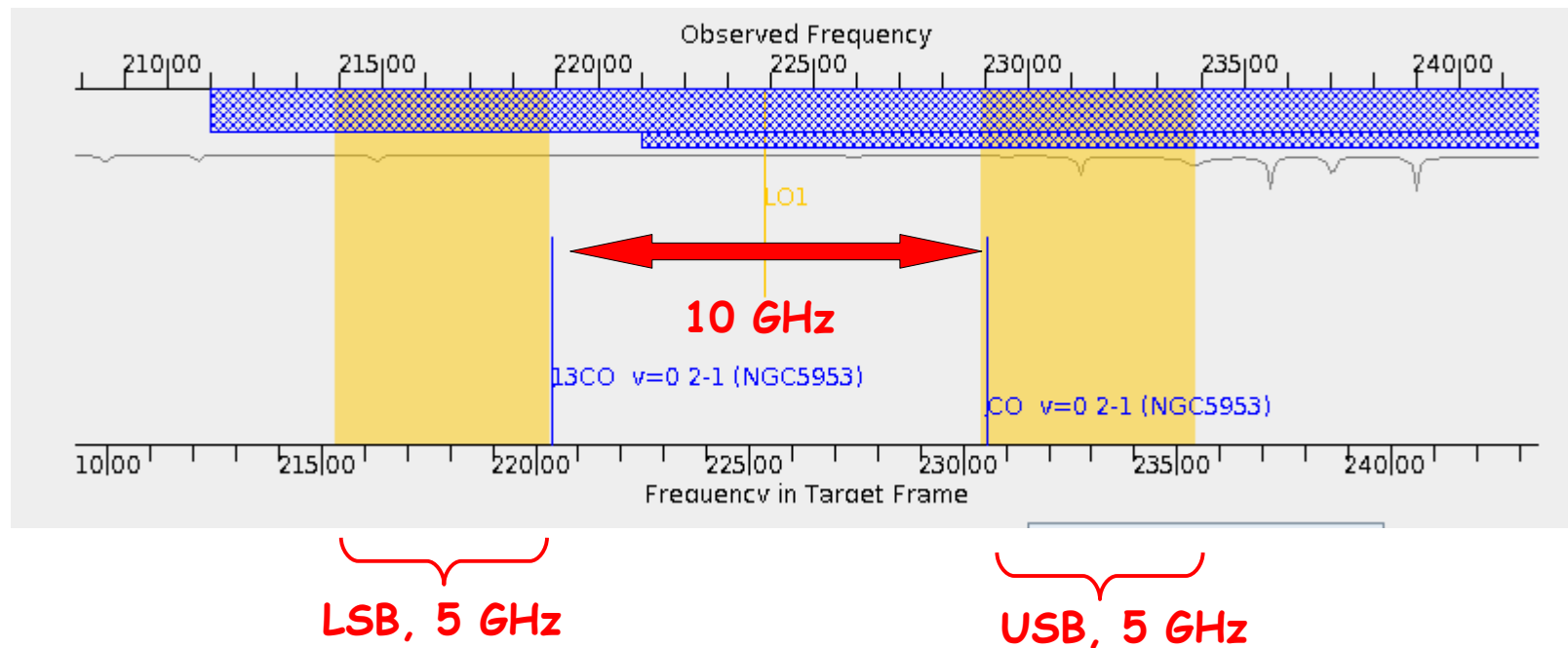


B7 (275-373 GHz), same properties

# 2SB receiver (B6)

- But in **Band 6** sidebands are 5 GHz wide and separated by 10 GHz (to allow simultaneous detection of  $^{12}\text{CO}$  and  $^{13}\text{CO}$ )

## B6 (211-275 GHz)

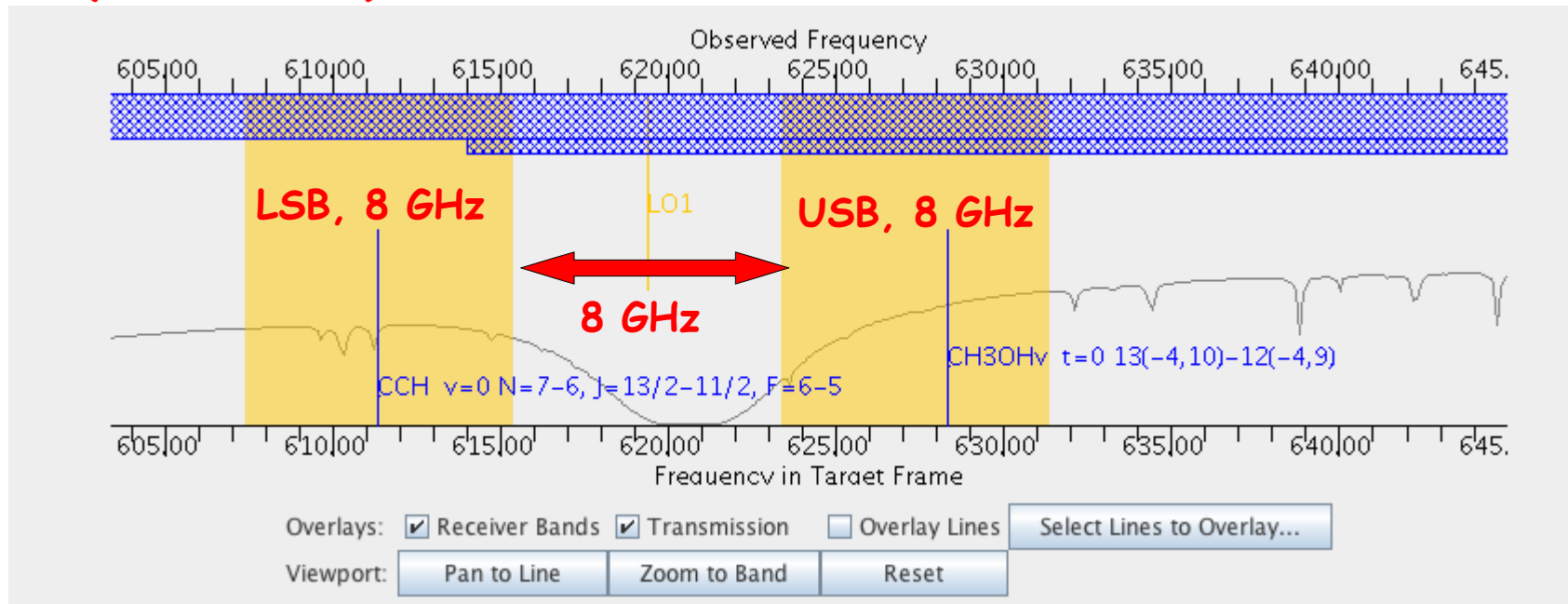


# DSB receivers (B9-B10)

For ES only B9

- ◆ Sidebands are separated in the correlator
- ◆ Sidebands are 8 GHz wide and separated by 8 GHz

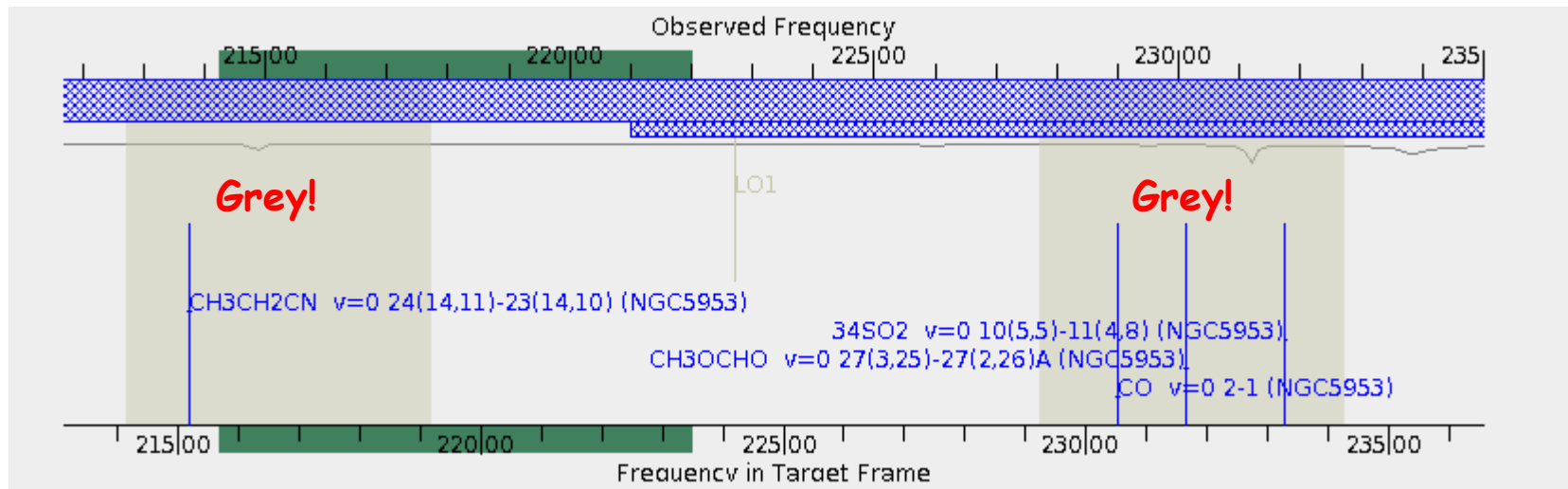
## B9 (602-720 GHz)



# Spectral window constraints for ES

- ◆ All spectral windows use the same correlator mode: **SAME BANDWIDTH, SAME RESOLUTION**
- ◆ 2SB receivers (B3, B6, and B7)
  - All (for a maximum of 4 spectral windows for this call) in USB or LSB
  - 2 in USB and 2 in LSB
  - A 3/1 split is **not possible**

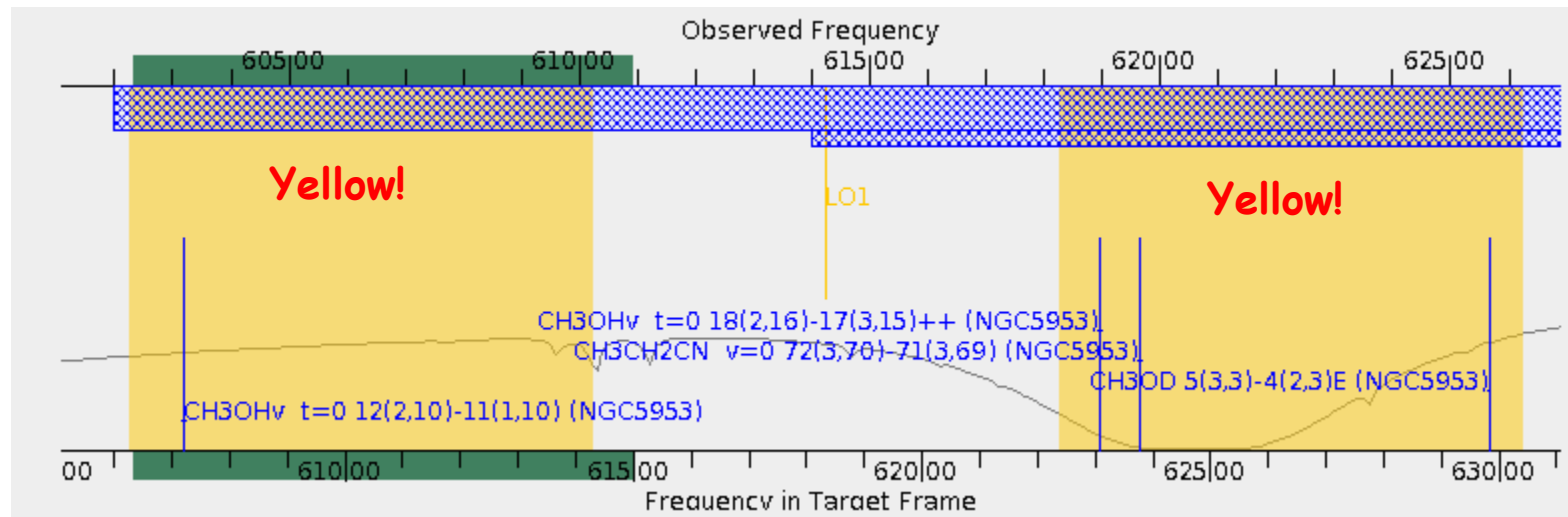
## B6 (211-275 GHz)



# Spectral window constraints for ES

- DSB receivers (B9-B10): A 3/1 split is **possible**

## B9 (602-720 GHz)



# Correlator Modes

Two kinds of operation

★ Time Division Mode (**TDM**)

- i. Pseudo-continuum/wide spectral line
- ii. SPW always 2-GHz wide with 128-256 channels

★ Frequency Division Mode (**FDM**)

- i. High-resolution spectral line
- ii. SPW can be 58.6-1875 MHz wide with up to 7680 channels

## ES-Cycle 0 Correlator Modes in Dual Polarization

### **BANDWIDTH**

### **CHANNELS**

### **SP. RESOLUTION**

• Pseudo-Continuum (2 GHz)	128 channels	15.6 MHz	<b>TDM</b>
• 1875 MHz	3840 channels x Pol	488 kHz	
• 938 MHz	3840 channels x Pol	244 kHz	<b>FDM</b>
• 469 MHz	3840 channels x Pol	122 kHz	
• 234 MHz	3840 channels x Pol	61 kHz	
• 117 MHz	3840 channels x Pol	30.5 kHz	
• 58.6 MHz	3840 channels x Pol	15 kHz	

# Line Observations

## ES-Cycle 0 Correlator Modes in Dual Polarization

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For a maximum of 4 spectral windows



# Line + Continuum Observations

- ◆ Time Division Mode (**TDM**)
  - i. Observe a wide spectral line with 2-GHz wide spectral window
  - ii. Other 3 spectral windows can be used for continuum

## ES-Cycle 0 Correlator Modes in Dual Polarization


<b>BANDWIDTH</b>	<b>CHANNELS</b>	<b>SP. RESOLUTION</b>	
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# Line + Continuum Observations

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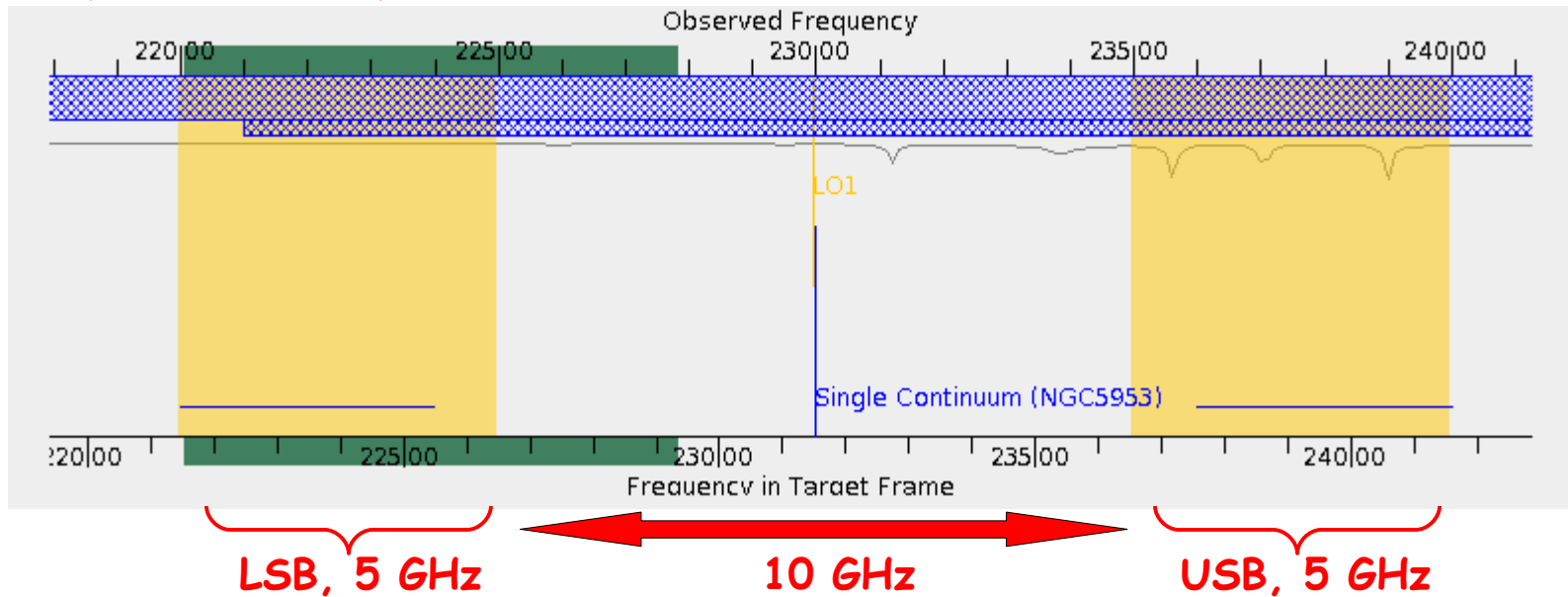
## ◆ Frequency Division Mode (**FDM**)

- i. Highest spectral resolution for the line (narrow bandwidth)
- ii. Remaining spectral windows will have same bandwidth (narrow for continuum)!
- iii. A solution might be to use separate Science Goals (one for line + one for continuum)  **MORE OBSERVING TIME**

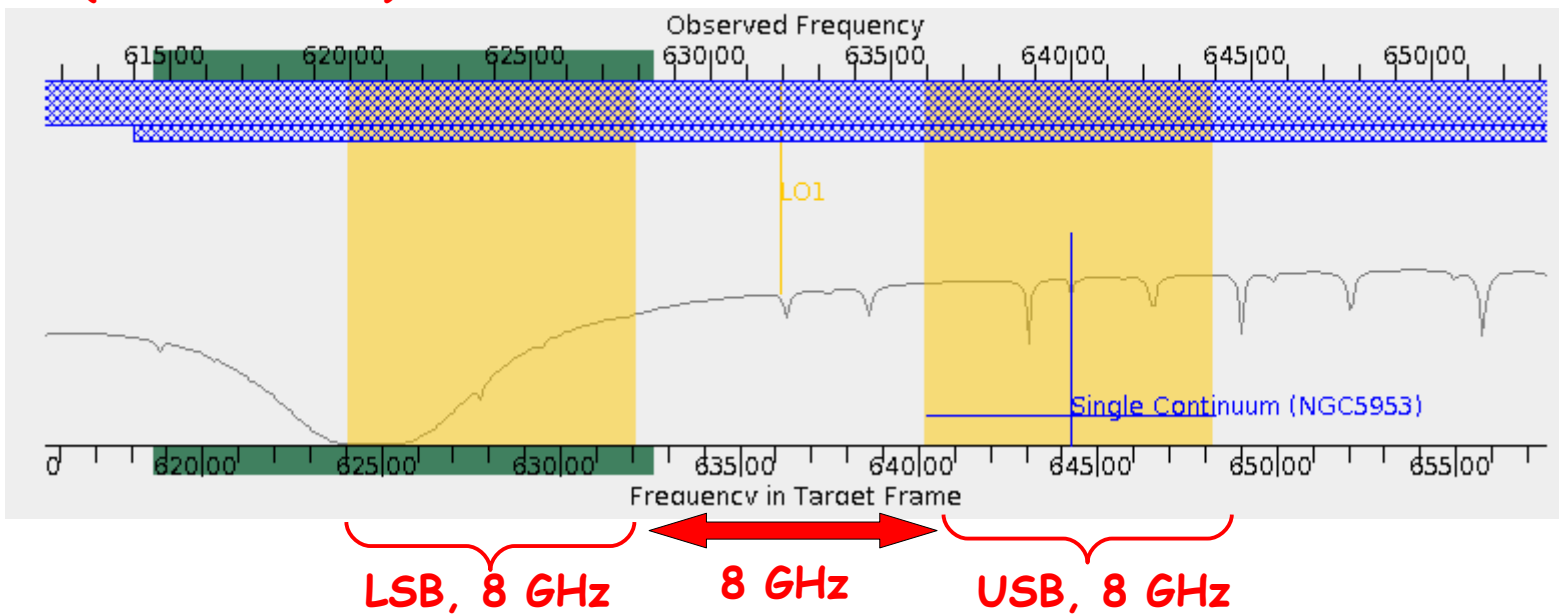
# Single Continuum Observations

- Only define a single frequency

## B6 (211-275 GHz)



## B9 (602-720 GHz)



# Phases of Proposal Submission

## 2 Phases:

- ◆ Phase I: Proposal Submission
- ◆ Phase II: Submission of Observing Program

The Observing Tool (OT) is used for both phases:

- Phase I
- ◆ Fill in PI, co-PIs, etc ... (**ALL ALREADY REGISTERED**)
  - ◆ Attach scientific/technical justification (single PDF)
  - ◆ Define Science Goals
  - ◆ Submit
- Phase II
- ◆ If awarded time, generate Scheduling Blocks from Science Goals and submit

## Science Goal (SG)

- ◆ Scientific requirements of the observations
- ◆ A user must enter:
  - i. Science Targets
  - ii. Spectral line and/or continuum frequencies
  - iii. Angular resolution, largest angular scale
  - iv. Required sensitivity

## Science Goal Constraints

- ◆ Field Setup: more than one source is allowed
  - i. Widely separated sources in different SGs
  - ii. Multiple targets cannot have a rectangular definition
  
- ◆ Spectral Setup: only one is allowed
  - i. One Band
  - ii. One set (up to 4) of simultaneously detectable lines
  
- ◆ Control Parameters (-->Sensitivity Calculator): only one is allowed (for the first line)

You will often need to define multiple Science Goals!

You may have to re-order your lines!

### Scheduling Block (SB)

- ◆ A self-contained definition of an observation
- ◆ It contains:
  - i. Source information (science targets + calibrators)
  - ii. Spectral Setup
  - iii. Observing Parameters
- ◆ A user will not normally interact with an SB!

# What you don't ask for

- ◆ Time on source
  - i. OT reports an estimated time based on likely weather: *observations will proceed until sensitivity is reached*
  - ii. Additional time can be requested  
(e.g.,  $(u,v)$  coverage at Cycle 0 is poor, you must justify it in the proposal!)
  - iii. Several SGs with time ranges
  
- ◆ Calibration sources
  - i. The observatory will provide all necessary calibration:  
*Choose "system-defined" calibration*
  - ii. Own calibrators can be requested:  
*you must justify it in the proposal!*



# OT

- ◆ The OT is a Java application
  - i. Java 6 must be installed on your computer!
- ◆ Download and run locally
  - i. Web Start (**recommended**) and Tarball versions
- ◆ Internet connection required intermittently
  - i. PI/co-PIs information from user database
  - ii. Source catalogues and images servers
  - iii. Spectral line catalogues
  - iv. Submission

# ALMA SCIENCE PORTAL ----> <http://almascience.org>

The interaction between science users and ALMA is done through the ARCs. The ALMA Science Portal allows this interaction.



**Atacama Large Millimeter/Submillimeter Array**  
In search of our Cosmic Origins

## Welcome to the ALMA Science Portal

Please select your preferred ALMA Regional Center (ARC) to access the Science Portal.

The ARCs provide the interface between ALMA and the astronomy community. They are located at NAOJ, in Mitaka, Japan for the East Asian partnership, at ESO in Garching, Germany for the European partnership and at NRAO in Charlottesville, USA for the North American partnership.

Portals:



# ALMA SCIENCE PORTAL @ ESO



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

Login & Registration



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Documents & Tools

User Services at ARCs

- [Helpdesk](#)
- [ALMA@ESO](#)
- [ALMA@NRAO](#)
- [ALMA@NAOJ](#)

OT

Info You are now logged out.

## Welcome to the ALMA Science Portal at ESO



### Overview

The **Atacama Large Millimeter/submillimeter Array (ALMA)** is a major new facility for world astronomy. When completed in 2013, ALMA will consist of a giant array of 12-m antennas, with baselines up to 16 km, and an additional compact array of 7-m and 12-m antennas to greatly enhance ALMA's ability to image extended targets. ALMA is outfitted with state-of-the-art receivers that cover atmospheric windows from 84–950 GHz (3mm – 300 micron). Construction of ALMA started in 2003 and will be completed in 2013. Science observations will start in 2011 with 16 antennas and four receiver bands. The ALMA project is an international collaboration between Europe, East Asia and North America in cooperation with the Republic of Chile. More details can be found via the **About ALMA** link in the left menu.

This is the website for **The ALMA Science Portal**, served from one of the **ALMA Regional Centers (ARCs)** of the ALMA partner organizations: ESO, NRAO or NAOJ. You may switch between the different instances of the portal through the links to the appropriate ALMA partner at the top banner. Through this portal you can find details about the technical capabilities of ALMA, how to propose for observing time, and how to access ALMA data. It includes links to all official ALMA documents and tools, including those for preparing and submitting proposals and processing ALMA data. In order to access some of the tools, users must register with the project and login to the portal via the links at the top banner.

### General News

ALMA Cycle 0 Call for Proposals is now open  
[Mar 30, 2011](#)

[More...](#)

### Local News

The Nordic ARC invites applications for an indefinite Staff Astronomer position.  
[Feb 16, 2011](#)

ALMA Community Days 6-7 April 2011: Towards Early Science  
[Dec 17, 2010](#)

ESO Takes Delivery of State-of-the-art Receiver  
[Dec 15, 2010](#)

Dutch ALMA Workshop, Leiden, Netherlands, 20-21 April 2011  
[Dec 10, 2010](#)

ESO hands over the ALMA Santiago Central Office headquarters to the Joint ALMA Observatory  
[Nov 05, 2010](#)

# The OT



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



Search Site

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- Home
- About ALMA
- ALMA Science
- Call for Proposals
  - Capabilities
  - Road Map
  - Proposers Guide
  - Technical Guide
  - Observing Tool**
  - Webstart Download Page
  - Tarball Download Page
  - OT Video Tutorials
  - Troubleshooting
- Sensitivity Calculator
- Notice of Intent

Home ▶ Call for Proposals ▶ Observing Tool

## Observing Tool

The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase I (observing proposal) and Phase II (telescope runfiles for accepted proposals) materials. The current *Cycle 0* release of the OT is configured for the Early Science Capabilities of ALMA as described in the [Cycle 0 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 you have Java 6 installed (see the [troubleshooting page](#) if you are experiencing Java problems). The ALMA OT is available in two flavours: WebStart and tarball.

The **WebStart** application has the advantage that the OT is automatically downloaded and installed on your computer. However, your Java Webstart [needs to be working](#). Note that the WebStart does not work with the Open JDK versions of Java such as the "Iced Tea" flavour common on many modern Linux installations. If this is the case, the tarball installation of the OT should be used.

The **tarball** must be installed manually, however it has the advantage that it is more robust than the WebStart application and will work with most versions of Java 6. For Linux users we also provide a download of the OT complete with a recommended version of the Java run time environment. Please use this if you have any problems running the OT tarball install with your default Java.





# The OT



Atacama Large Millimeter/Submillimeter Array

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[Proposers Guide](#)

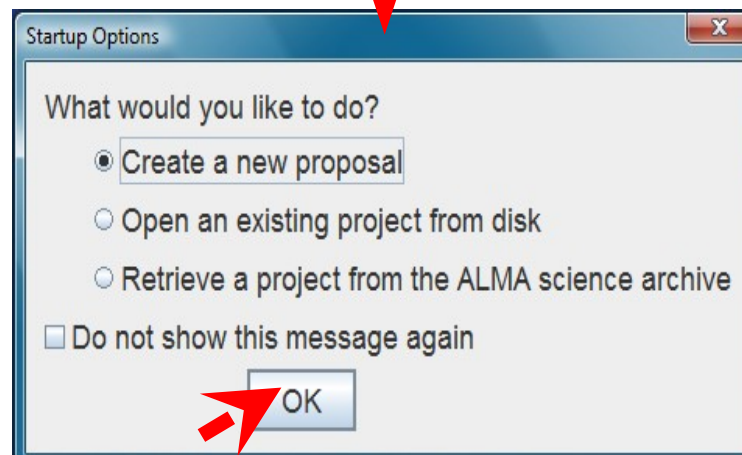
[Technical Guide](#)

[Observing Tool](#)

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## Webstart Download Page

**First Time Users:** When you use the ALMA OT Webstart for the first time, it will download a large amount of shared resources (on the order of 130 MB) to your host, taking a few minutes to do so. This will only happen the first time, or when a revised version of the OT is released. Subsequent use of the OT will be much faster.



# OT structure

My new idea - Observing Tool for ALMA (Early Science), version R8.0.1

File Edit View Tool Search Help Perspective 1

**Project Structure**

Proposal Program

My new idea

- My new idea
  - Proposal **Proposal panel**
  - Planned Observing
    - Science Goal ()
      - Description
      - Field Setup
      - Calibration Setup Parameters
      - Spectral Setup
      - Control and Performance Parameters

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

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  - Proposal **Template panel**
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    - Science Goal (Band 6 Mixed 219 GHz SSB Co
    - Science Goal (Band 6 13CO J=2-1 mapping c
    - Science Goal (Band 6 Mixed simultaneous 12
    - Science Goal (Band 9 700 GHz search for pat

**Editors**

Spectral Spatial Proposal Catalog **Tab menu for viewer**

Proposal Information

Proposal Title: My new idea

Proposal Cycle: 9999.4

Abstract (max. 300 words)

**Editors Panel**

**Feedback**

Problems Information Log

Description	Suggestion

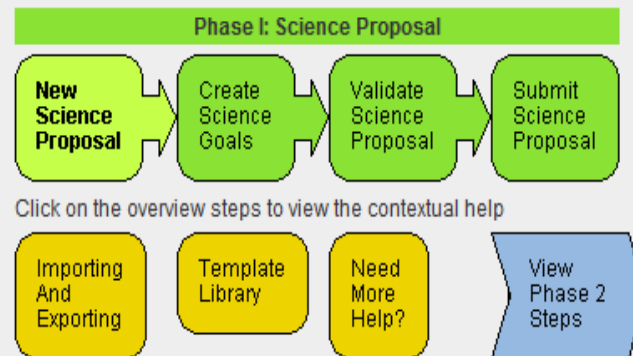
**Feedback Panel**

Overview

## Project Overview Panel

Contextual Help

- Please ensure you and your co-Is are registered with the [ALMA user 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.



# The project properties

The screenshot displays the 'Project - Observing Tool for ALMA (Early Science), version Cycle0-RC1' application. The interface is divided into several sections:

- Project Structure:** Shows a tree view under '(unnamed project)' with folders for 'My new idea' and 'Proposal'.
- Editors:** Contains tabs for 'Spectral', 'Spatial', 'Proposal', and 'Catalog'. The 'Proposal' tab is active, showing 'Proposal Information'.
- Proposal Information:** Includes fields for 'Proposal Title' (My new idea), 'Proposal Cycle' (9999.5), and an 'Abstract' (max. 300 words) with a 'Launch Editor' button.
- Scientific Category:** A list of radio button options: 'Cosmology and the High Redshift Universe' (selected), 'Galaxies and Galactic Nuclei', 'ISM/Astrochemistry/Star Formation/protoplanetary disks/exoplanets', and 'Stellar Evolution/the Sun and the Solar System'.
- Feedback:** A section with 'Problems', 'Information', and 'Log' tabs, and a table with columns 'Descripti...' and 'Suggestion'.
- Overview:** A green bar at the bottom of the interface.

# The project properties

Project - Observing Tool for ALMA (Early Science), version Cycle0-RC1

File Edit View Tool Search Help Perspective 2

Project Structure

Proposal Program

(unnamed project)

- My new idea
  - Proposal

Editors

Spectral Spatial Proposal Catalog

Recent Publications

Investigators

Title	Full name	Email	Affiliation	ALMA ID	
PI	Not set	Not set	Not set	Not set	NON

Select PI... Add Col... Remove Col Add fr

Science Case

Science Case(Mandatory, PDF, 5 pages max.) NewIdea\_sciencecase.pdf Attach... De

Observatory Use Only

Feedback

Problems Information Log

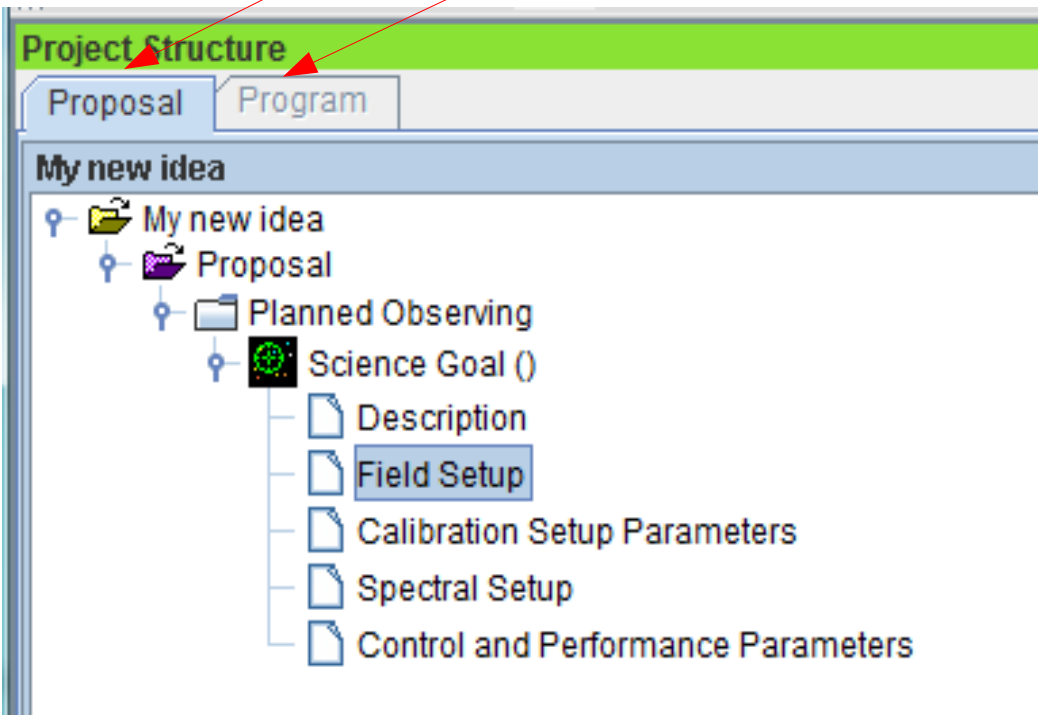
Descripti... Suggestion

Overview



# Project navigation and Science Goal

- ◆ Navigate through project using the Project Tree
- ◆ Two tabs
  - i. Proposal (Phase I)
  - ii. Program (Phase II)



The OT divides the observing info of a project into **SGs**

**SG** is a container of

- i. An optional description of the goal
- ii. the Field Setup to define the observing targets
- iii. The Calibration Setup
- iv. The Spectral Setup to define the frequency range and correlator configuration
- v. The Control and Performance parameters to define the sensitivity and resolution goals

# The Science Goal: Template Library

A selection of hot science topics for science goal templates is on-board the OT

Possibility to drag and copy the full science goal!!!

The screenshot displays the 'Observing Tool for ALMA (Early Science)' interface. The title bar reads 'Project - Observing Tool for ALMA (Early Science), version Cycle0-RC1'. The menu bar includes 'File', 'Edit', 'View', 'Tool', 'Search', and 'Help'. A toolbar with various icons is located below the menu. The main window is divided into two panes. The top pane, titled 'Project Structure', shows a tree view for '(unnamed project)'. It contains a folder 'My new idea' which includes a 'Proposal' folder. Inside 'Proposal' is a 'Planned Observing' folder, which contains a 'Science Goal ()' folder. This folder has five sub-items: 'Description', 'Field Setup', 'Calibration Setup Parameters', 'Spectral Setup' (which is highlighted), and 'Control and Performance Parameters'. The bottom pane, titled 'Template library. Turn the keys on the JTree below & read the ...', shows a similar tree structure. It contains a 'Proposal' folder with a 'Planned Observing' folder. Under 'Planned Observing', there are several 'Science Goal' entries, each with a green icon and a detailed title, such as 'Science Goal (Band 3 100 GHz (rest frame) doub...', 'Science Goal (Band 3 Nyquist-sampled mosaic c...', 'Science Goal (Band 6 Mixed 219 GHz SSB Cont...', 'Science Goal (Band 6 13CO J=2-1 mapping of 1...', 'Science Goal (Band 6 Mixed simultaneous 12CO...', 'Science Goal (Band 9 700 GHz search for pata-s...', 'Science Goal (ES Primer 1 (Molecular Gas and [...', and 'Science Goal (ES Primer 1 (Molecular Gas and [...'. The interface includes a scrollbar on the right side of the bottom pane.

# The Spatial Visual Editor

- ◆ Downloads and displays an image of the sky
  - i. Image server (DSS, 2MASS, NVSS, FIRST, ...)
  - ii. Local images files (FITS)
- ◆ Other required information
  - i. Coordinate and velocity information
  - ii. Source properties (peak flux density, polarization, line width)

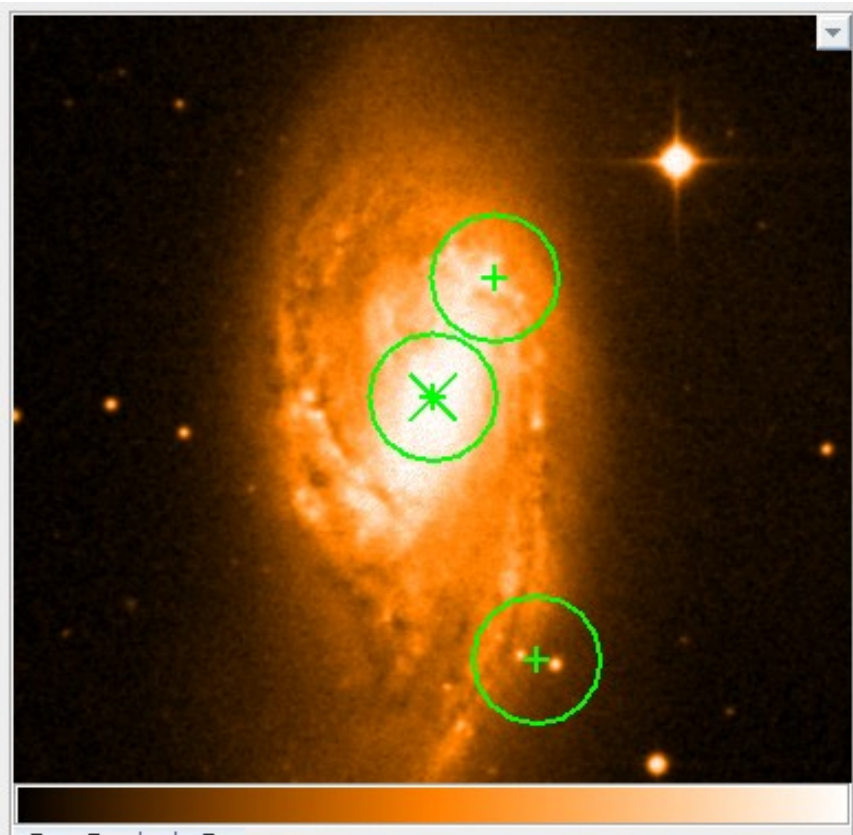
The screenshot displays the Spatial Visual Editor interface. On the left, a large window shows an image of a galaxy (NGC 3627) with a green 'X' marking a source. Below the image is a toolbar with zoom and pan icons, and a status bar showing coordinates (11:20:17.073, +13:02:15.27) and image filename. The right side of the interface is a configuration panel for the selected source, NGC3627. It includes sections for Source information, Source Coordinates, Source Velocity, Target Type, Expected Source Properties, and Field Center Coordinates. The 'Expected Source Properties' section shows Peak Flux Density per Beam at 12.00000 mJy, Polarisation Percentage at 0.0%, and Line Width at 100.00000 km/s. The 'Field Center Coordinates' section has a table for adding field coordinates.

RA [arcsec]	Dec [arcsec]

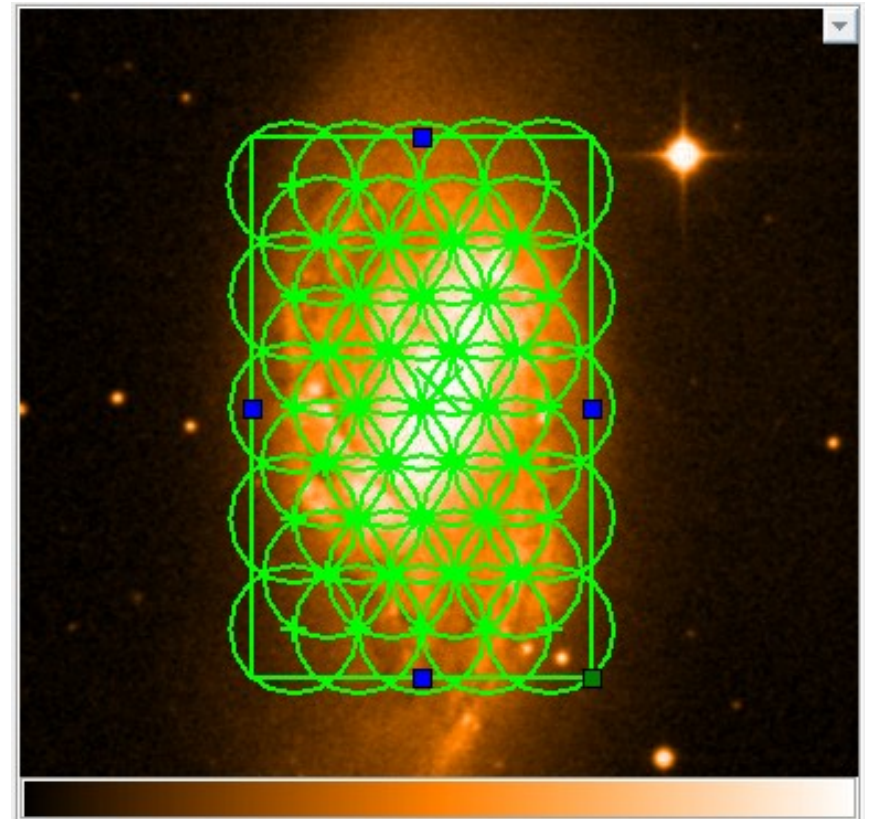
Buttons at the bottom of the configuration panel include: Add Source, Load from File..., Delete Source, and Delete All Sources.

# Mosaicking

Single field pointings



Mosaic (up to 50 pointings for Cycle 0)





# The Calibration Setup

The "System-defined calibration" is strongly suggested

Select calibration setup.  
If "system" is selected, the ALMA system will select default calibrators.

Goal Calibrators

Select *User-defined calibration* to choose your own calibrators, or *System-defined calibration* to let the system automatically select the calibrators to be observed. We **STRONGLY** suggest that you leave this choice at "System-defined" - the Observatory will ensure that suitable calibrators are selected.

System-defined calibration

User-defined calibration

- When first selected, the table shows a reasonable set of calibrators to include.
- *Dynamic Calibrators* are found by a source catalogue query executed at project execution time. Edit the query with *Edit Criteria...*
- *Fixed Calibrators* are calibrators specified now, at project creation time. Specify which calibrator should be observed with *Edit Target...*

Add Dynamic Calibrator... Add Fixed Calibrator... Delete Selected Calibration

Calibration Intent	Target Type	Source Name	RA	Dec
Amplitude	Dynamic Calibrator		00:00:00.000 ± 20.00°	00:00:00.000 ± 20.00°
Pointing	Dynamic Calibrator		00:00:00.000 ± 20.00°	00:00:00.000 ± 20.00°
Phase	Dynamic Calibrator		00:00:00.000 ± 20.00°	00:00:00.000 ± 20.00°
Bandpass	Dynamic Calibrator		00:00:00.000 ± 20.00°	00:00:00.000 ± 20.00°

# The Spectral Visual Editor

**Editors**

Spectral Spatial Spectral Setup

Visualisation

After creating spectral setups in the forms you may visualize them here.  
 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

**Green:** Overlaid Lines

**Blue:** Requested Lines

Atmospheric Transmission

Observed Frequency

Frequency in Target Frame

Overlays:  Receiver Bands  Transmission  Overlay Lines

Viewport:

Spectral Type

Spectral Type: Choose the type of spectral observation you wish to make

- Up to 4 spectral windows
- More than 4 spectral windows
- Single continuum (average frequency)
- Spectral scan

Polarization Products desired

- SINGLE-X
- DU...

Up to 4 spectral windows

Center Freq Rest	Center Freq Sky	Transition	Bandwidth, Channel Spacing	Process As Continuum
88.63160 GHz	88.04521 GHz	HCN v=0 J=1-0	1875.000 MHz( 6384 km/s), 488.281 kHz( 1.663 km/s)	<input type="checkbox"/>
89.18853 GHz	88.59846 GHz	HCO+ v=0 1-0	1875.000 MHz( 6344 km/s), 488.281 kHz( 1.652 km/s)	<input type="checkbox"/>
102.03188 GHz	101.35683 GHz	34SO2 v=0 3(1,...	1875.000 MHz( 5546 km/s), 488.281 kHz( 1.444 km/s)	<input type="checkbox"/>
100.20040 GHz	99.53747 GHz	U-100200.4	1875.000 MHz( 5647 km/s), 488.281 kHz( 1.471 km/s)	<input type="checkbox"/>

# The Spectral Line Picker


AgT
Select Spectral Lines
✕

**Filter / Species**


Include description in search

---

**ALMA Band**



**Sky Frequency (GHz)**



Min  Max

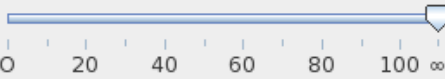
**Sideband Filter**

Enable sideband filter

Filtering lines outside sidebands

---

**Maximum Upper-state Energy (K)**



0 20 40 60 80 100 ∞

**Molecule Filter / Environment**

Show

---

**Notes**

- The initial database is an offline database, containing selected transitions from the full spectral line catalogue.
- Additional transitions from the full catalogue can be found by clicking *Search Online*.
- *Search Online* is only enabled when a species is given, environment filter is disabled and frequency constrained to one ALMA band or less

**Transitions matching your filter settings**

Transition ^	Description	Rest Freq... ^	Sky Freq...	Upper-state E...	Lovas Inte...	Sij μ²
U-101713.6	UNIDENTIFIED	101.714 GHz	101.041 ...		0.02	
CH3OHv t=0 9(-2,8)-9(1,8)	Methanol	101.737 GHz	101.064 ...	130.4 K	0.36	0.17 D²
H(70)ζ	Hydrogen Recombination...	101.77 GHz	101.097 ...			
CH3OCHO v=0 24(5,19)-24(4,20)A	Methyl Formate	101.772 GHz	101.099 ...	198.86 K	0.06	8.31 D²
C6H J=73/2-71/2, Q=1/2, l=f	1,3,5-Hexatriynyl	101.874 GHz	101.2 GHz	113.79 K	0.75	2240.1...
C6H- 37-36	1,3,5-Hexatriynyl anion	101.881 GHz	101.207 ...	66.58 K	0.25	2487.8...
MgCN N=10-9, J=21/2-19/2	Magnesium Cyanide	101.893 GHz	101.218 ...	26.9 K	0.01	5.24 D²
C6H J=73/2-71/2, Q=1/2, l=e	1,3,5-Hexatriynyl	101.926 GHz	101.251 ...	113.86 K	0.78	2239.9...
Na37Cl v=0 8-7	Sodium chloride	101.962 GHz	101.287 ...	16.9 K	0.68	648.17 ...
U-101970	UNIDENTIFIED	101.97 GHz	101.295 ...		0.05	
H2CCO 5(1,4)-4(1,3)	Ketene	101.981 GHz	101.307 ...	27.74 K	0.22	29.03 D²
AlCl v=0 J=7-6, F1=13/2-11/2, F2=7-6	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	5.92 D²
AlCl v=0 J=7-6, F1=9/2-7/2, F2=3-2	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	2.69 D²
AlCl v=0 J=7-6, F1=11/2-9/2, F2=7-6	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	6.41 D²
AlCl v=0 J=7-6, F1=9/2-7/2, F2=5-4	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	4.34 D²
AlCl v=0 J=7-6, F1=11/2-9/2, F2=4-3	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	3.66 D²
AlCl v=0 J=7-6, F1=13/2-11/2, F2=8-7	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	7.34 D²
AlCl v=0 J=7-6, F1=15/2-13/2, F2=6-5	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	5.08 D²
AlCl v=0 J=7-6, F1=9/2-7/2, F2=6-5	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	5.67 D²
AlCl v=0 J=7-6, F1=13/2-11/2, F2=5-4	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	4.65 D²
AlCl v=0 J=7-6, F1=13/2-11/2, F2=6-5	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	5.57 D²
AlCl v=0 J=7-6, F1=15/2-13/2, F2=7-6	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	6.47 D²
AlCl v=0 J=7-6, F1=15/2-13/2, F2=8-7	Aluminum Monochloride	102.032 GHz	101.357 ...	19.59 K	0.82	7.07 D²

Add to Selected Transitions

---

**Selected transitions**

Transition ^	Description	Rest Frequency ^	Sky Frequency	Upper-state Energy	Lovas Intensity	Sij μ²
HCN v=0 J=1-0		88.632 GHz	88.045 GHz			
HCO+ v=0 1-0		89.189 GHz	88.598 GHz			
SO3Σ v=0 4(5)-4(4)	Sulfur Monoxide	100.03 GHz	99.368 GHz	38.58 K	0.38	0.84 D²
AlCl v=0 J=7-6, F1...	Aluminum Mon...	102.032 GHz	101.357 GHz	19.59 K	0.82	5.08 D²

Remove from Selected Transitions

The OT's interface to NRAO's Splatalogue

- i. Online search 8.5 million lines
- ii. The OT has a smaller internal version

# Control and Performance

## Editors

Spectral Spatial **Control and Performance**

These parameters are used to control various aspects of the observations, including the required antenna configurations and integration times. The Representative Frequency is used to evaluate these performance targets, perhaps most critically in the time estimate where it sets the atm. The OT chooses a reasonable default although this can be changed.

### Control and Performance

Representative Frequency

88.04521 GHz

For the first line

Antenna Beamsize (  $\lambda/D$  )

12m 58.5 arcsec

Early Science Extended Configuration:

Max Baseline(L) and corresponding beam size( $\lambda/D$ ):

400.0 m 1.8 arcsec

Early Science Compact Configuration:

Max Baseline(L) and corresponding beam size( $\lambda/D$ ):

125.0 m 5.6 arcsec

2 config.

Desired Angular Resolution

1.8 arcsec

Largest Angular Scale of source

Point Source  Extended Source 16.00000 arcsec

Desired Sensitivity per Pointing

2.40000 mJy equivalent to 0.12882 K

Bandwidth used for Sensitivity

FinestResolution Frequency Width 488.281 kHz

Sensitivity Calculator

Time Estimate

Does your setup need more time than is indicated by the time estimate?

Yes  No

Is this observing time constrained (occultations, coordinated observing,...)?

Yes  No

ACA Use: (ACA Not yet available)



# Sensitivity Calculator

**Sensitivity Calculator**

Common Parameters

Dec	15:11:37.799	
Polarization	Dual	
Observing Frequency	88.04521	GHz
Bandwidth per Polarization	488.28125	kHz
Water Vapour Column Density	Calculator Chooses	
tau/Tsky	tau=0.031, Tsky=10.584 K	
Tsys	73.934 K	

Individual Parameters

	12m Array		7m Array		Total Power Array	
Number of Antennas	16		0		0	
Resolution	1.80000	arcsec	23.410940 arcsec		58.527350 arcsec	
Sensitivity(rms)	2.40000	mJy	2.40000	mJy	2.40000	mJy
(equivalent to)	0.12882	K	0.00076	K	0.00008	K
Integration Time	2.14803	h	Infinity	d	Infinity	d

Integration Time Unit Option: Automatic

Calculate Integration Time    Calculate Sensitivity    Close

# Estimated Time

The screenshot shows a software window titled 'Information' with a sub-header 'Estimated time'. It contains several sections of data:

- Requested Sensitivity**: 2.4000 mJy
- Bandwidth used for Sensitivity**: 488.281 kHz
- Required Time on Source per Pointing**: 2.15 h
- Number of Antenna Configurations**: 1
- Total Number of Pointings**: 1
- Total on Source**: 2.15 h
- Total Estimated Time (inc. Calibration)**: 2.50 h

**Calibration Breakdown**

- Bandpass (inc. AtmosphericCal)**: 28.26 s x 1 = 28.26 s
- Pointing**: 18.00 s x 9 = 2.70 min
- Amplitude (inc. AtmosphericCal)**: 26.04 s x 1 = 26.04 s
- Phase**: 8.00 s x 26 = 3.47 min
- Atmospheric**: 26.00 s x 33 = 14.30 min

**Achievable Sensitivity**

- HCN v=0 J=1-0 with 12m Array**: 2.4000 mJy
- HCO+ v=0 1-0 with 12m Array**: 2.3978 mJy
- 34SO2 v=0 3(1,3)-2(0,2) with 12m Array**: 2.4481 mJy
- U-100200.4 with 12m Array**: 2.4227 mJy

An 'OK' button is located at the bottom center of the dialog box.

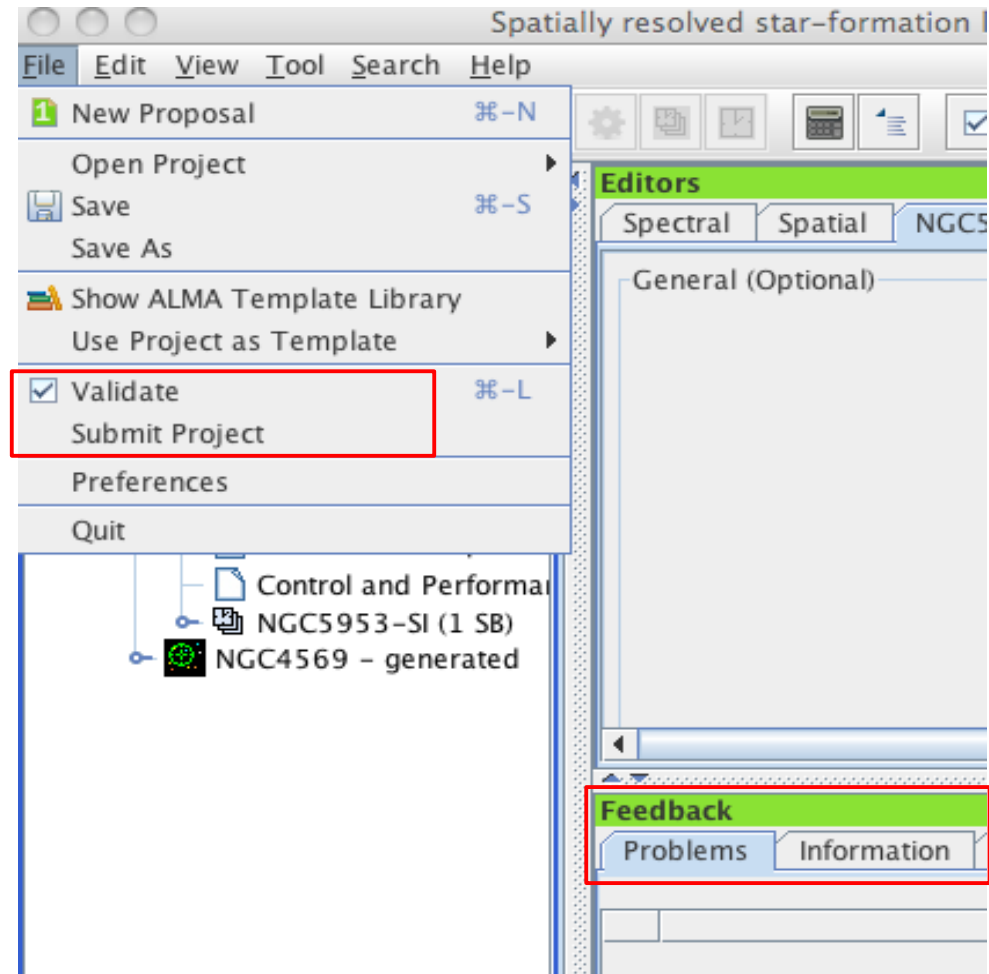
**Estimated Times**

**Calibration Times**

**Sensitivities obtained with the time needed for the first line**

# Proposal Submission and Resubmission

- ❖ When ready, validate your proposal
  - i. OT checks that all necessary information is present
  - ii. Errors appear in the Feedback Panel
  - iii. A project cannot be submitted without validation
- ❖ For your records
  - i. E-mail will acknowledge submission
  - ii. Printable summary of proposal is produced
- ❖ OT asks you to save to disk:  
Project code is assigned
- ❖ Resubmission is possible up to the deadline





## Phase II Observing Program

- ◆ Proposal Review process via email and successful investigators will be invited to submit the detailed observing plan
- ◆ The OT is used to prepare individual **Scheduling Blocks** (SBs)
- ◆ The SBs are generated from the Science Goal automatically
- ◆ Each SB will last 30-40 min

# Documentation & Help

The screenshot shows an 'Overview' page for 'Phase I: Science Proposal'. On the left, a 'Contextual Help' box contains three numbered instructions: 1. Register with the ALMA user portal; 2. Create a new proposal by either selecting 'File > New Proposal', clicking a help icon in the toolbar, or clicking a link; 3. Click on the 'proposal' tree node and complete the relevant fields. On the right, a flowchart shows the steps: 'New Science Proposal' -> 'Create Science Goals' -> 'Validate Science Proposal' -> 'Submit Science Proposal'. Below the flowchart are buttons for 'Importing And Exporting', 'Template Library', 'Need More Help?', and 'View Phase 2 Steps'.

**Contextual Help**

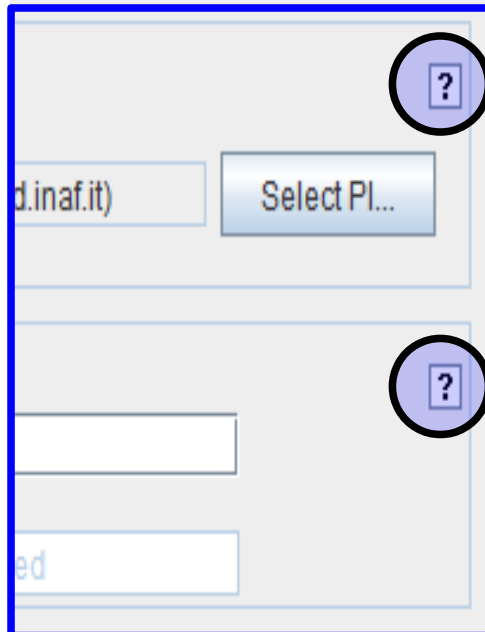
1. Please ensure you and your co-Is are registered with the [ALMA user portal](#)
2. Create a new proposal by either:
  - Selecting *File > New Proposal*
  - Clicking on the  icon in the toolbar
  - Or clicking on this [link](#)
3. Click on the  [proposal](#) tree node and complete the relevant fields.

**Phase I: Science Proposal**

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



**OT User Manual**

**Video Tutorial**

For any questions on **OT**, **ALMA data reduction**, ...  
please contact the ALMA Helpdesk @

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

P. Andreani's Lecture for details on the submission of a ticket to the  
ALMA Helpdesk

**ITALIAN ARC**

Web: <http://www.alma.inaf.it>

Email: [help-desk@ira.inaf.it](mailto:help-desk@ira.inaf.it)

**Enjoy your ALMA proposal!**