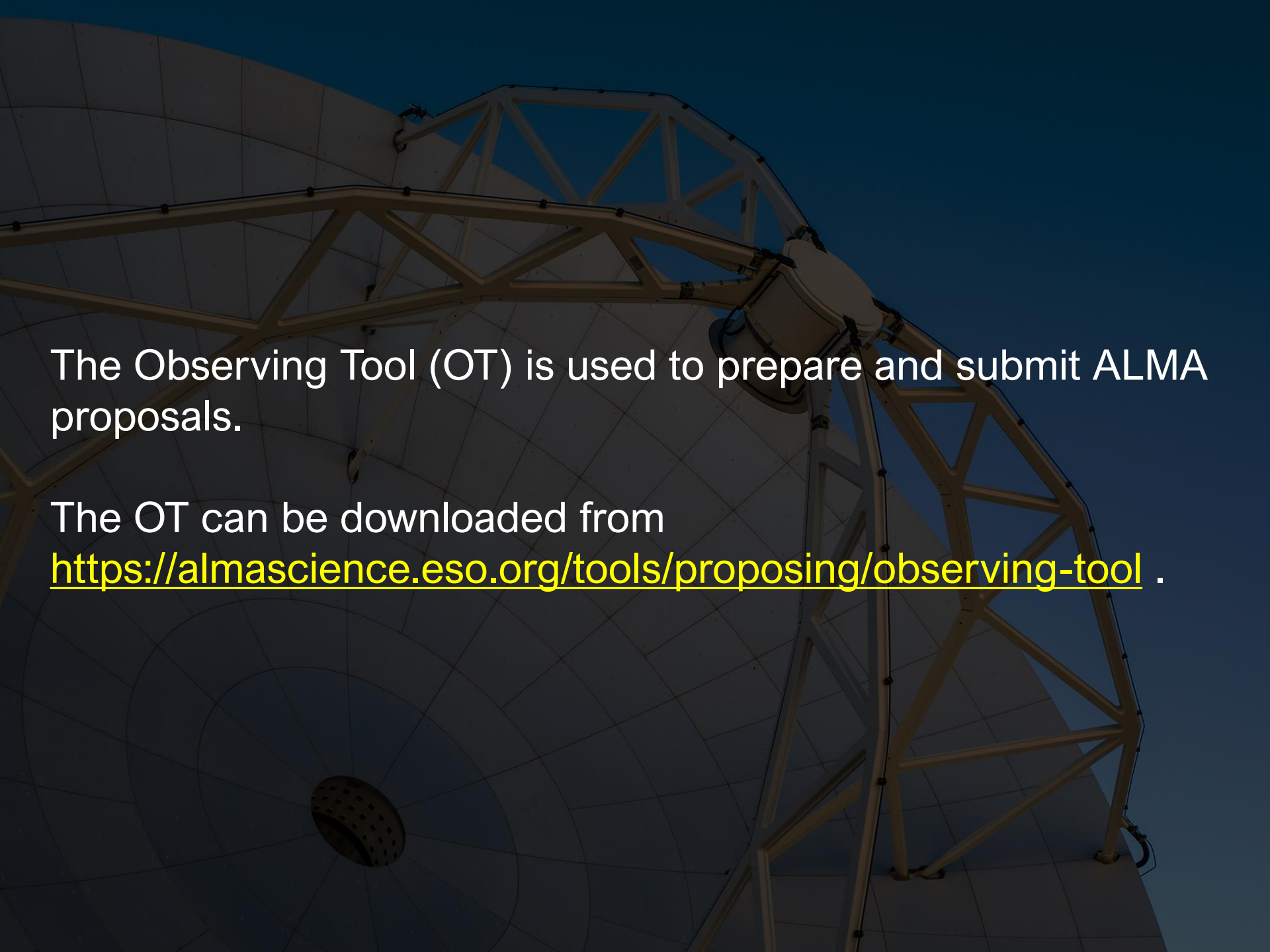


# ***The Observing Tool***

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The University of Manchester

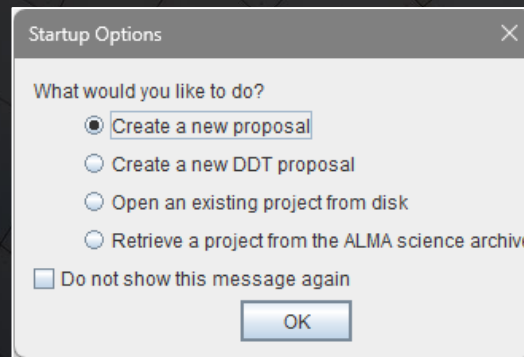




The Observing Tool (OT) is used to prepare and submit ALMA proposals.

The OT can be downloaded from <https://almascience.eso.org/tools/proposing/observing-tool> .

When starting the OT, a pop-up window will ask whether to create a new proposal or open an existing one.



Startup Options

What would you like to do?

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



Do not show this message again

OK

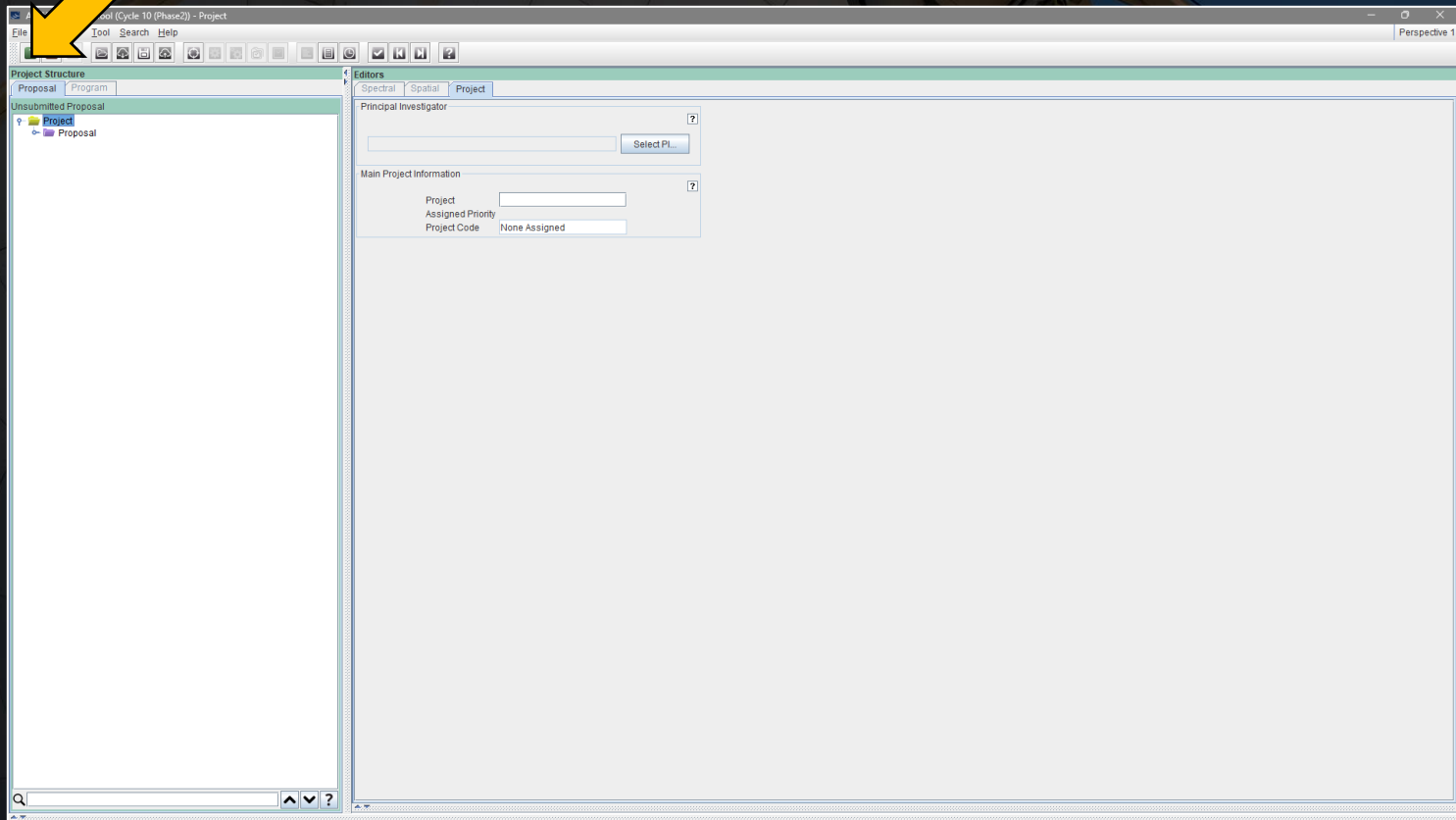
After selecting “Create a new proposal”, the OT will display the template for a new program.

(The flow chart on the bottom is not really useful and can be minimized.)

The screenshot shows the ALMA Observing Tool (Cycle 10 Phase 2) - Project window. The interface is divided into several sections:

- Project Structure:** A tree view on the left showing the hierarchy: Unsubmitted Proposal > Project > Proposal.
- Editors:** A central area with tabs for Spectral, Spatial, and Project. The Project tab is active, showing a form for entering project details.
  - Principal Investigator:** A text field with a "Select PI..." button.
  - Main Project Information:** Fields for Project, Assigned Priority, and Project Code (currently set to "None Assigned").
- Contextual Help:** A section on the bottom left providing instructions for creating a new proposal.
  - 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 1: Science Proposal:** A flow chart on the bottom right showing the process: New Science Proposal -> Create Science Goals -> Validate Science Proposal -> Submit Science Proposal. Below this are buttons for "Importing and Exporting", "Template Library", "Need More Help?", and "View Phase 2 Steps".

Proposals can also be created or opened by either selecting the corresponding options from the File menu or button bar.



The proposal tab shows summary information about the proposal, including the abstract and authors of the project.

The science case is also attached using a button in this tab.

The screenshot displays the 'ALMA Observing Tool (Cycle 10 Phase2) - Project' interface. The 'Proposal' tab is active, showing the following sections:

- Proposal Information:** Includes fields for 'Proposal Title', 'Proposal Cycle' (set to 2023.1), and 'Abstract (max. 1200 characters)'. There is a '?' icon next to the title field.
- Proposal Type:** Radio buttons for 'Regular', 'Large Program', 'Target of Opportunity', 'Phased Array', and 'VLBI'.
- Scientific Category:** Radio buttons for 'Cosmology and the High Redshift Universe', 'Galaxies and Galactic Nuclei', 'ISM, star formation and astrochemistry', 'Circumstellar disks, exoplanets and the solar system', and 'Stellar Evolution and the Sun'.
- Keywords:** A text box with the prompt 'Please select one or two keywords'.
- Student project:** A checkbox.
- Joint Proposals:** A section with the question 'Is this a Joint Proposal?' and radio buttons for 'Yes' and 'No' (selected).
- Investigators:** A table with columns: Type, Full name, Email, Affiliation, ALMA ID, Executive, and Reviewer.

Type	Full name	Email	Affiliation	ALMA ID	Executive	Reviewer
PI	Not set	Not set	Not set	Not set	Non-ALMA	<input checked="" type="checkbox"/>

The science case is a separate LaTeX document that can be downloaded from <https://almascience.eso.org/documents-and-tools/proposing/proposal-template> .

## 1 Scientific justification

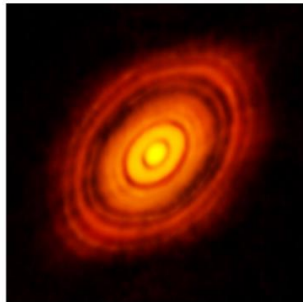


Figure 1: ALMA image of the protoplanetary disc surrounding the young star HL Tauri.

Table 1: Here we show the continuum sensitivity required per band.

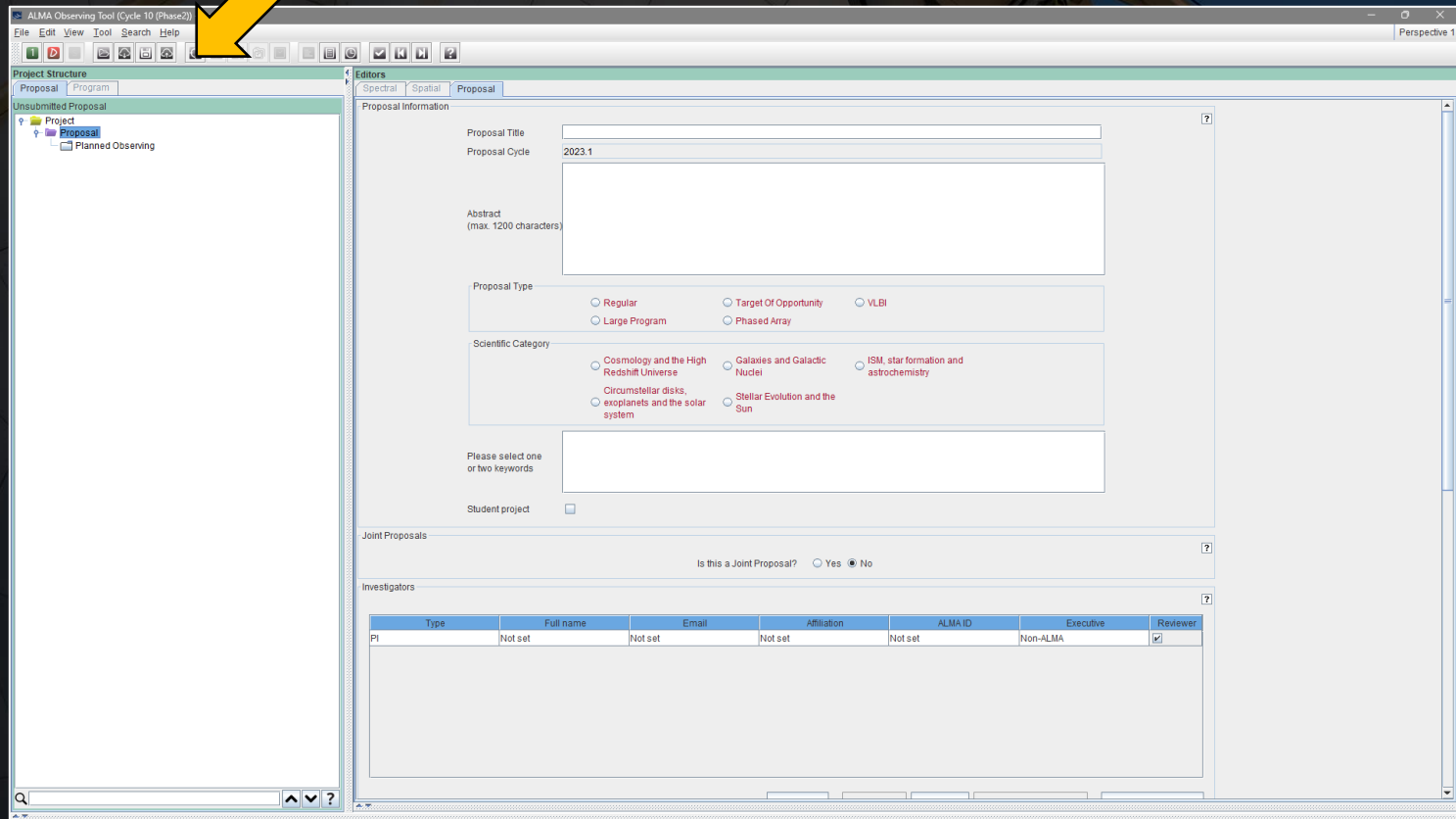
Frequency (GHz)	Sensitivity (mJy)
300	0.10
850	0.50

## 2 Description of observations

## 3 References

- [1] Author1 et al. year, journal, vol, page
- [2] Author2 et al. year, journal, vol, page

The observations are set up by adding Science Goals, which can be done by either right-clicking on the Planned Observations tab or clicking the corresponding button in the button bar.



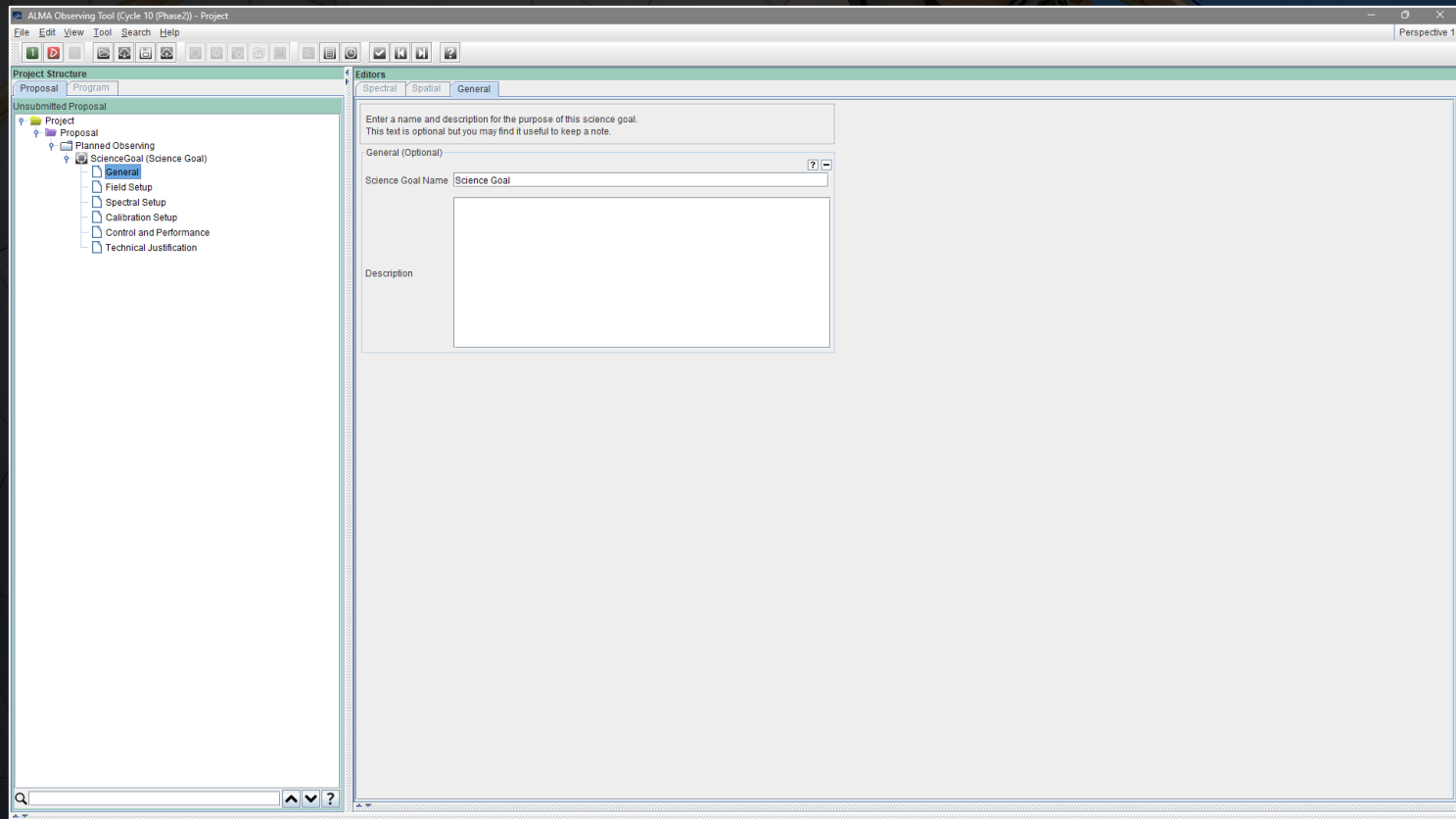
The screenshot displays the ALMA Observing Tool interface. A yellow arrow points to a button in the top toolbar. The interface is divided into two main panels: 'Project Structure' on the left and 'Editors' on the right. The 'Project Structure' panel shows a tree view with 'Project' expanded to show 'Proposed' and 'Planned Observing'. The 'Editors' panel is currently on the 'Proposed' tab and contains a form for 'Proposed Information'. The form includes fields for 'Proposal Title', 'Proposal Cycle' (set to 2023.1), and 'Abstract (max. 1200 characters)'. Below these are radio button options for 'Proposal Type' (Regular, Large Program, Target Of Opportunity, Phased Array, VLB) and '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). There is also a 'Please select one or two keywords' field and a 'Student project' checkbox. At the bottom of the form, there is a 'Joint Proposals' section with 'Is this a Joint Proposal?' (Yes/No) and an 'Investigators' table.

Type	Full name	Email	Affiliation	ALMA ID	Executive	Reviewer
PI	Not set	Not set	Not set	Not set	Non-ALMA	<input checked="" type="checkbox"/>



Each Science Goal consists of a set of six tabs.

The General tab describes the Science Goal.



The Field Setup tab describes the locations in the sky to be observed.

Multiple sources can be specified in this tab. Mosaic observations can also be specified here.

The screenshot displays the ALMA Observing Tool interface. On the left, the Project Structure tree shows the 'Field Setup' tab selected under 'Planned Observing'. The main window is divided into three sections:

- Spatial Image:** Shows a visual representation of the field with a red circle indicating the target area. Below the image are FOV Parameters: Representative Frequency (Sky) 104.500 GHz, Array Type 12m, Antenna Beamsize (HPBW) 55.722 arcsec, and Show Antenna Beamsize checked.
- Source Configuration (M83):**
  - Source Name: M83
  - System: ICRS
  - RA: 13:37:00.9192
  - Dec: -29:51:56.739
  - Source Radial Velocity: 519.100 km/s
  - Target Type: Individual Pointing(s)
  - Expected Source Properties: Peak Continuum Flux Density per Synthesized Beam 0.00000 Jy, Continuum Linear Polarization 0.0 per cent, Continuum Circular Polarization 0.0 per cent, Peak Line Flux Density per Synthesized Beam 0.00000 Jy, Line Width 0.00000 km/s, Line Linear Polarization 0.0 per cent, Line Circular Polarization 0.0 per cent.
  - Field Centre Coordinates: Coord Type Relative, Array Type 12m, Offset Unit arcsec, #Pointings 12m Array 1.
- Image Query:** Image Server: Digitized Sky (Version II) at ESO, Image Size (arcmin) 10.0.

At the bottom, there are buttons for 'Add Source', 'Load from File', 'Export to File', 'Clone Source', 'Delete Source', and 'Delete All Sources'.

The Field Setup tab describes the locations in the sky to be observed.

Multiple sources can be specified in this tab. Mosaic observations can also be specified here.

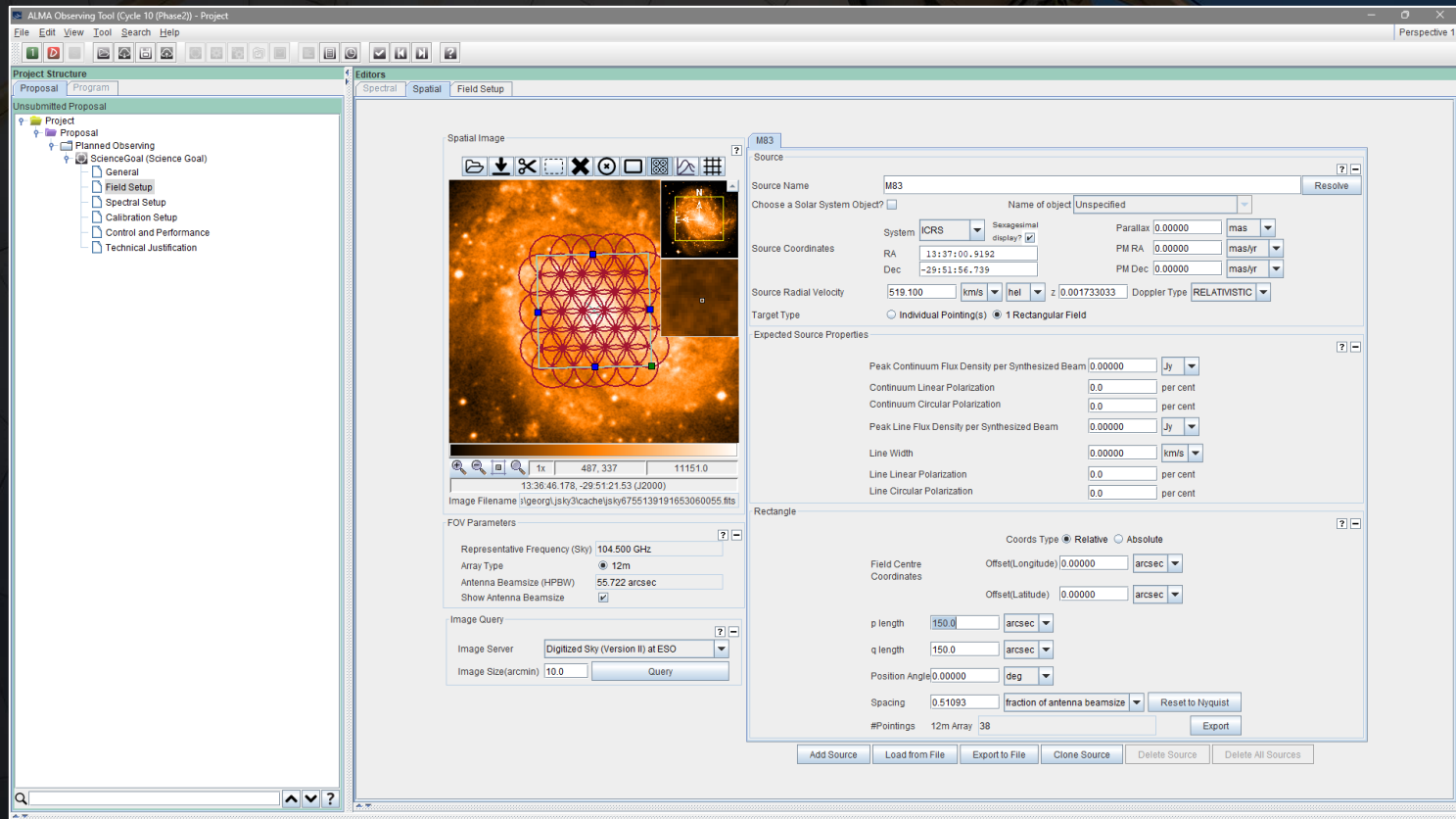
The screenshot displays the ALMA Observing Tool interface. On the left, the Project Structure tree shows the 'Field Setup' tab selected. The main window is divided into three sections:

- Spatial Image:** A central image of the M83 galaxy with two red circles indicating observation fields. Below the image are FOV Parameters: Representative Frequency (Sky) 104.500 GHz, Array Type 12m, Antenna Beamsize (HPBW) 55.722 arcsec, and Show Antenna Beamsize checked.
- Source Configuration (M83):**
  - Source Name: M83
  - System: ICRS
  - RA: 13:37:00.9192
  - Dec: -29:51:56.739
  - Source Radial Velocity: 519.100 km/s
  - Target Type: Individual Pointing(s)
  - Expected Source Properties: Peak Continuum Flux Density per Synthesized Beam 0.00000 Jy, Continuum Linear Polarization 0.0 per cent, Continuum Circular Polarization 0.0 per cent, Peak Line Flux Density per Synthesized Beam 0.00000 Jy, Line Width 0.00000 km/s, Line Linear Polarization 0.0 per cent, Line Circular Polarization 0.0 per cent.
  - Field Centre Coordinates table:

RA [arcsec]	Dec [arcsec]
0.00000	-0.00000
51.19729	58.55285
- Image Query:** Image Server: Digitized Sky (Version II) at ESO, Image Size (arcmin): 10.0

The Field Setup tab describes the locations in the sky to be observed.

Multiple sources can be specified in this tab. Mosaic observations can also be specified here.



Although source positions and redshifts can be automatically filled in, users need to check that these quantities were filled in correctly or insert new values if appropriate.

ALMA Observing Tool (Cycle 10 Phase2) - Project

File Edit View Tool Search Help

Project Structure

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

Editors

Spectral Spatial Field Setup

Spatial Image

M83

Source

Source Name: M83

Choose a Solar System Object?  Name of object: Unspecified

System: ICRS Senegalimal display?

Parallax: 0.00000 mas

RA: 13:37:00.9192 PM RA: 0.00000 mas/yr

Dec: -29:51:56.739 PM Dec: 0.00000 mas/yr

Source Radial Velocity: 519.100 km/s hel z: 0.001733033 Doppler Type: RELATIVISTIC

Target Type:  Individual Pointing(s)  1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam: 0.00000 Jy

Continuum Linear Polarization: 0.0 per cent

Continuum Circular Polarization: 0.0 per cent

Peak Line Flux Density per Synthesized Beam: 0.00000 Jy

Line Width: 0.00000 km/s

Line Linear Polarization: 0.0 per cent

Line Circular Polarization: 0.0 per cent

Field Centre Coordinates

Coord Type:  Relative  Absolute

Array Type:  12m

Offset Unit: arcsec

#Pointings: 12m Array 1

RA [arcsec]	Dec [arcsec]
0.00000	0.00000

Add Delete Reset Import Export

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

The Spectral Setup tab describes how the receivers are set up for the observations.

Multiple spectral and polarization settings are available.

The screenshot displays the ALMA Observing Tool interface. The 'Project Structure' tree on the left shows the 'Spectral Setup' tab selected under 'Planned Observing'. The main window is divided into several sections:

- Visualisation:** Contains text explaining the configuration of up to 16 spectral windows and a plot of 'Observed Frequency (GHz)' vs 'Rest Frequency (GHz)'. The plot shows 10 distinct spectral windows labeled 01 through 10.
- Overlays:** Includes checkboxes for 'Receiver Bands', 'Transmission', 'DSB Image', and 'Spectral Lines', along with a 'Select Lines to Overlay' button.
- Water Vapour Column Density:** Offers 'Automatic Choice' and 'Manual Choice' (set to 5.185mm (7th Octile)).
- Spectral Type:** Features radio buttons for 'Spectral Line', 'Single Continuum', and 'Spectral Scan', and checkboxes for 'Produce image sidebands' and 'Polarization products desired'.
- Spectral Setup Errors:** Displays a red error message: 'No spectral window in the list. No suitable receiver band for the range [0.0 GHz, 0.0 GHz]'.
- Spectral Line Table:** A table with columns: Fraction, Centre Freq (rest, hel), Centre Freq (sky, hel), Transition, Bandwidth, Resolution (smoothed), Spec. Avg, and Representative Window.

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

When the spectral type is set to spectral line, the individual spectral windows need to be created by the user.

When the other spectral types are used, the spectral windows are set based on the user's input.

ALMA Observing Tool (Cycle 10 (Phase2)) - Project

File Edit View Tool Search Help

Project Structure

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

Editors

Spectral Spatial Spectral Setup

Spectral Type

Spectral Type

Spectral Line  
 Single Continuum  
 Spectral Scan

Produce image sidebands (Bands 9 and 10 only)

Polarization products desired  XX  DUAL  FULL

Spectral Setup Errors

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

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

Baseband-2

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

Baseband-3

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

Baseband-4

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

When the spectral type is set to spectral line, the individual spectral windows need to be created by the user.

When the other spectral types are used, the spectral windows are set based on the user's input.

The screenshot displays the 'ALMA Observing Tool (Cycle 10 Phase2) - Project' interface. The 'Editors' pane is active, showing the 'Spectral Setup' tab. The 'Spectral Type' is set to 'Spectral Line'. The 'Produce image sidebands (Bands 9 and 10 only)' checkbox is unchecked. The 'Polarization products desired' are set to 'DUAL'. The 'Spectral Setup Errors' section is empty. Below, four basebands are listed, each with a table of spectral windows.

Fraction	Centre Freq (rest/rel)	Centre Freq (sky/rel)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg	Representative Window
1(Full)	97.98095 GHz	97.81144 GHz	CS v=0 2-1	1875.000 MHz( 5747 km/s), 1.129 MHz( 3.460 km/s) (2-bit)	2	●
1(Full)	99.77261 GHz	99.60000 GHz	Continuum 1	1875.000 MHz( 5644 km/s), 1.129 MHz( 3.398 km/s) (2-bit)	2	○
1(Full)	109.78994 GHz	109.60000 GHz	Continuum 2	1875.000 MHz( 5129 km/s), 1.129 MHz( 3.088 km/s) (2-bit)	2	○
1(Full)	111.59306 GHz	111.40000 GHz	Continuum 3	1875.000 MHz( 5046 km/s), 1.129 MHz( 3.038 km/s) (2-bit)	2	○



When the spectral type is set to spectral line, the individual spectral windows need to be created by the user.

When the other spectral types are used, the spectral windows are set based on the user's input.

Create spectral windows centred on spectral lines

Transition Filter  
CS v=0\*

Include description

Frequency Filters  
ALMA Band  
1 2 3 4 5 6 7 8 9 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.

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
CS v=0 1-0	Carbon Monosulfide	48.990957 GHz	48.906201 GHz	2.351 K	3.533.834 D <sup>+</sup>		Offline
CS v=0 2-1	Carbon Monosulfide	97.980953 GHz	97.811443 GHz	7.053 K	6.947.668 D <sup>+</sup>		Offline
CS v=0 3-2	Carbon Monosulfide	146.969025 GHz	146.714763 GHz	14.106 K	8.111.501 D <sup>+</sup>		Offline
CS v=0 4-3	Carbon Monosulfide	195.954211 GHz	195.615203 GHz	23.511 K	3.315.287 D <sup>+</sup>		Offline
CS v=0 5-4	Carbon Monosulfide	244.935556 GHz	244.511809 GHz	35.266 K	5.519.169 D <sup>+</sup>		Offline
CS v=0 6-5	Carbon Monosulfide	293.912091 GHz	293.403613 GHz	49.371 K	3.323.003 D <sup>+</sup>		Offline
CS v=0 7-6	Carbon Monosulfide	342.882857 GHz	342.289658 GHz	65.827 K	9.652.636 D <sup>+</sup>		Offline
CS v=0 8-7	Carbon Monosulfide	391.848993 GHz	391.168984 GHz	84.634 K	30.67 D <sup>+</sup>		Offline
CS v=0 9-8	Carbon Monosulfide	440.803237 GHz	440.040632 GHz	105.788 K	34.504 D <sup>+</sup>		Offline
CS v=0 10-9	Carbon Monosulfide	489.750927 GHz	488.903541 GHz	129.293 K	11.738.338 D <sup>+</sup>		Offline
CS v=0 13-12	Carbon Monosulfide	636.532466 GHz	635.431243 GHz	213.895 K	29.949.839 D <sup>+</sup>		Offline
CS v=0 14-13	Carbon Monosulfide	685.435929 GHz	684.250101 GHz	246.79 K	25.53.673 D <sup>+</sup>		Offline
CS v=0 17-16	Carbon Monosulfide	832.061708 GHz	830.622212 GHz	359.552 K	57.265.174 D <sup>+</sup>		Offline
CS v=0 18-17	Carbon Monosulfide	880.905560 GHz	879.381563 GHz	401.929 K	15.369.008 D <sup>+</sup>		Offline
CS v=0 19-18	Carbon Monosulfide	929.732106 GHz	928.123637 GHz	446.448 K	172.942 D <sup>+</sup>		Offline

Add to spectral window list

Spectral windows in this baseband (maximum of four)

Transition	Description	Rest Frequency	Sky Frequency
------------	-------------	----------------	---------------

Remove spectral window(s)

The spectral line catalogue will appear when either overlaying spectral lines in the spectrum plot or defining spectral windows to observe.

Create spectral windows centred on spectral lines

Transition Filter  
CS v=0\*

Include description

Frequency Filters  
ALMA Band  
1 2 3 4 5 6 7 8 9 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.

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
CS v=0 1-0	Carbon Monosulfide	48.990957 GHz	48.906201 GHz	2.351 K	3.533.834 D*		Offline
CS v=0 2-1	Carbon Monosulfide	97.980953 GHz	97.811443 GHz	7.053 K	6.947.668 D*		Offline
CS v=0 3-2	Carbon Monosulfide	146.969025 GHz	146.714763 GHz	14.106 K	8.111.501 D*		Offline
CS v=0 4-3	Carbon Monosulfide	195.954211 GHz	195.615203 GHz	23.511 K	3.315.287 D*		Offline
CS v=0 5-4	Carbon Monosulfide	244.935556 GHz	244.511809 GHz	35.266 K	5.519.169 D*		Offline
CS v=0 6-5	Carbon Monosulfide	293.912091 GHz	293.403613 GHz	49.371 K	3.323.003 D*		Offline
CS v=0 7-6	Carbon Monosulfide	342.882857 GHz	342.289658 GHz	65.827 K	9.652.636 D*		Offline
CS v=0 8-7	Carbon Monosulfide	391.846893 GHz	391.168984 GHz	84.634 K	30.67 D*		Offline
CS v=0 9-8	Carbon Monosulfide	440.803237 GHz	440.040632 GHz	105.786 K	34.504 D*		Offline
CS v=0 10-9	Carbon Monosulfide	489.750927 GHz	488.903541 GHz	129.293 K	11.738.338 D*		Offline
CS v=0 13-12	Carbon Monosulfide	635.532466 GHz	635.431243 GHz	213.895 K	29.949.839 D*		Offline
CS v=0 14-13	Carbon Monosulfide	685.435929 GHz	684.250101 GHz	246.79 K	25.53.673 D*		Offline
CS v=0 17-16	Carbon Monosulfide	832.061708 GHz	830.622212 GHz	359.552 K	57.265.174 D*		Offline
CS v=0 18-17	Carbon Monosulfide	880.905560 GHz	879.381563 GHz	401.929 K	15.369.008 D*		Offline
CS v=0 19-18	Carbon Monosulfide	929.732106 GHz	928.123637 GHz	446.448 K	172.942 D*		Offline

Add to spectral window list

Spectral windows in this baseband (maximum of four)

Transition	Description	Rest Frequency	Sky Frequency
------------	-------------	----------------	---------------

Remove spectral window(s)

This catalogue can be searched using many criteria and is a generally useful reference.

The catalogue is also available on the web at

<https://splatalogue.online/>

Create spectral windows centred on spectral lines

Transition Filter  
CS v=0\*

Include description

Frequency Filters

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

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
CS v=0 1-0	Carbon Monosulfide	48.990957 GHz	48.906201 GHz	2.351 K		3.533.834 D <sup>+</sup>	Offline
CS v=0 2-1	Carbon Monosulfide	97.980953 GHz	97.811443 GHz	7.053 K		6.947.668 D <sup>+</sup>	Offline
CS v=0 3-2	Carbon Monosulfide	146.969025 GHz	146.714763 GHz	14.106 K		8.111.501 D <sup>+</sup>	Offline
CS v=0 4-3	Carbon Monosulfide	195.954211 GHz	195.615203 GHz	23.511 K		3.315.287 D <sup>+</sup>	Offline
CS v=0 5-4	Carbon Monosulfide	244.935556 GHz	244.511809 GHz	35.266 K		5.519.169 D <sup>+</sup>	Offline
CS v=0 6-5	Carbon Monosulfide	293.912091 GHz	293.403613 GHz	49.371 K		3.323.003 D <sup>+</sup>	Offline
CS v=0 7-6	Carbon Monosulfide	342.882857 GHz	342.289658 GHz	65.827 K		9.652.636 D <sup>+</sup>	Offline
CS v=0 8-7	Carbon Monosulfide	391.848993 GHz	391.168984 GHz	84.634 K		30.67 D <sup>+</sup>	Offline
CS v=0 9-8	Carbon Monosulfide	440.803237 GHz	440.040632 GHz	105.788 K		34.504 D <sup>+</sup>	Offline
CS v=0 10-9	Carbon Monosulfide	489.750927 GHz	488.903541 GHz	129.293 K		11.738.338 D <sup>+</sup>	Offline
CS v=0 13-12	Carbon Monosulfide	636.532466 GHz	635.431243 GHz	213.895 K		29.949.839 D <sup>+</sup>	Offline
CS v=0 14-13	Carbon Monosulfide	685.435929 GHz	684.250101 GHz	246.79 K		25.53.673 D <sup>+</sup>	Offline
CS v=0 17-16	Carbon Monosulfide	832.061708 GHz	830.622212 GHz	359.552 K		57.265.174 D <sup>+</sup>	Offline
CS v=0 18-17	Carbon Monosulfide	880.905560 GHz	879.381563 GHz	401.929 K		15.369.008 D <sup>+</sup>	Offline
CS v=0 19-18	Carbon Monosulfide	929.732106 GHz	928.123637 GHz	446.448 K		172.942 D <sup>+</sup>	Offline

Add to spectral window list

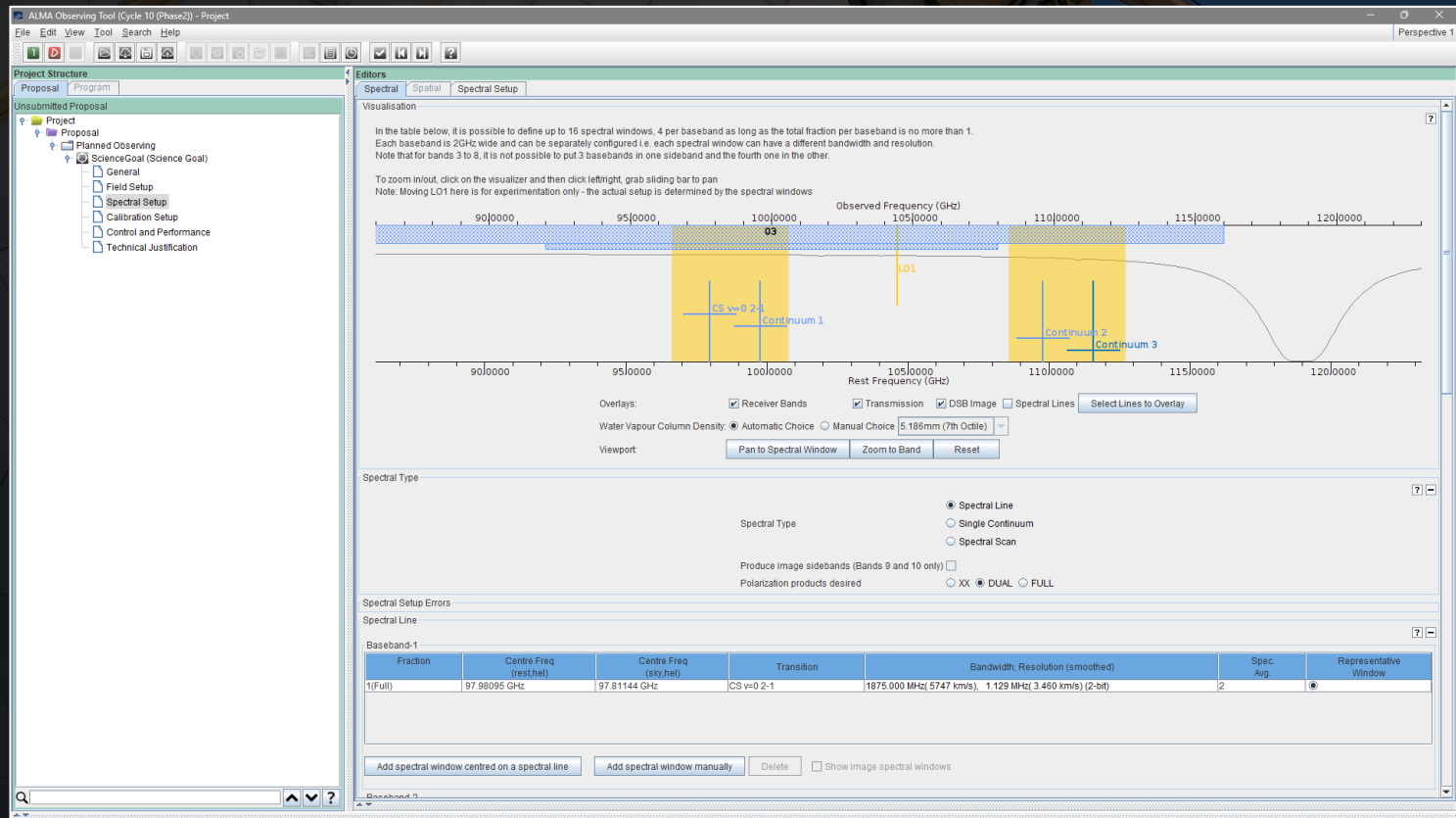
Spectral windows in this baseband (maximum of four)

Transition	Description	Rest Frequency	Sky Frequency
------------	-------------	----------------	---------------

Remove spectral window(s)

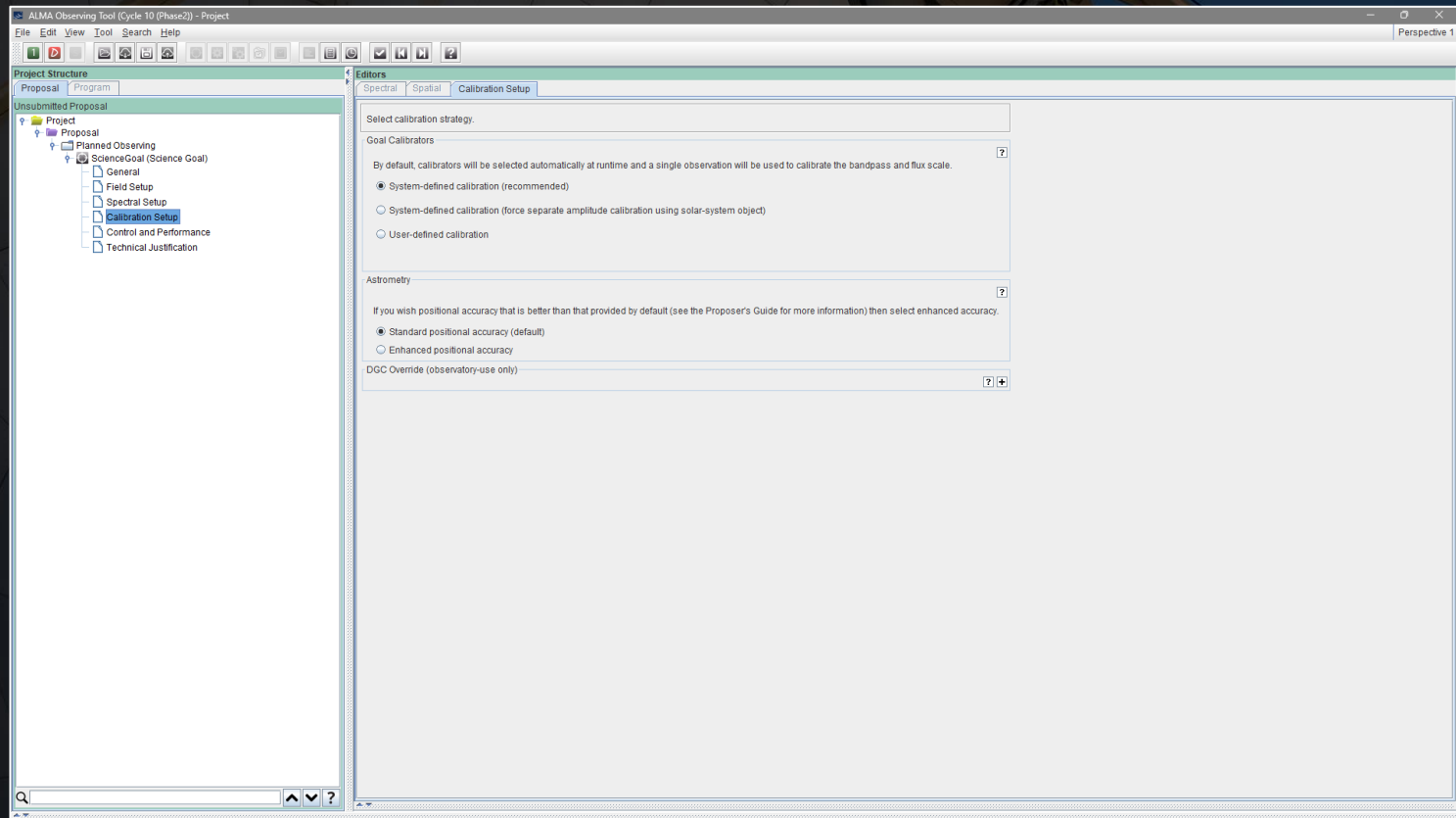
The plot at the top of the window will be updated as the spectral windows are set.

If the yellow bands do not appear, the spectral windows are not configured correctly.



The Calibration Setup tab is used to create specific calibration settings for the observations.

For most programs, the default settings are generally all that is needed.



Do not select an option other than system-defined calibration without seeking expert help.

ALMA Observing Tool (Cycle 10 (Phase2)) - Project

File Edit View Tool Search Help

Project Structure

Proposal Program

Unsubmitted Proposal

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

Editors

Spectral Spatial Calibration Setup

Select calibration strategy.

Goal Calibrators

By default, calibrators will be selected automatically at runtime and a single observation will be used to calibrate the bandpass and flux scale. ?

- System-defined calibration (recommended)
- System-defined calibration (force separate amplitude calibration using solar-system object)
- User-defined calibration

Astrometry ?

If you wish positional accuracy that is better than that provided by default (see the Proposer's Guide for more information) then select enhanced accuracy.

- Standard positional accuracy (default)
- Enhanced positional accuracy

DGC Override (observatory-use only) ? +

The Control and Performance tab is used to specify what sensitivity and angular resolution is required for the project.

The options here cannot be set until the Field Setup and Spectral Setup are set.

The screenshot displays the ALMA Observing Tool interface. The main window is titled "ALMA Observing Tool (Cycle 10 Phase2) - Project". The "Editors" panel is active, showing the "Control and Performance" tab. The "Project Structure" panel on the left shows a tree view with "Control and Performance" selected. The "Control and Performance" tab contains the following sections:

- Configuration Information**
  - Antenna Beamsize (1.13 \*  $\lambda/D$ ): 12m 59.532 arcsec, 7m 102.056 arcsec
  - Number of Antennas: 12m 43, 7m 10, TP 3
  - ACA 7m configuration, Most compact 12m configuration, Most extended 12m configuration
  - Longest baseline: 0.049 km, 0.161 km, 8.548 km
  - Synthesized beamsize: 12.784 arcsec, 3.470 arcsec, 0.098 arcsec
  - Shortest baseline: 0.009 km, 0.015 km, 0.113 km
  - Maximum recoverable scale: 68.424 arcsec, 29.330 arcsec, 1.458 arcsec
- Desired Performance**
  - Desired Angular Resolution (Synthesized Beam):  Single  Range  Any  Standalone ACA
  - 0.00000 arcsec
  - Largest Angular Structure in source: Undefined arcsec
  - Desired sensitivity per pointing: 0.00000 Jy equivalent to Infinity K
  - Bandwidth used for Sensitivity: RepWindowEffectiveChannelWidth, Frequency Width 1.562500 MHz
  - Override OT's sensitivity-based time estimate (must be justified):  Yes  No
  - Science Goal Breakdown: time estimate, clustering, beam and configurations
  - Simultaneous 12-m and ACA observations:  Yes  No
  - Are the observations time-constrained?:  Yes  No

If a desired angular resolution is needed, that should be specified here. **Using the Range option is strongly recommended.**

The screenshot displays the ALMA Observing Tool interface. On the left, the 'Project Structure' pane shows a tree view with 'Control and Performance' selected. The main window is titled 'Editors' and contains the 'Control and Performance' configuration panel. This panel includes a 'Configuration Information' section with fields for antenna beams, number of antennas, and various baselines. Below this is the 'Desired Performance' section, where the 'Range' radio button is selected for 'Desired Angular Resolution (Synthesized Beam)'. The resolution is set to 0.5 arcsec to 2.5 arcsec. Other parameters include 'Largest Angular Structure in source' (45.0 arcsec), 'Desired sensitivity per pointing' (0.01000 mJy), and 'Bandwidth used for Sensitivity' (AggregateBandWidth, 7.338557 GHz).

Parameter	ACA 7m configuration	Most compact 12m configuration	Most extended 12m configuration
Antenna Beamsize (1.13 * λ/D)	12m 59.532 arcsec	7m 102.056 arcsec	
Number of Antennas	12m 43	7m 10	TP 3
Longest baseline	0.049 km	0.161 km	8.548 km
Synthesized beamsize	12.784 arcsec	3.470 arcsec	0.098 arcsec
Shortest baseline	0.009 km	0.015 km	0.113 km
Maximum recoverable scale	68.424 arcsec	29.330 arcsec	1.458 arcsec



For observations that only need detections, **using the Any option is strongly recommended**. Alternately, the standalone ACA can be used, particularly for bright sources.

The screenshot displays the ALMA Observing Tool interface. On the left, the 'Project Structure' tree shows a hierarchy: Project > Planned Observing > Science Goal (Science Goal) > Control and Performance. The main 'Editors' panel is active on the 'Control and Performance' tab. It contains the following sections:

- Configuration Information:** Parameters for antenna beams and configurations. A table shows configurations for 12m and 7m antennas, including longest and shortest baselines, synthesized beamsizes, and maximum recoverable scales.
- Desired Performance:** Radio button options for 'Single', 'Range', 'Any', and 'Standalone ACA'. The 'Any' option is selected. Below, there are input fields for 'Desired sensitivity per pointing' (0.01000 mJy) and 'Bandwidth used for Sensitivity' (AggregateBandWidth).
- Override OT's sensitivity-based time estimate (must be justified):** Radio button options for 'Yes' and 'No', with 'No' selected.
- Science Goal Breakdown:** A 'Planning and Time Estimate' button.
- Simultaneous 12-m and ACA observations:** Radio button options for 'Yes' and 'No', with 'No' selected.
- Are the observations time-constrained?:** Radio button options for 'Yes' and 'No', with 'No' selected.

If the source is extended and if that extended emission is important for the science, then specifying the largest angular structure is important. This will determine whether the ACA or the total power arrays are needed. (Note that total power continuum observations are currently not possible.)

ALMA Observing Tool (Cycle 10 Phase2) - Project

File Edit View Tool Search Help

Project Structure

Unsubmitted Proposal

Project

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 observations, including the required antenna configurations and integration times.

Configuration Information

Antenna Beamsize (1.13 \*  $\lambda$  / D) 12m 59.532 arcsec 7m 102.056 arcsec

Number of Antennas 12m 43 7m 10 TP 3

	ACA 7m configuration	Most compact 12m configuration	Most extended 12m configuration
Longest baseline	0.049 km	0.161 km	8.548 km
Synthesized beamsize	12.784 arcsec	3.470 arcsec	0.098 arcsec
Shortest baseline	0.009 km	0.015 km	0.113 km
Maximum recoverable scale	68.424 arcsec	29.330 arcsec	1.458 arcsec

Desired Performance

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

0.5 arcsec to 2.5 arcsec

Largest Angular Structure in source 45.0 arcsec

Desired sensitivity per pointing 0.01000 mJy equivalent to 0.20448 mK @ 2.50" and 0.0051121 K @ 0.500"

Bandwidth used for Sensitivity AggregateBandWidth Frequency Width 7.338557 GHz

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

Science Goal Breakdown: time estimate, clustering, beam and configurations [Planning and Time Estimate](#)

Simultaneous 12-m and ACA observations  Yes  No

Are the observations time-constrained?  Yes  No

**ALMA is not like other telescopes in that it does not allocate “time” to observing proposals.**

ALMA will instead observe the targets until it achieves the desired sensitivity.

The screenshot displays the ALMA Observing Tool interface. On the left, the 'Project Structure' tree shows a hierarchy: Unsubmitted Proposal > Project > Planned Observing > ScienceGoal (Science Goal) > Control and Performance. The main 'Editors' panel is active on the 'Control and Performance' tab. It contains the following sections:

- Configuration Information:** Parameters for antenna configurations and integration times. A table shows configurations for 12m and 7m antennas, including longest and shortest baselines, synthesized beamsizes, and maximum recoverable scales.
- Desired Performance:** Settings for angular resolution and sensitivity. Includes dropdowns for 'Desired Angular Resolution (Synthesized Beam)' (0.5 to 2.5 arcsec), 'Largest Angular Structure in source' (45.0 arcsec), and 'Desired sensitivity per pointing' (0.01000 mJy equivalent to 0.20448 mK @ 2.50°).
- Bandwidth used for Sensitivity:** Set to 'AggregateBandWidth' with a frequency width of 7.338557 GHz.
- Override OT's sensitivity-based time estimate (must be justified):** Radio button set to 'No'.
- Science Goal Breakdown:** Includes a 'Planning and Time Estimate' button.
- Simultaneous 12-m and ACA observations:** Radio button set to 'No'.
- Are the observations time-constrained?:** Radio button set to 'No'.

The tab has a button that can be used to check the time needed for an observation. While minimizing the observing time while achieving a desired sensitivity is important, keep in mind that **ALMA does not allocate “time” to observing proposals.**

Planning and 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	0.01000 mJy
Bandwidth used for sensitivity	7.339 GHz
Representative frequency (sky, first source)	97.811 GHz

**Estimated Total time for Science Goal** **1.84 h**

Cluster 1

Source Name	RA	Dec	Velocity
M83	13:37:00.9192	-29:51:56.739	519.100 km/s

**Possible Configuration Combinations**

12-m (1)	12-m (2)	7-m	TP	Nominal Beam(°)	Max expected axial ratio
C-1	None	No	No	3.227 x 3.732	1.5
C-2	None	No	No	2.192 x 2.534	1.5
C-3	None	No	No	1.316 x 1.597	1.5
C-4	None	No	No	0.88 x 1.007	1.5
C-5	None	No	No	0.539 x 0.578	1.5
C-6	None	No	No	0.277 x 0.357	1.5

**Input Parameters**

Precipitable water vapour (all sources)	5.186mm (7th Octile)
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**Time required for 12m (1) [C-1]**

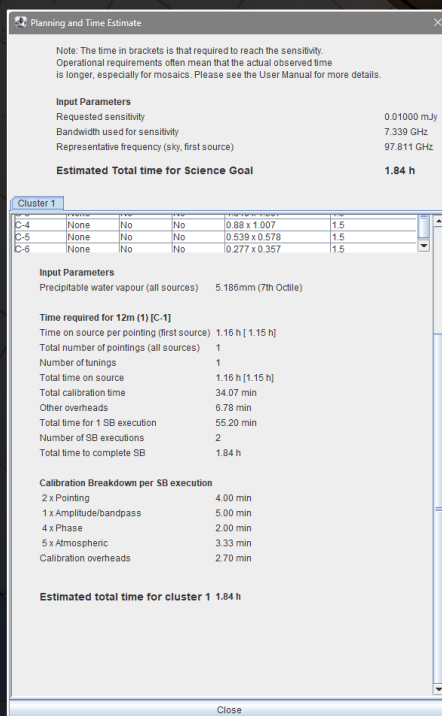
Time on source per pointing (first source)	1.16 h [ 1.15 h]
Total number of pointings (all sources)	1
Number of tunings	1
Total time on source	1.16 h [ 1.15 h]
Total calibration time	34.07 min
Other overheads	6.78 min
Total time for 1 SB execution	55.20 min
Number of SB executions	2
Total time to complete SB	1.84 h

**Calibration Breakdown per SB execution**

2 x Pointing	4.00 min
1 x Amplitude/bandpass	5.00 min
4 x Phase	2.00 min
5 x Atmospheric	3.33 min

Close

The tab has a button that can be used to check the time needed for an observation. While minimizing the observing time while achieving a desired sensitivity is important, keep in mind that **ALMA does not allocate “time” to observing proposals.**



Planning and 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	0.01000 mJy
Bandwidth used for sensitivity	7.339 GHz
Representative frequency (sky, first source)	97.811 GHz

**Estimated Total time for Science Goal** 1.84 h

**Cluster 1**

Source	RA	DEC	Flux	Size	Time
C-4	None	No	No	0.88 x 1.007	1.5
C-5	None	No	No	0.539 x 0.578	1.5
C-6	None	No	No	0.277 x 0.357	1.5

**Input Parameters**

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

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

Time on source per pointing (first source)	1.16 h [1.15 h]
Total number of pointings (all sources)	1
Number of tunings	1
Total time on source	1.16 h [1.15 h]
Total calibration time	34.07 min
Other overheads	6.78 min
Total time for 1 SB execution	55.20 min
Number of SB executions	2
Total time to complete SB	1.84 h

**Calibration Breakdown per SB execution**

2 x Pointing	4.00 min
1 x Amplitude/bandpass	5.00 min
4 x Phase	2.00 min
5 x Atmospheric	3.33 min
Calibration overheads	2.70 min

**Estimated total time for cluster 1** 1.84 h

Close

The Technical Justification tab is a place where a justification for the sensitivity goal, requested angular resolutions, and spectral window setup should be added.

This information does not need to be in the science case.

ALMA Observing Tool (Cycle 10 (Phase2)) - Project

File Edit View Tool Search Help

Project Structure

Proposal Program

Unsubmitted Proposal

Project

Planned Observing

ScienceGoal (Science Goal)

General

Field Setup

Spectral Setup

Calibration Setup

Control and Performance

Technical Justification

Editors

Spectral Spatial Technical Justification

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

Sensitivity

Requested RMS over 7.339 GHz: is 10.00 uJy

Achieved RMS over the total 7.339 GHz bandwidth is 9.96 uJy, 0.11 mK-12.92 mK For a continuum flux density of 0.00 Jy, 0.00 mK-0.00 mK , the achieved S/N is 0.0

Note that one or more of the S/N estimates are < 3. Please double-check the RMS and/or line fluxes entered and/or address the issue below.

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.

Imaging

Requested angular resolution 3.47 arcsec-313.87 mas

Requested Largest Angular Scale 0.00 arcsec

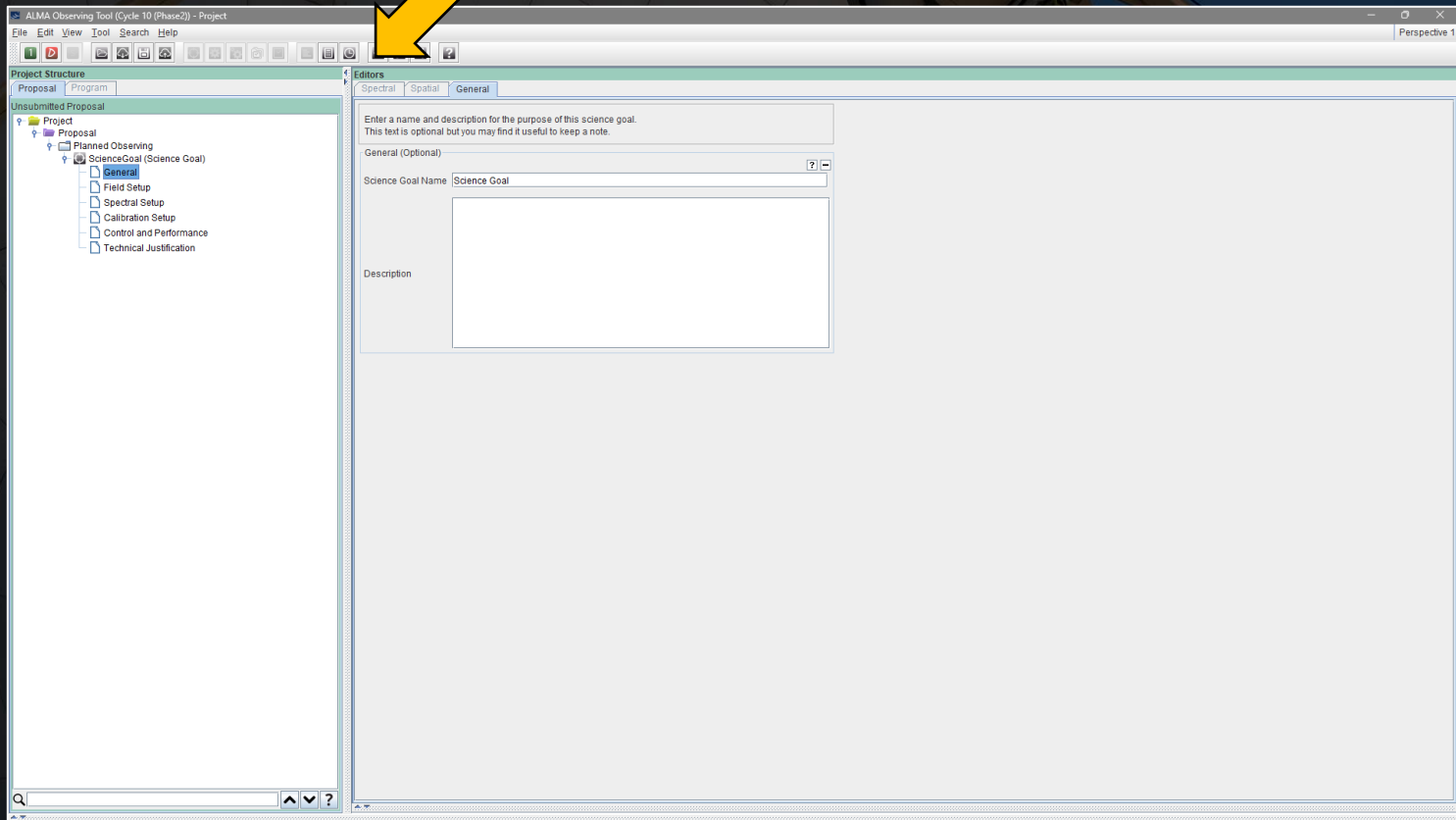
Justify the chosen angular resolution and largest angular scale for the source(s) in this Science Goal

Correlator configuration

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

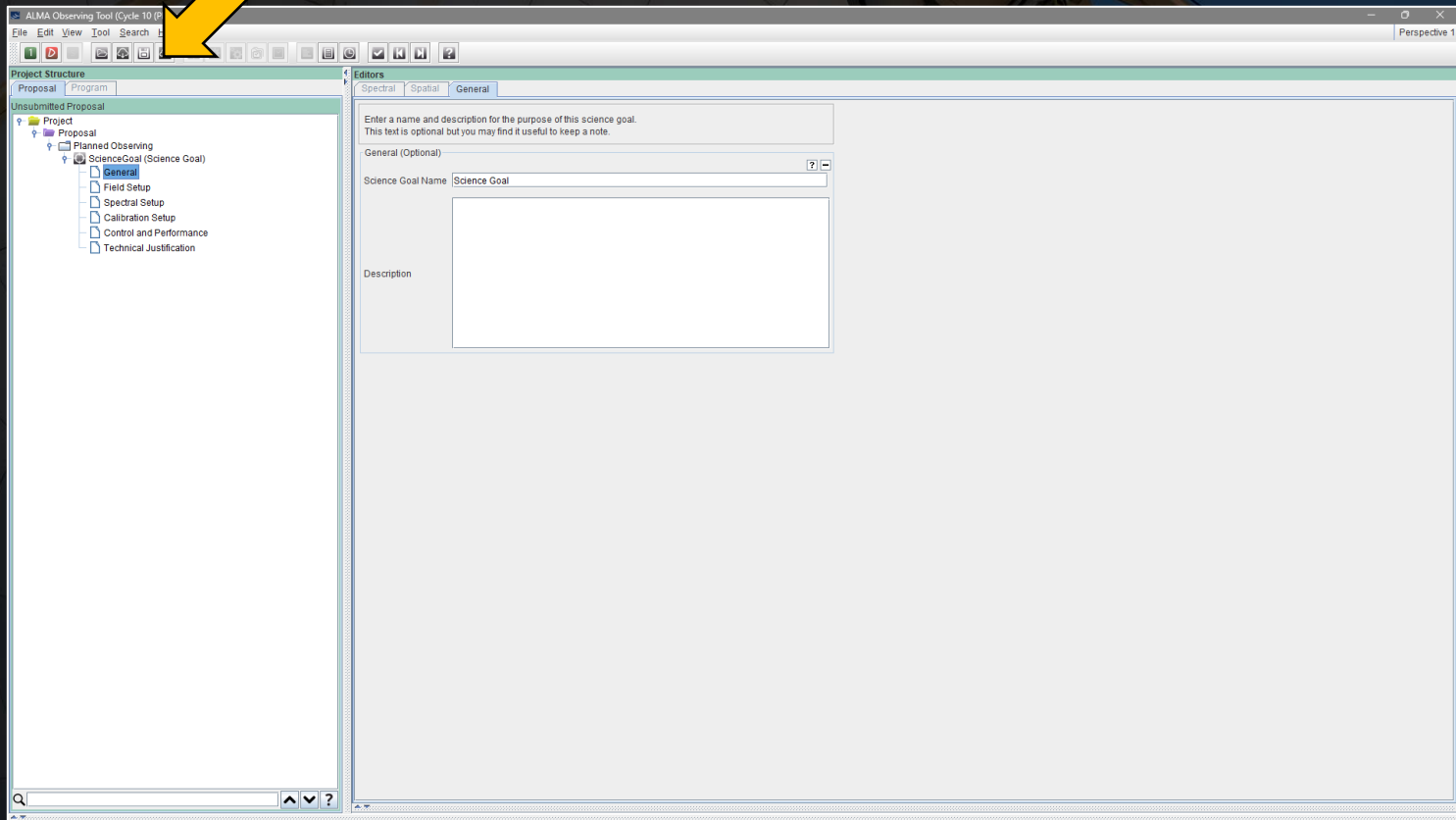
Once a proposal is created, it should be validated using the option in the File menu or the button in the button bar.

After the proposal is validated, it can be submitted using another option in the File menu.



Once a proposal is created, it should be validated using the option in the File menu or the button in the button bar.

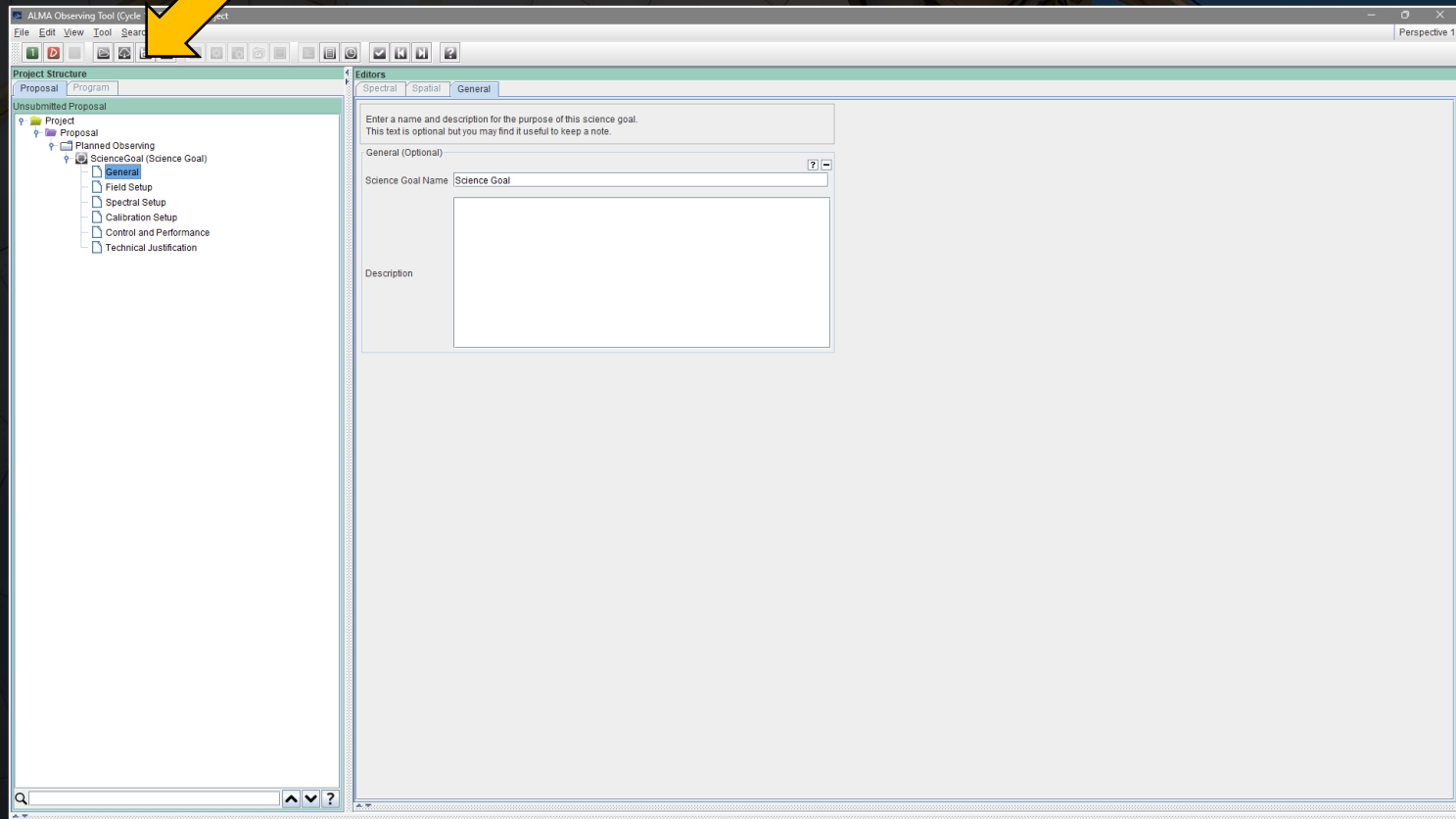
After the proposal is validated, it can be submitted using another option in the File menu.





The proposal can be saved as an aot file at any time using the save options in the File menu or button bar.

Additionally, the proposal can be exported as a PDF.



## Some recommendations on setting up observations:

- Make sure all Co-Is have registered for an account with ALMA (or ESO) so that they can be listed on the proposal.
- Check the source coordinates, velocities and/or redshifts, and spectral settings before proposal submission. These can be updated later, but if more changes need to be made, more errors can be introduced.
- Use at least four spectral windows. Any spectral window not covering a line of scientific interest can be used for serendipitous continuum and spectral line detection.
- Use 1920 channels per baseband. The extra channels provide extra spectral resolution if needed, and if the higher resolution is not needed, the channels can be averaged together after observing to improve sensitivity.
- Do not use 3840 channels per spectral window (unless you know what you are doing). The effective spectral resolution will still be equivalent to 1920 channels.
- Do not place important spectral lines near the edges of spectral windows where the sensitivity of the detectors decreases.

## Some recommendations on setting up observations:

- Do not try to gain sensitivity by overlapping the spectral windows. The instrument doesn't work that way.
- Do not change anything under Calibration Setup unless you know what you are doing.
- Do not specify a single angular resolution unless you absolutely need to. A program that specifies a range is more likely to be observed.
- Use “Any” for the desired angular resolution if you only need to detect the source.
- Do not forget to account for extended source emission in terms of uv coverage.
- Do not forget to account for extent of the source emission when estimating the peak surface brightness.

A large satellite dish antenna structure is shown against a dark blue sky. The dish is composed of a grid of white panels and a complex metal support frame. A circular component is visible on the surface of the dish.

A proposal can be resubmitted multiple times before the proposal deadline.

After the deadline, the proposal can no longer be changed until the review process is completed.