

The ALMA Observing Tool

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What is the ALMA OT?

- * JAVA-based application, can be run on any OS that has a recent version of JAVA (currently JAVA 6 and 7 supported) installed
- * Two flavours: web-start (recommended; updates done automatically) or tarball (more robust)
- * The ALMA OT is the one-stop shop for
 - ✓ Preparing ALMA Observing Proposals (Phase I)
 - ✓ Submitting proposals to the ALMA archive
 - ✓ Generating Scheduling Blocks (Phase II)
 - ✓ Submitting Phase II material to the archive
- * Designed to allow users without in-depth technical knowledge of sub-mm/interferometry concepts to prepare high-quality proposals



Phase I - Concepts

- * OT software can be freely downloaded from the ALMA Science Portal. Then run locally, although intermittent internet connection required (e.g. database access, submission)
- * PIs prepare ALMA proposals containing
 - ✓ General information (title, abstract, PI and co-Is etc)
 - ✓ Science Case (4 page PDF)
 - ✓ One or several **Science Goals** (SGs – contain technical information)
- * All PIs and Co-Is must be registered with the ALMA Science Portal
- * All proposals must pass a validation check before submission

Phase I – Getting started

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The menu bar includes "File", "Edit", "View", "Tool", "Search", and "Help". The toolbar contains various icons for file operations and editing. The "Project Structure" pane on the left shows a tree view with "Project" and "Proposal" nodes. The "Editors" pane on the right is active, showing the "Project" tab. The "Principal Investigator" field has a "Select PI..." button. The "Main Project Information" section includes fields for "Project", "Assigned Priority", and "Project Code" (set to "None Assigned"). There are also expandable sections for "Project Notes (Staff Only)" and "Advanced Options (Staff Only)".

- * Contextual Help
- * Tooltips
- * Quickstart Guide
- * Video Tutorials
- * User Manual
- * Reference Manual
- * ALMA Helpdesk

The "Overview" section contains a "Contextual Help" box and a "Phase I: Science Proposal" flowchart. The "Contextual Help" box lists three steps: 1. Register with the ALMA Science Portal. 2. Create a new proposal by either: selecting File > New Proposal, clicking the proposal icon in the toolbar, or clicking the proposal link. 3. Click on the proposal tree node and complete the relevant fields. The "Phase I: Science Proposal" flowchart shows a sequence of steps: New Science Proposal, Create Science Goals, Validate Science Proposal, and Submit Science Proposal. Below the flowchart are buttons for "Importing And Exporting", "Template Library", "Need More Help?", and "View Phase 2 Steps".

Phase I – Getting started

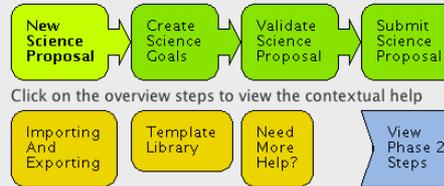
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Overview

Contextual Help

1. Please ensure you and your co-Is are registered with the [ALMA Science Portal](#)
2. Create a new proposal by either:
 - Selecting *File > New Proposal*
 - Clicking on the  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



Phase I – Getting started

ALMA Observing Tool (Cycle2) Project - Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help

- Quick Start Guide F1
- User Manual F2
- Reference Manual F3
- About...

Project Structure

- Proposal Program
- Unsubmitted Proposal
 - Project
 - Proposal

Editors

Spectral Spatial Project

Principal Investigator [] [Select PI...]

Main Project Information

Project []

Assigned Priority []

Project Code None Assigned []

Project Notes (Staff Only) [?] [+]

Advanced Options (Staff Only) [?] [+]

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Overview

Contextual Help

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

Phase I: Science Proposal



Phase I – Getting started

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window shows a 'Project Structure' tree on the left with 'Project' and 'Proposal' nodes. A 'Quick Start Guide' window is open, displaying the 'Attach supporting material' section. The guide text reads: 'In the second step you **attach supporting material** used for the scientific and technical assessment of your proposal. You are required to present a science case and a technical justification in a single .pdf file not exceeding 5 pages in total, including any figures and tables. The science case should put the proposed observations in a broad scientific context, highlight their impact on the field of research and present the immediate goal you expect to achieve. The technical justification should justify the setup requested, including the sensitivity requirement, spectral resolution and field setup. **Any technical information not captured by the OT should be included here.** This includes for example justifying an observing time allocation that is not driven by sensitivity requirements, and thus differs from that estimated by the OT. Please see the *Technical Justification* section of the *Proposers Guide* (available on the Science Portal) for more detailed information.'

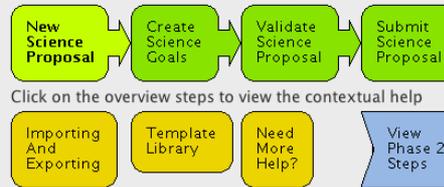
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Overview

Contextual Help

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2. Create a new proposal by either:
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Phase I: Science Proposal



Click on the overview steps to view the contextual help

Phase I – General info

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled 'Project - Observing Tool for ALMA, version Cycle2Test2'. The interface is divided into several sections:

- Project Structure:** Located on the left, it shows a tree view with 'Unsubmitted Proposal' and a sub-entry 'Demo of the amazingness of the OT'.
- Editors:** The main workspace, currently showing the 'Proposal' tab. It contains a form for entering proposal information.

Proposal Information Form:

- Proposal Title:** Demo of the amazingness of the OT
- Proposal Cycle:** TEST.7
- Abstract (max. 1200 characters):** In this demo project I will show the world how amazing the OT is
- Launch Editor:** A button to edit the abstract.
- Proposal Type:** Radio buttons for 'Standard' (selected) and 'Target Of Opportunity'.
- 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' (selected).
- Keywords (max. 2 keywords):** A list box containing 'The Sun', 'Main sequence stars', 'Asymptotic Giant Branch (AGB) stars', 'Post-AGB stars', and 'Hypergiants'.
- Student project:** A checkbox, currently unchecked. Options include 'Continuation' and '(Not Applicable)'.
- Related Proposals:** An empty text field.
- Previous Proposals:** An empty text field.

Investigators: A table at the bottom of the form.

Type	Full name	Email	Affiliation	ALMA ID	Executive
PI	Not set	Not set	Not set	Not set	Non-ALMA

Navigate using the proposal tree

Phase I – General info

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2" and shows a "Proposal" form. A modal dialog titled "Investigator search constraints" is open, showing a search for "Suzanna" and a table of results.

Investigator search constraints

Name contains

Full name	Email	Affiliation	ALMA ID
Suzanna Randall	srandall@eso.org	Headquarters Garching, Eu...	srandall

Science & Technical Case
Science & Technical Case (Mandatory, PDF, 4 pages max.)
Observatory Use Only

Phase I – Science Goal(s)

- * A Science Goal defines the scientific requirements of an observation
 - * Field setup (several point sources with offset pointings OR 1 mosaic)
 - * One Spectral setup (frequencies, spectral resolution...)
 - * Calibration requirements
 - * One set of Control & Performance parameters (spatial resolution and LAS, sensitivity required, timing constraints...)
- * The correlator setup, array configuration(s), time required to achieve requested sensitivity, observing sequence etc. are then all defined by the OT based on the user input
- * Technical Justification to be included in each SG by PI

Phase I – Science Goal(s)

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The title bar shows "ALMA Observing Tool (Cycle2)" and "Project - Observing Tool for ALMA, version Cycle2Test2". The menu bar includes "File", "Edit", "View", "Tool", "Search", and "Help". The toolbar contains various icons for file operations and editing.

The interface is divided into several panels:

- Project Structure:** A tree view on the left showing the project hierarchy. A blue box highlights the "ScienceGoal (Science Goal)" folder, which contains sub-items: "General", "Field Setup", "Spectral Setup", "Calibration Setup", "Control and Performance", and "Technical Justification".
- Editors:** The main workspace, currently showing the "ScienceGoal (Science Goal)" editor. It has tabs for "Spectral", "Spatial", and "ScienceGoal (Science Goal)".

The "ScienceGoal (Science Goal)" editor is divided into several sections:

- General (Optional):** Contains a "Science Goal Name" field with the value "Science Goal" and a "Description" field. A "Launch Editor" button is located below the description field.
- SinglePoint Source:** Contains fields for "Source Name", "Choose a Solar System Object?" (checkbox), "Name of object" (dropdown menu set to "Unspecified"), "System" (dropdown menu set to "J2000"), "Sexagesimal display?" (checkbox), "Parallax" (0.00000 mas), "PM RA" (0.00000 mas/yr), "Dec" (00:00:00.0000), "PM DEC" (0.00000 mas/yr), "Source Radial Velocity" (0.000 km/s), "Isrk" (dropdown menu), "z" (0.000000000), and "Doppler Type" (RADIO). A "Target Type" section has radio buttons for "Multiple Pointings" (selected) and "1 Rectangular Field".
- Expected Source Properties:** Contains fields for "Peak Continuum Flux Density per Beam" (0.00000 Jy), "Continuum Polarization Percentage" (0.0 %), "Peak Line Flux Density per Beam" (0.00000 Jy), "Line Width" (0.00000 km/s), and "Line Polarization Percentage" (0.0 %).
- Field Center Coordinates:** Contains fields for "Custom Mosaic" (checkbox), "PointingPattern" (Offset), "Offset Unit" (arcsec), and "#Pointings" (dropdown menu).

Phase I – Field Setup

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The "Editors" panel is active, showing the "Field Setup" configuration for source M100. The "Spatial Image" window is highlighted with a blue callout box, showing a red rectangular mosaic of beam footprints overlaid on a grayscale image of the source. The "Field Setup" panel includes the following fields:

- Source Name: M100
- Source Coordinates: RA 12:22:54.8990, Dec 15:49:20.572
- Source Radial Velocity: 1570.000 km/s
- Target Type: 1 Rectangular Field
- Expected Source Properties:
 - Peak Continuum Flux Density per Beam: 0.50000 Jy
 - Continuum Polarization Percentage: 0.0 %
 - Peak Line Flux Density per Beam: 2.00000 mJy
 - Line Width: 30.00000 km/s
 - Line Polarization Percentage: 0.0 %
- Rectangle:
 - Coords Type: RELATIVE
 - Field Center Coordinates: System J2000, Offset(Longitude) 0.00000 arcsec, Offset(Latitude) 0.00000 arcsec
 - p length: 200.0 arcsec
 - q length: 200.0 arcsec
 - Position Angle: 0.00000 deg
 - Spacing: 0.48113 fraction of main beam
 - #Pointings: 12m Array 126

A blue callout box highlights the "Spatial Image" window, which displays a red rectangular mosaic of beam footprints overlaid on a grayscale image of the source. The callout box also contains the following text:

- Can resolve source properties from SIMBAD
- Can download image from a number of servers
- Interactively set up and visualise multiple offset pointings/rectangular mosaic

Phase I – Spectral Setup

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The "Editors" tab is active, showing the "Spectral Setup" window. The spectral plot displays "Observed Frequency" and "Rest Frequency" on the x-axis, with several receiver bands (03, 04, 06, 07, 08, 09) highlighted. The "Spectral Type" section is set to "Single Continuum". The "Polarization products desired" section is set to "DUAL". The "Receiver Band" is set to "9 [602.0-720.0 GHz]". The "Sky Frequency" is set to "625.0 GHz" and the "Rest Frequency" is set to "625.000000 GHz".

Project Structure:

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

Spectral Setup Errors:

Single Continuum

Receiver Band: 9 [602.0-720.0 GHz]

Reset to Standard Frequency

Only standard frequencies in B3.6.7 can be used when full polarization is selected

Sky Frequency: 625.0 GHz

Rest Frequency: 625.000000 GHz

Baseband-1	Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
Baseband-1				Single Continuum	2000.000 MHz(904 km/s), 31.250 MHz(15.062 km/s)	1	
Baseband-2							

- Choice of spectral line, continuum, spectral scan
- Full polarization now offered for some setups
- Sky transparency chosen & displayed based on frequency selected

The Spectral Line Picker

ALMA Observing Tool (Cycle2)

Project - Observing Tool for ALMA, version Cycle2Test2

Select Spectral Lines

Transition Filter: CO*

Include description

Frequency Filters

ALMA Band: 1 2 3 4 5 6 7 8 9 10

Sky Frequency (GHz): Min 602 Max 720

Receiver/Back End Configuration

Hide unobservable lines

Filtering unobservable lines

Maximum Upper-state Energy (K): 0 20 40 60 80 100 ∞

Molecule Filter / Environment

Show: all atoms and molecules

Can't find the transition you're looking for in the offline pool? Find more in the online Splatalogue.

Find More...

Reset Filters

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

Transition ^	Description	Rest Freque... ^	Sky Freque... ^	Upper-state En...	Lovas Inten...	Sij μ^2	Catal...
CO v=2 6-5	Carbon Monoxide	678.88 GHz	675.973 GHz	6243.288 K		0.073 D ²	Offline

- Interface to Splatalogue database containing thousands of common transitions
- Can search by species, frequency, common molecules etc.
- Once a line has been selected only transitions that can be observed with the same setup are shown

Add to Selected Transitions

Selected transitions

Transition ^	Description	Rest Frequency ^	Sky Frequency
CO v=2 6-5	Carbon Monoxide	678.88 GHz	675.973 GHz

Remove from Selected Transitions

Cancel Ok

Accept selected lines and close the dialog

Spectral Setup – Spectral Line

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled "Spectral Setup" and contains a "Visualisation" section. The visualization shows a plot of "Observed Frequency" (GHz) on the x-axis (ranging from 220,000 to 280,000) and "Rest Frequency" (GHz) on the x-axis (ranging from 220,000 to 280,000). The plot displays several spectral lines, including Si 13CC 10(2,9)-9(2,8) and Si 15O v = 0 6-5. A "LO1" label is visible near the 240,000 GHz mark. The interface also includes a "Project Structure" pane on the left, a "Table" at the bottom, and various control buttons like "Pan to Line", "Zoom to Band", and "Reset".

In the table below, it is possible to define up to 16 spectral windows, 4 per baseband as long as the total Fraction per baseband is no more than 1. Each baseband is 2GHz wide and can be separately configured i.e. each spectral window can have a different bandwidth and resolution. Note that for bands 3, 4, 6, 7 and 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other.

Left/right click to zoom in/out, grab sliding bar to pan
Note: Moving LO1 here is for experimentation only – actual setup determined by the windows

Overlays: Receiver Bands Transmission Overlay Lines DSB Image

Viewport: Vapour Column Density: Automatic Choice Manual Choice 1.262mm (4th Octile)

Spectral Type: Spectral Line Single Continuum Spectral Scan

Polarization products desired: XX DUAL FULL

Fraction	Center Freq (Rest)	Center Freq (Sky)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1/2	226.34036 GHz	225.37126 GHz	CO v=2 2-1	117.188 MHz(156 km/s), 122.070 kHz(0.162 km/s)	1	<input checked="" type="radio"/>
1/2	227.00456 GHz	226.03262 GHz	Si13CC 10(2,9)-9(2,8)	117.188 MHz(155 km/s), 122.070 kHz(0.162 km/s)	1	<input type="radio"/>

- Complicated spectral setups with up to 16 spectral windows with different resolution now allowed
- Can be set up with the spectral line picker + manually, and are visualised in the graphical display and table
- Non-valid spectral setups immediately give an error message

Spectral Setup – Spectral Scan

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The interface is divided into several sections:

- Project Structure:** A tree view on the left showing the project hierarchy, including "Unsubmitted Proposal", "Demo of the amazingness of the OT", "Planned Observing", and "ScienceGoal (Science Goal)".
- Editors:** A tabbed interface with "Spectral", "Spatial", and "Spectral Setup" tabs. The "Spectral Setup" tab is active.
- Plot Area:** A graph showing "Observed Frequency" (top axis, 290,000 to 350,000) and "Rest Frequency" (bottom axis, 290,000 to 360,000). The plot displays various spectral lines and bands, with a blue shaded region indicating the requested scan range.
- Configuration Panel:** A panel below the plot with various settings:
 - Overlays:** Checkboxes for "Receiver Bands", "Transmission", "Overlay Lines", and "DSB Image".
 - Spectral Scan:** Checkboxes for "Requested Scan", "Tuning 1", "Tuning 2", "Tuning 3", "Tuning 4", and "Tuning 5".
 - Water Vapour Column Density:** Radio buttons for "Automatic Choice" and "Manual Choice", with a dropdown menu set to "1.262mm (4th Octile)".
 - Viewport:** Buttons for "Pan to Line", "Zoom to Band", and "Reset".
- Spectral Type:** Radio buttons for "Spectral Line", "Single Continuum", and "Spectral Scan" (selected).
- Polarization products desired:** Radio buttons for "XX", "DUAL" (selected), and "FULL".
- Requested start frequency (sky):** Input field with "300.0" and "GHz" dropdown.
- Requested end frequency (sky):** Input field with "330.0" and "GHz" dropdown.
- Requested range (rest):** Input field with "301.2900 GHz - 331.4190 GHz".
- Achieved scan range (sky):** Input field with "300.0 GHz - 330.75 GHz".
- Bandwidth, Resolution (Hanning smoother):** Input field with "2000.000 MHz, 31.250 MHz".
- Spectral averaging:** Input field with "1".
- Representative frequency (sky):** Input field with "315.37500" and "GHz" dropdown.

- New for Cycle 2
- User inputs start & end frequency and desired spectral resolution
- A spectral scan with up to 5 tunings is automatically set up

Phase I – Calibration Setup

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The title bar reads "ALMA Observing Tool (Cycle2)" and the project name is "Project - Observing Tool for ALMA, version Cycle2Test2". The menu bar includes "File", "Edit", "View", "Tool", "Search", and "Help". The toolbar contains various icons for file operations and tool settings. The "Project Structure" pane on the left shows a tree view with "Unsubmitted Proposal" expanded, containing "Demo of the amazingness of the OT", "Proposal", and "Planned Observing". Under "Planned Observing", "ScienceGoal (Science Goal)" is expanded, showing "General", "Field Setup", "Spectral Setup", "Calibration Setup" (highlighted), "Control and Performance", and "Technical Justification". The "Editors" pane on the right has tabs for "Spectral", "Spatial", and "Calibration Setup". The "Calibration Setup" tab is active, displaying the following text: "Select calibration setup. If 'system' is selected, the ALMA system will select default calibrators." Below this is the "Goal Calibrators" section, which includes a help icon and the text: "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." Two radio buttons are present: "System-defined calibration" (selected) and "User-defined calibration". A blue box highlights the "System-defined calibration" radio button.

Project Structure

- Unsubmitted Proposal
 - Demo of the amazingness of the OT
 - Proposal
 - Planned Observing
 - ScienceGoal (Science Goal)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

Editors

Spectral Spatial Calibration Setup

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

- Normally, the observatory will select a standard set of calibrators dynamically (see talk by E. Van Kampen)
- For special cases, a user-defined calibration strategy can be defined

Phase I – Control & Performance

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The "Editors" panel is active, showing the "Control and Performance" configuration. The "Configuration Information" section includes fields for Antenna Beamsize, Number of Antennas, Longest baseline (L_{max}), Synthesized beamsize (λ/L_{max}), Shortest baseline (L_{min}), and Maximum recoverable scale ($0.6\lambda/L_{min}$). The "Desired Performance" section includes fields for Desired Angular Resolution, Largest Angular Structure in source, Desired sensitivity per pointing, and Bandwidth used for Sensitivity. A blue box highlights the "Desired Performance" section, which includes a "Suggest" button and a "Time Estimate" button. The "Project Structure" panel on the left shows a tree view of the project, with "Control and Performance" selected.

- User inputs desired angular resolution, largest angular scale, sensitivity requested over a certain bandwidth
- Choices are guided by the configuration information that is updated depending on the capabilities of the array

Phase I – Control & Performance

The screenshot shows the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The "Editors" panel is active, showing the "Control and Performance" configuration. A dialog box titled "ACA Necessity Estimator" is overlaid on the configuration, displaying the message: "ACA use is not recommended. The ALMA Observing Tool suggests this observation *does not need* the ACA because the largest recoverable angular scale of the 12m array configuration(s) exceeds the largest angular scale in source." The configuration panel shows parameters for antenna beamsizes, number of antennas, and baselines.

Parameter	12m	7m	TP
Antenna Beamsize ($1.2 * \lambda / D$)	27.438 arcsec	47.036 arcsec	
Number of Antennas	34	9	2
Longest baseline (L_{max})	1.5078900000000002 km	165.641 m	
Synthesized beamsize (λ/L_{max})	0.182 arcsec	1.656 arcsec	
Shortest baseline (L_{min})	40.611 m	14.189 m	

ACA Necessity Estimator

ACA use is not recommended

The ALMA Observing Tool suggests this observation *does not need* the ACA because the largest recoverable angular scale of the 12m array configuration(s) exceeds the largest angular scale in source.

OK Cancel

Do you request complementary ACA Observations? Yes No

Science goal integration time estimate

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

Do you request complementary ACA Observations? Yes No

- OT determines necessary array configuration(s) behind the scenes
- OT makes recommendation on whether ACA / TP observations required to resolve large-scale structure based on LAS

Phase I – Control & Performance

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2" and shows the "Control and Performance" tab. A dialog box titled "ALMA OT - Information" is open, displaying estimated time and calibration breakdown details.

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 (m)	
Number of Antennas	
Longest baseline (km)	
Synthesized beams	
Shortest baseline (km)	
Maximum recoverable flux density (Jy)	
Desired Performance	
Desired Angular Resolution (arcsec)	
Largest Angular Structure (arcsec)	
Desired sensitivity per resolution element (mJy/beam)	
Bandwidth used for Sensitivity (MHz)	
Do you request complex flagging?	
Science goal integration time (s)	
Is more time required?	
Are the observations time-critical?	

Estimated time

Requested sensitivity	100.0000 mJy
Bandwidth used for sensitivity	0.122 MHz
Representative frequency (sky, first source)	225.37 GHz
Precipitable water vapour (all sources)	1.262mm (4th Octile)

ALMA 12m Array - 34 antennas

Time on source per pointing (first source)	10.00 s
Total number of pointings (all sources)	1
Total time on source	10.00 s
Total time on calibrators	13.55 min
Total overheads	398.00 s
Total 12m array time (inc. calibration & overheads)	20.35 min

Calibration Breakdown

Estimated number of tunings required	1
1 x SidebandRatio	1.68 min
3 x Pointing	54.00 s
1 x Amplitude (inc. AtmosphericCal)	3.27 min
1 x Bandpass (inc. AtmosphericCal)	5.77 min
1 x Phase (inc. AtmosphericCal)	1.27 min
1 x Atmospheric	40.00 s
Additional calibration overheads	6.53 min

Estimated total time for science goal 20.35 min

- OT gives an estimate of the observing time required to reach the requested sensitivity
- Overheads and calibrations included

Phase I – Control & Performance

ALMA Observing Tool (Cycle2) Project – Observing Tool for ALMA, version Cycle2Test2

File Edit View Tool Search Help Perspective 1

Project Structure

- Unsubmitted Proposal
- Demo of the amazingness of the O
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- ScienceGoal (Science Goal)
- General
- Field Setup
- Spectral Setup
- Calibration Setup
- Control and Performan
- Technical Justification

Editors

Spectral Spatial **Control and Performance**

Shortest baseline (L_{min}) 40.611 m 14.189 m

Maximum recoverable scale ($0.6\lambda/L_{min}$) 4.054 arcsec 11.602 arcsec

Desired Performance

Desired Angular Resolution 1.00000 arcsec

Largest Angular Structure in source Point Source Extended So 10.00000 arcsec

Desired sensitivity per pointing 0.10000 Jy equivalent to 2.40725 K

Bandwidth used for Sensitivity RepresentativeWindowResolution Frequency Width 0.122070 MHz

Do you request complementary ACA Observations? Yes No

Science goal integration time estimate

Is more time required due to u,v coverage issues? (must be justified) Yes No Enter total time estimate 0.00000 min

Are the observations time-constrained? Yes No Specific Dates Multiple Epochs Continuous Monitoring

Please specify the arrangement of visits for your observation.

Monitoring can either be for a specific date or at an arbitrary date.

Monitoring specified : 1

Monitoring Constraints
Start date of 2013-09-09T15:32:06.510Z with a monitoring length of 3.0 h

Please add any other relevant timing information.

- Time constrained observations now handled by OT
- Can specify several possible time windows, multiple visits, continuous monitoring (length of monitoring overrides time estimate based on sensitivity)
- Coordinated observations possible in the future

Phase I – Validation & Submission

The screenshot displays the ALMA Observing Tool (Cycle2) interface. The main window is titled "Project - Observing Tool for ALMA, version Cycle2Test2". The "Editors" tab is active, showing the "Technical Justification" section. A blue box highlights a checkmark icon in the toolbar. The "Feedback" section at the bottom shows a table with two rows of validation errors.

Technical Justification Parameters:

Parameter	Value	Parameter	Value
Sensitivity	0.10 Jy	Angular Resolution	1.00 arcsec
Bandwidth for sensitivity	122.07 kHz	Largest angular scale	10.00 arcsec
Representative frequency	225.37 GHz	ACA	No
Continuum:			
Aggregate bandwidth	3.81 GHz	Sensitivity	77.53 mJy
Peak flux density	2.00 mJy	SNR	0.78
Line:			
Peak flux density	0.50 Jy	SNR	5.00
Line width	2.00 MHz	Resolution	0.03
Dynamic Range (cont. peak/line rms)			

Feedback Table:

Description	Suggestion
No document found - you must add a Science Case to your proposal	Select the proposal node in the Proposal tab and add your document
12M array data rate is 32.17 MB/s which exceeds the average of 6.00 MB/s	An excessive data rate requires scientific justification

- User can validate project at any time to get feedback on completeness/technical problems
- Validation is also performed upon submission to the archive; proposals that have validation errors are not accepted

Beyond Phase I

- * Re-submission of projects possible up until the deadline
- * All projects submitted by the deadline are ranked based on their scientific merit
- * From Cycle 2 the ranking will follow the ABCD grades as in place for ESO proposals
- * Technical feasibility is evaluated – if not technically feasible, the proposal is rejected
- * Proposals judged likely to be executed pass to Phase II – they then appear in the Program tab of the OT
- * Scheduling Blocks (SBs) are generated semi-automatically by a member of staff using the OT, and are then approved (often after iteration & fine-tuning) by the PI
- * After PI approval, the Phase II SBs are submitted to the archive by ALMA staff and set to Ready in the Project Tracker software

Phase II – Scheduling Blocks

- * For each Science Goal an ObsUnitSet containing one or more SBs is created simply by pressing a button, then some checks & tweaks are done manually
- * Normally one SB per array (12-m, ACA, TP)
- * An SB is the smallest executable unit and contains all the technical details of the science observations as well as associated calibrations
- * SBs normally run for 1-1.5 hours and are executed repeatedly until the time on source (calculated by OT based on sensitivity or specified by user for monitoring) has been reached

Phase II – Scheduling Blocks

The screenshot displays the ALMA Observing Tool (Early Science) interface. The top menu bar includes 'File', 'Edit', 'View', 'Tool', 'Search', and 'Help'. The main window is titled 'Spatially extended [CII] in a z=4.8 SMG – Observing Tool for ALMA, version Cycle1PhaseII'. The 'Project Structure' pane on the left shows a hierarchy starting with 'Proposal' and 'Program', leading to 'Spatially extended [CII] in a z=4.8 SMG'. Underneath, there are sections for 'Control and Performance', 'LESS J033229.4-275619-SI', 'Group 1 : Calibrators', 'Group 2 : Science', '14 Targets', and 'Resources'. The 'Targets' list includes items like 'Titan Amplitude (Amplitude)', 'J1337 Pointing for Amplitude (Titan) (Pointing)', 'B0402 Bandpass (Science) (Pointing)', etc. The 'Resources' section lists '8 Field Sources', '6 Instrument Setup', and '9 Observing Parameters'. The 'Editors' pane on the right shows 'Spectral' and 'Spatial' tabs, with 'Group 1 : Calibrators' selected. It contains a table titled 'All Available Targets' and 'Observing Group Targets'. The 'Observing Group Targets' table is highlighted below.

Index	Source Name	RA	DEC	Spectral Spec	Rest Freq	Purpose
1	J1337	13:37:39	-12:57:24	Band 3 Pointing se...	98.0 GHz	PntCal
2	Titan	00:00:00	00:00:00	CII_red Science se...	329.5 GHz	AmpCal
3	Titan	00:00:00	00:00:00	CII_red Science se...	329.5 GHz	AmpCal
4	B0402	04:03:53	-36:05:01	Band 3 Pointing se...	98.0 GHz	PntCal
5	B0402	04:03:53	-36:05:01	TDM Atm Cal setup	329.5 GHz	AtmCal
6	B0402	04:03:53	-36:05:01	CII_red Science se...	98.0 GHz	PntCal
7	B0507	05:10:02	18:00:41	Band 3 Pointing se...	98.0 GHz	PntCal
8	Ceres	00:00:00	00:00:00	CII_red Science se...	329.5 GHz	AmpCal
9	Ceres	00:00:00	00:00:00	TDM Atm Cal setup	329.5 GHz	AtmCal

* SBs contain a rather complicated set of parameters fixing the technical details of the observations that are then parsed to scripts executing the observations at the telescope

The Observing Script Simulator

- * The presentation of SBs in the OT can be confusing to novice users; in particular the observing sequence and potential calibrators cannot be easily understood
- * The Observing Script Simulator simulates what will happen at the telescope assuming a given execution date
- * For each SB, it outputs the scan sequence and a time-break-down

OSS Summary of OSS-453-0-v1.txt

BP=Bandpass Cal, AMP=Amplitude Cal, PHASE=Phase Cal, SCI=Science Target,
 ⊙=Pointing, ↔=Sideband Ratio, atm= T_{sys} , wvr=Water Vapour Radiometry

SECTION 1

Scan Summary

t_{run}	Scan	Source	t_{int}	N_{sub}	BP	AMP	PHASE	SCI	⊙	↔	atm	wvr	Setup
0:00	1	J1516+0015	0:50	5									A
0:50	2	J1516+0015	1:00	2					•				B
1:50	3	J1516+0015	0:12	3							•		B
2:02	4	J1516+0015	5:02	10	•								C
7:04	5	J1550+054	0:12	3							•		B
7:16	6	J1550+054	2:31	5		•							C
9:47	7	J1516+1932	1:31	3			•						C
11:18	8	Arp220	0:11	3							•		B
11:29	9	Arp220	4:02	8				•					C
15:31	10	J1516+1932	1:31	3			•					•	C

Setups:

- A B6 Pointing Setup
- B Tsys Setup #1
- C Manual window Science setup

Science Setup:

Band 6
 SPWs 284.6, 286.2, 296.8, 298.4 GHz

SECTION 2

Time Break Down

Source	Time	BP	AMP	PHASE	SCI	⊙	↔	atm
Arp220	4:13				•			•
J1516+0015	7:04	•				•	•	•
J1516+1932	3:02			•				
J1550+054	2:43		•					•
	17:02	5:02	2:31	3:02	4:02	0:50	1:00	0:35

The Observing Script Simulator

- * The OSS also queries the ALMA calibrator data base and shows which calibrators are likely to be selected at run-time
- * In the future, the OSS will be incorporated into the OT to make things more user-friendly
- * Eventually, PIs will be able to create, submit and set to Ready their own SBs

SECTION 3

Calibrator Query

3.1 Bandpass Calibrator

The OSS performs a search of possible bandpass calibrators within 45.0 deg from the science target. A SNR of 50.0 per channel must be reached within 3.0 to 15.0 min, which conforms to a limiting flux density of 718 mJy (90 mJy if smoothing to 64ch in FDM). The minimum elevation is set to 56.0 deg.

The OSS query returned the following targets (the final choice is marked in bold):

Source	Ang.Sep.	Flux Density	Ref.Frequency
J1512-0905	33.0°	1.8 Jy	284.6 GHz
J1516+0015	23.7°	0.53 Jy	284.6 GHz
J1513-1012	34.1°	0.52 Jy	284.6 GHz

3.2 Phase Calibrator

The OSS performs a search of possible phase calibrators within 15.0 deg from the science target. A SNR of 15.0 over the full bandwidth must be reached within 0.5 to 2.0 min, which conforms to a limiting flux density of 18.4 mJy.

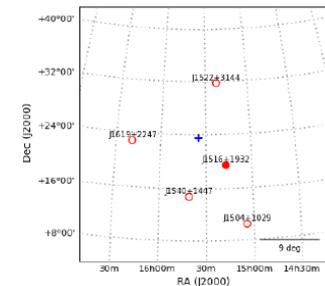
The OSS query returned the following targets (the final choice is marked in bold):

Source	Ang.Sep.	Flux Density	Ref.Frequency
J1516+1932	5.8°	0.45 Jy	284.6 GHz
J1540+1447	8.8°	0.4 Jy	284.6 GHz
J1504+1029	14.9°	0.36 Jy	284.6 GHz
J1619+2247	10.2°	0.12 Jy	284.6 GHz
J1522+3144	8.7°	0.1 Jy	284.6 GHz

3.3 Amplitude Calibrator

source	size	baselines*
Pallas	0.2"	3 / 6
Ceres	0.5"	1 / 6
Titan	0.8"	1 / 6
Callisto	1.2"	1 / 6
Ganymede	1.3"	1 / 6
Neptune	2.2"	1 / 6
Uranus	3.3"	1 / 6
Mars	3.9"	1 / 6
Venus	9.7"	0 / 6
Jupiter	34.9"	0 / 6

* fraction of baselines that are short enough to not resolve out the source



No suitable Solar System Object found. Choosing Grid Source **J1550+054** instead.

Conclusion

- * The OT is constantly evolving – many new capabilities still to come
- * A huge effort was made to make this tool as self-explanatory and user-friendly as possible
- * There is extensive documentation available
- * Any suggestions for improvement / comments are welcome!