

ALMA OT and Archive!

09:15 - 09:50 -- ALMA Overview talk, ALMA Cycle 5 proposals

09:50 - 10:40 -- Local ALMA Science Highlights:
Brendan Bowler, Yao-Lun Yang,
Jackie Champagne, Sam Factor

10:40 - 11:00 -- Break

11:00 - 11:20 -- ALMA Observing Tool and ALMA data archive

11:20 - 12:30 -- Small group work on ALMA OT and/or archive

12:30 - 13:40 -- Lunch (provided for registered participants)

13:40 - 14:10 -- Introduction to data imaging and ALMA simulations

14:10 - 16:30 -- Small group work on Data Imaging or Simulations



Goals:

- **If you are writing Cycle 5 proposals,**
Have a draft of a “Science Goal” in your ALMA OT.
Check for possible duplication in ALMA data archive.
-
- **If you’re not planning to write a proposal this time,**
Check if your target of interest (or similar type of sources) have exiting ALMA data in the archive.
Examine the data content, and the preliminary imaging results.

Downloading the ALMA OT



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



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



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Observing Tool

The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase 1 (observing proposal) and Phase 2 (telescope runfiles for accepted proposals) materials. It is also used for preparing and submitting Director's Discretionary Time (DDT) proposals. The current *Cycle 4* release of the OT is configured for the present capabilities of ALMA as described in the [Cycle 4 Call For Proposals](#). Note that in order to submit proposals you will have to register with the ALMA Science Portal beforehand.

Note that preparation of Cycle 3 Phase 1 and DDT proposals needs to be done using the Cycle 3 version of the Observing Tool. This version of the OT can be found in the [DDT page](#), or the Phase 2 menu.

Download & Installation

The OT will run on most common operating systems, as long as you have **Java 8** installed ([see the troubleshooting page](#) if you are experiencing Java problems). The ALMA OT is available in two flavours: Web Start and tarball.

The **Web Start** application is the recommended way of using the OT. It has the advantage that the OT is automatically downloaded and installed on your computer and it will also automatically detect and install updates. There are some issues with Web Start, particularly that it does not work with the Open JDK versions of Java such as the "Iced Tea" flavour common on many modern Linux installations. The Sun/Oracle variant of Java should therefore be installed instead. If this is not possible, then the tarball installation of the OT is available.

The **tarball** version must be installed manually and will not automatically update itself, however there should be no installation issues. For Linux users, we also provide a download complete with a recommended version of the Java Runtime Environment. Please use this if you have any problems running the OT tarball install with your default Java.

Webstart

Tarball



OT Video Tutorials



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OT Video Tutorials

The OT video tutorials provide an audio-visual demonstration of different aspects of proposal preparation in the OT. Novice users should start with the first video and work their way down, while more experienced users may want to jump straight to one of the specialised videos.

OT Video Tutorial 1: Useful to Know

This video will help you get started with the OT and introduce you to some handy tips and tricks. Topics covered include navigating the OT, using the help function, the template library, time estimation, validation, opening & submitting projects including re-submissions, and the concept of non-standard modes.



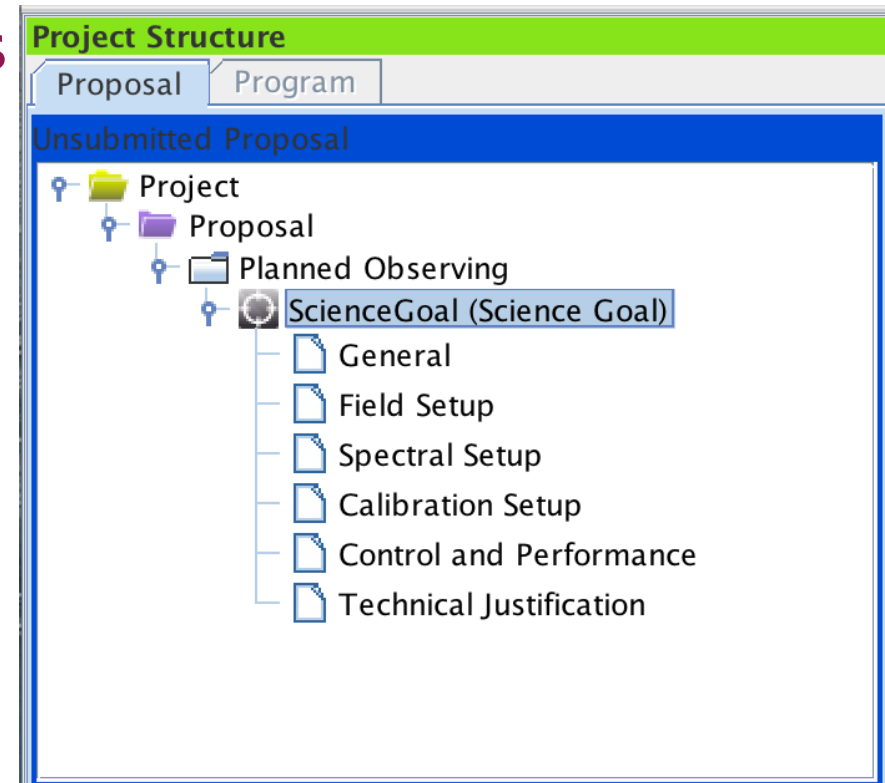
Video 1:
Useful to Know



Demo:
“Proposal” + “Science case” in OT

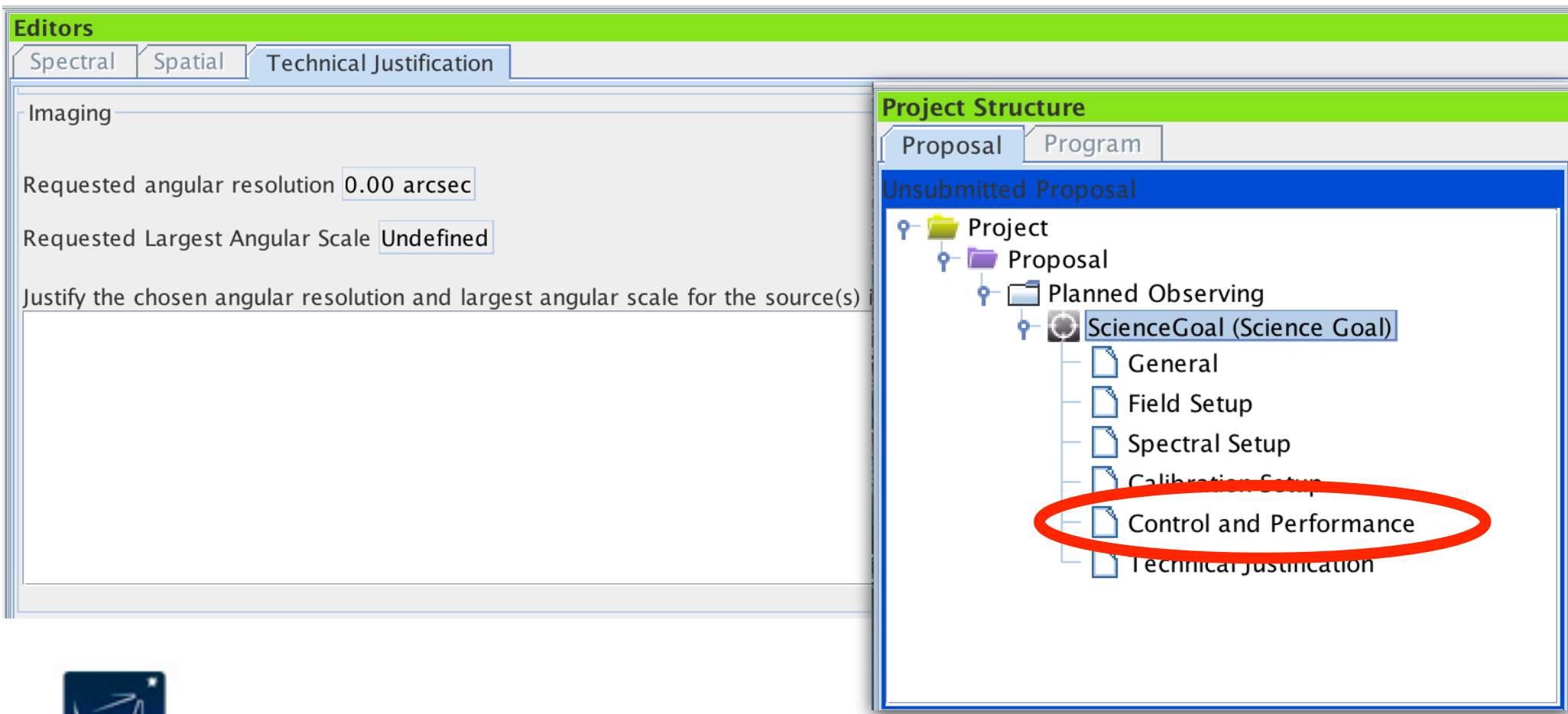
What is a “Science Goal”:

- Like the Technical Justification Section (Targets, Instrumentation Setup, and Justifications)
- In OT, a Science Goal includes
- Each SG contains one or more sources of the same target types (individual pointing(s) or 1 rectangular mosaic), and limited to one correlator setup with up to five frequency tunings, one calibration strategy, and one set of Control/Performance parameters.



Three key elements:

- Angular resolution (array configuration)
- Largest angular scale (do I need ACA? mosaic?)



The screenshot displays the ALMA proposal editor interface. The 'Editors' panel on the left has three tabs: 'Spectral', 'Spatial', and 'Technical Justification'. The 'Technical Justification' tab is active, showing the 'Imaging' section with the following fields:

- Requested angular resolution: 0.00 arcsec
- Requested Largest Angular Scale: Undefined
- Justify the chosen angular resolution and largest angular scale for the source(s):

The 'Project Structure' panel on the right shows a tree view of the proposal structure. The 'Unsubmitted Proposal' section is expanded, showing the following hierarchy:

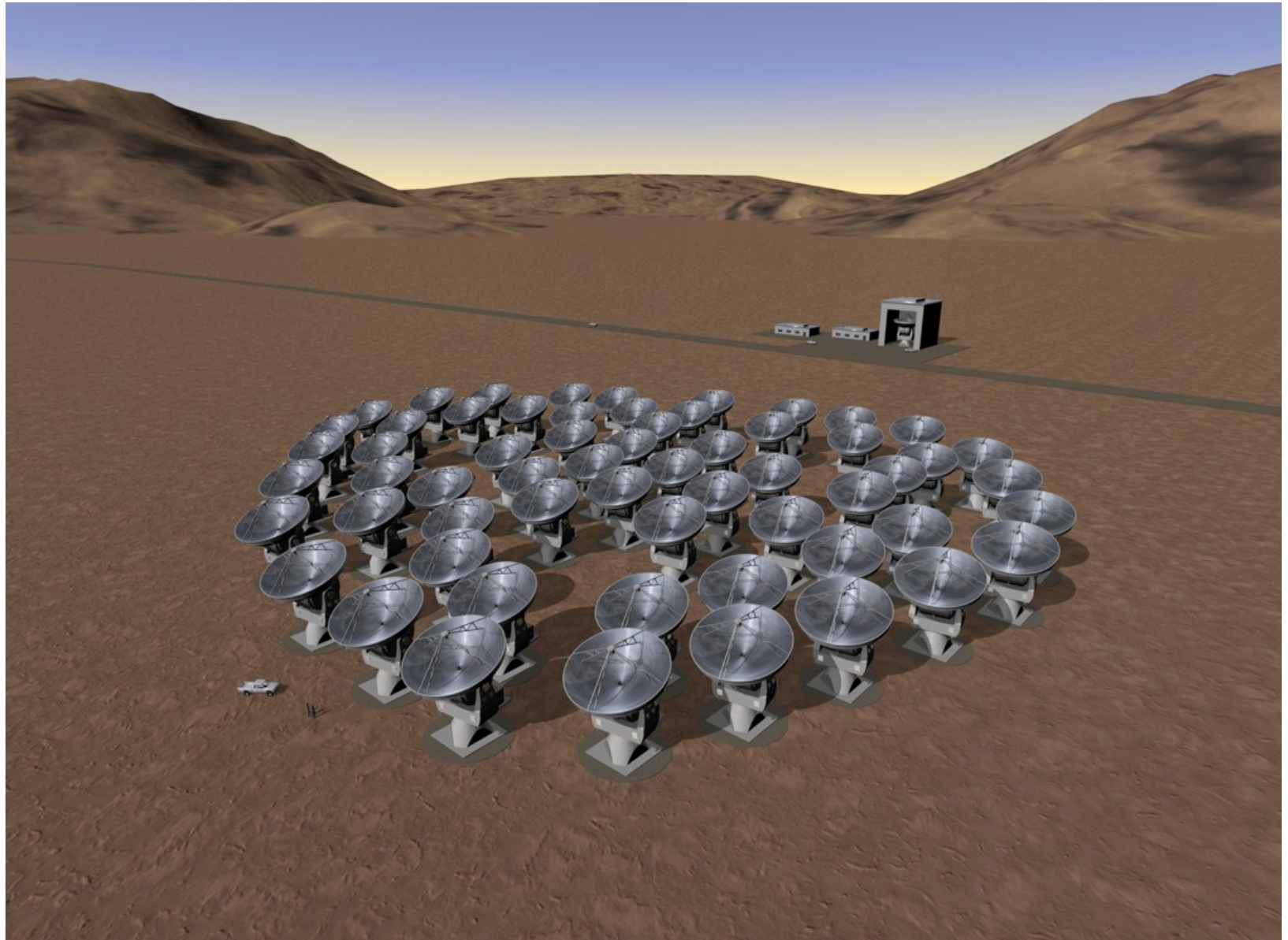
- Project
 - Proposal
 - Planned Observing
 - ScienceGoal (Science Goal)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical justification

The 'Control and Performance' item is circled in red.

Interferometry Basics

Single dish: diameter is responsible for sensitivity, field of view, resolution

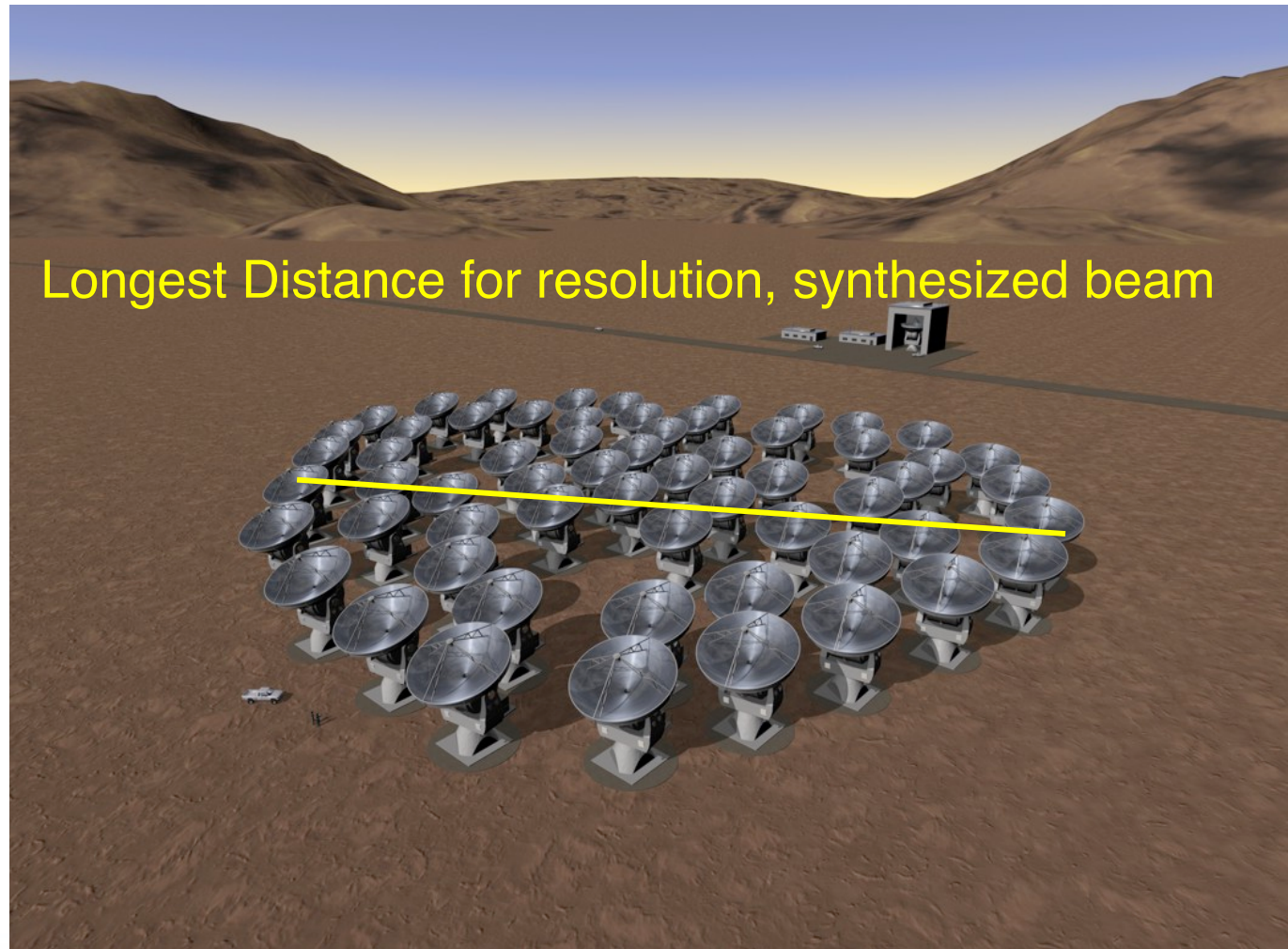
Interferometer: multiple contributing design parameters



Characteristic Angular Scales

Angular resolution of telescope array:

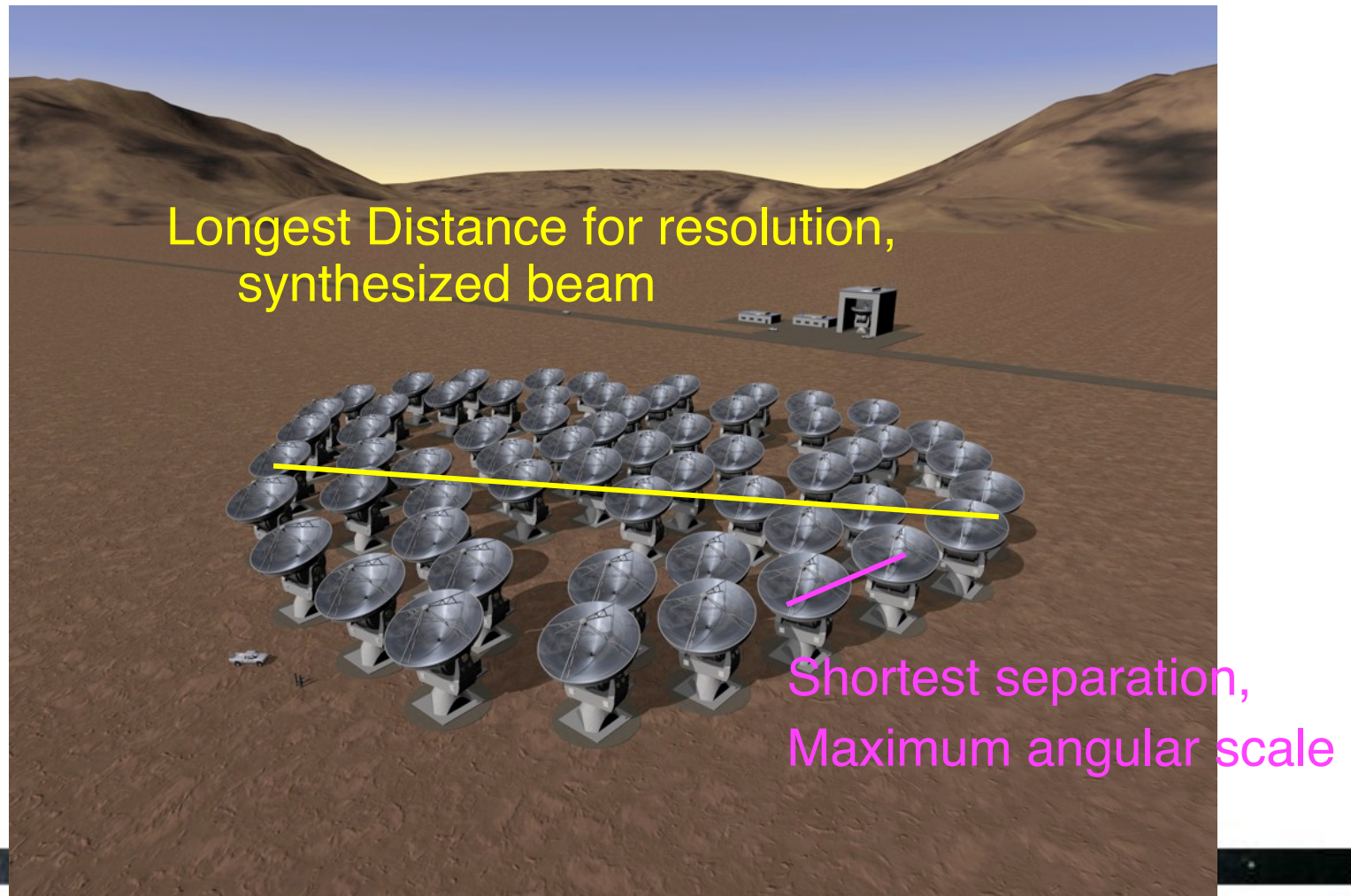
- $\sim \lambda/B_{\text{max}}$, where B_{max} is the longest baseline



Characteristic Angular Scales

Maximum angular scale:

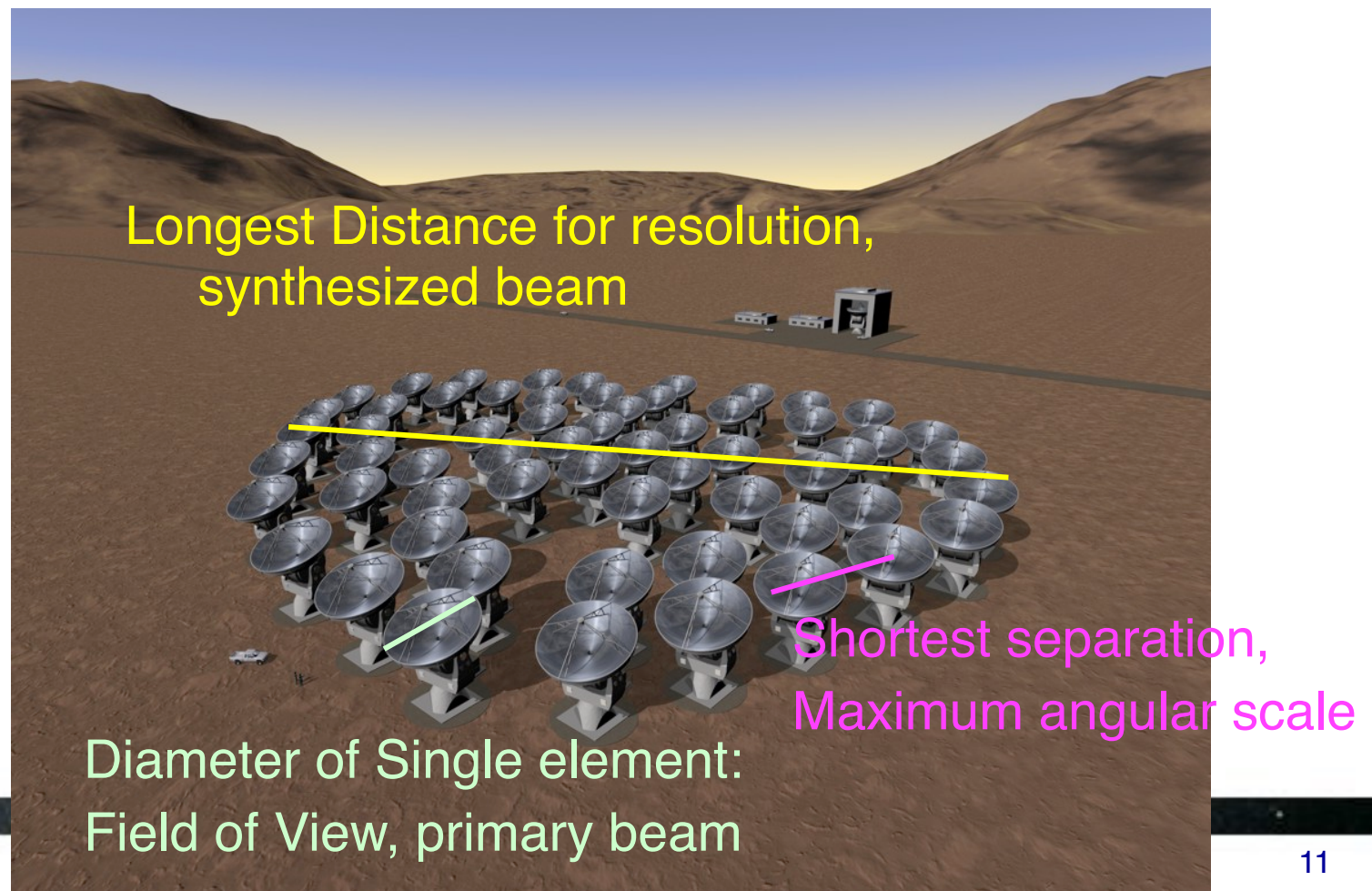
- a source is resolved if the angular size $> \lambda/B_{\min}$
(B_{\min} is the minimum separation between apertures)



Characteristic Angular Scales

Field of view of a single aperture (single dish):

- $\sim \lambda/D$, where D is the diameter of the telescope.
- If sources are more extended than the FOV, it can be observed using multiple pointing centers in a mosaic.



Characteristic Angular Scales

Angular resolution of telescope array:

- $\sim \lambda/B_{\max}$, where B_{\max} is the longest baseline

Maximum angular scale:

- a source is resolved if the angular size $> \lambda/B_{\min}$
(B_{\min} is the minimum separation between apertures)

Field of view of a single aperture (single dish):

- $\sim \lambda/D$, where D is the diameter of the telescope.
- If sources are more extended than the FOV, it can be observed using multiple pointing centers in a mosaic.

An interferometer is sensitive to a range of angular sizes

$$\lambda/B_{\max} < \theta < \lambda/B_{\min}$$

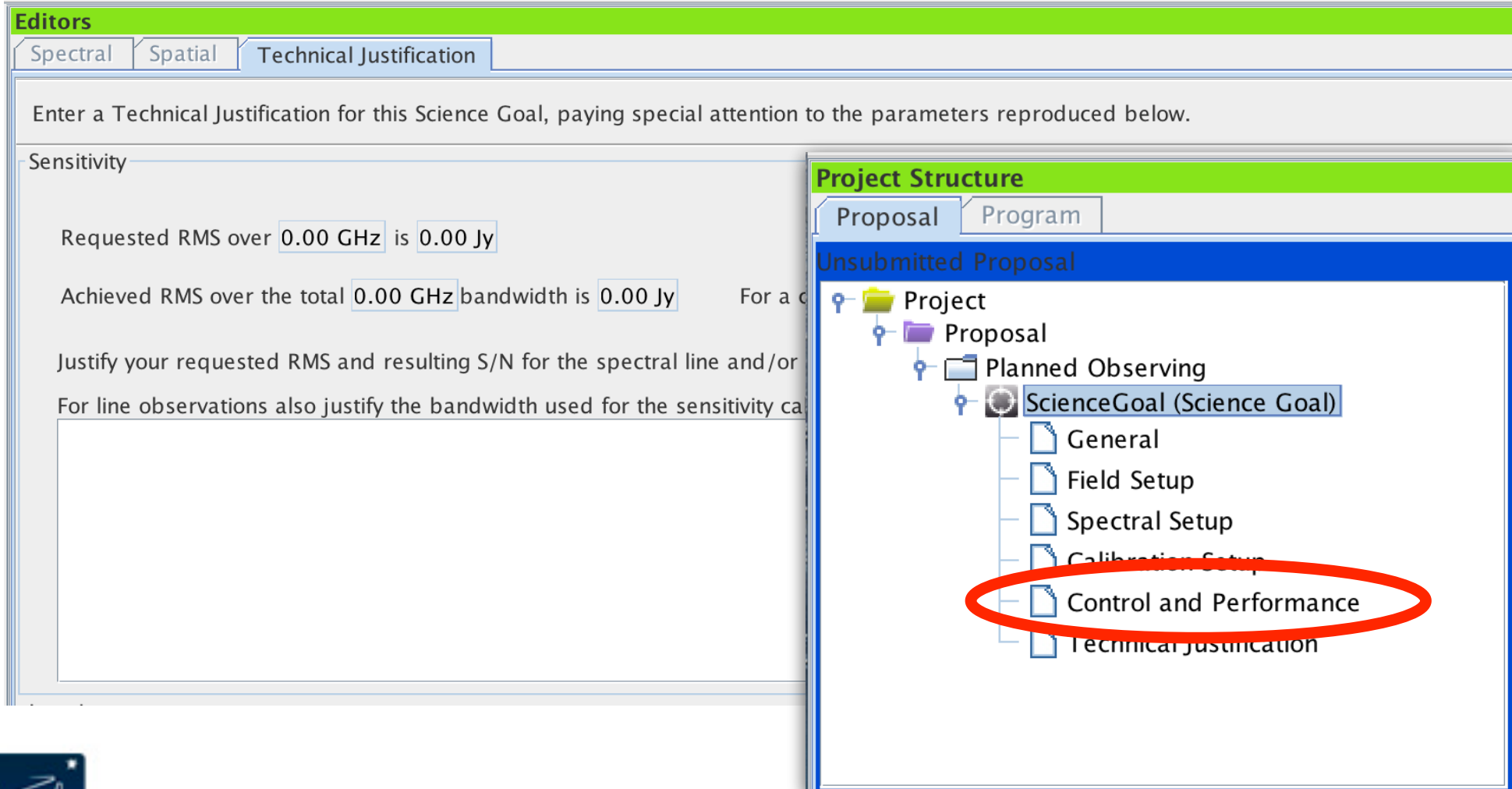
Since $B_{\min} > D$, an interferometer is not sensitive to the large angular scales and cannot recover the total flux of resolved sources

Config	Lmax	Band	Band 3	Band 4	Band 5	Band 6	Band 7	Band 8	Band 9	Band 10
	Lmin	Freq	100 GHz	150 GHz	183 GHz	230 GHz	345 GHz	460 GHz	650 GHz	870 GHz
7-m Array	45 m	AR	12.5"	8.4"	6.8"	5.4"	3.6"	2.7"	1.9"	1.4"
	9 m	MRS	66.7"	44.5"	36.1"	29.0"	19.3"	14.5"	10.3"	7.7"
C43-1	161 m	AR	3.4"	2.3"	1.8"	1.5"	1.0"	0.74"	0.52"	0.39"
	15 m	MRS	29.0"	19.0"	15.4"	12.4"	8.3"	6.2"	4.4"	3.3"
C43-2	314 m	AR	2.3"	1.5"	1.2"	1.0"	0.67"	0.50"	0.35"	0.26"
	15 m	MRS	22.6"	15.0"	12.2"	9.8"	6.5"	4.9"	3.5"	2.6"
C43-3	500 m	AR	1.4"	0.94"	0.77"	0.62"	0.41"	0.31"	0.22"	0.16"
	15 m	MRS	16.2"	10.8"	8.7"	7.0"	4.7"	3.5"	2.5"	1.9"
C43-4	784 m	AR	0.92"	0.61"	0.50"	0.40"	0.27"	0.20"	0.14"	0.11"
	15 m	MRS	11.2"	7.5"	6.1"	4.9"	3.3"	2.4"	1.7"	1.3"
C43-5	1.4 km	AR	0.54"	0.36"	0.30"	0.24"	0.16"	0.12"	0.084"	0.063"
	15 m	MRS	6.7"	4.5"	3.6"	2.9"	1.9"	1.5"	1.0"	0.77"
C43-6	2.5 km	AR	0.31"	0.20"	N/A	0.13"	0.089"	0.067"	0.047"	0.035"
	15 m	MRS	4.1"	2.7"		1.8"	1.2"	0.89"	0.63"	0.47"
C43-7	3.6 km	AR	0.21"	0.14"	N/A	0.092"	0.061"	0.046"	0.033"	0.024"
	64 m	MRS	2.6"	1.7"		1.1"	0.75"	0.56"	0.40"	0.30"
C43-8	8.5 km	AR	0.096"	0.064"	N/A	0.042"	0.028"	N/A	N/A	N/A
	110 m	MRS	1.4"	0.95"		0.62"	0.41"			
C43-9	13.9	AR	0.057"	0.038"	N/A	0.025"	N/A	N/A	N/A	N/A
	368 m	MRS	0.81"	0.54"		0.35"				
C43-10	16.2	AR	0.042"	0.028"	N/A	0.018"	N/A	N/A	N/A	N/A
	244 m	MRS	0.50"	0.33"		0.22"				

Table A-1 in ALMA Proposer Guide

Three key elements:

- Sensitivity Requirement



The screenshot displays the ALMA proposal editor interface. The 'Editors' tab is active, with the 'Technical Justification' sub-tab selected. The main text area contains the following instructions and input fields:

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

Sensitivity

Requested RMS over 0.00 GHz is 0.00 Jy

Achieved RMS over the total 0.00 GHz bandwidth is 0.00 Jy For a c

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

For line observations also justify the bandwidth used for the sensitivity ca

The 'Project Structure' panel on the right shows the hierarchy of the proposal. The 'Unsubmitted Proposal' section is expanded, showing the following structure:

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

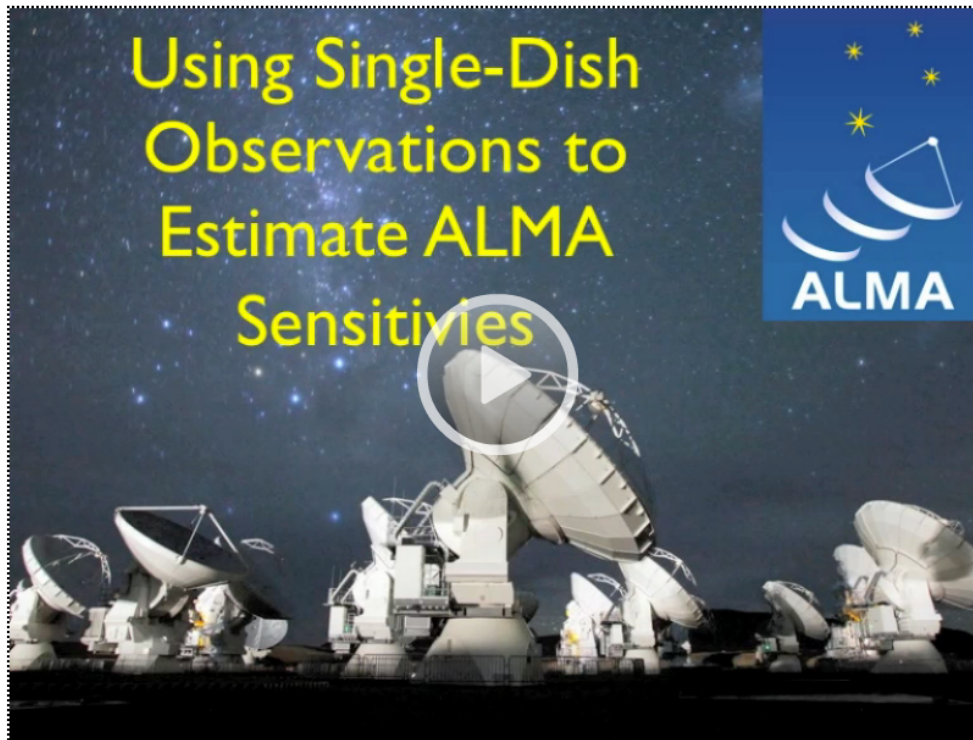
The 'Control and Performance' item is highlighted with a red oval.

Three key elements:

- If you have single dish measurements:

Using Single-Dish Data to Estimate ALMA Sensitivities

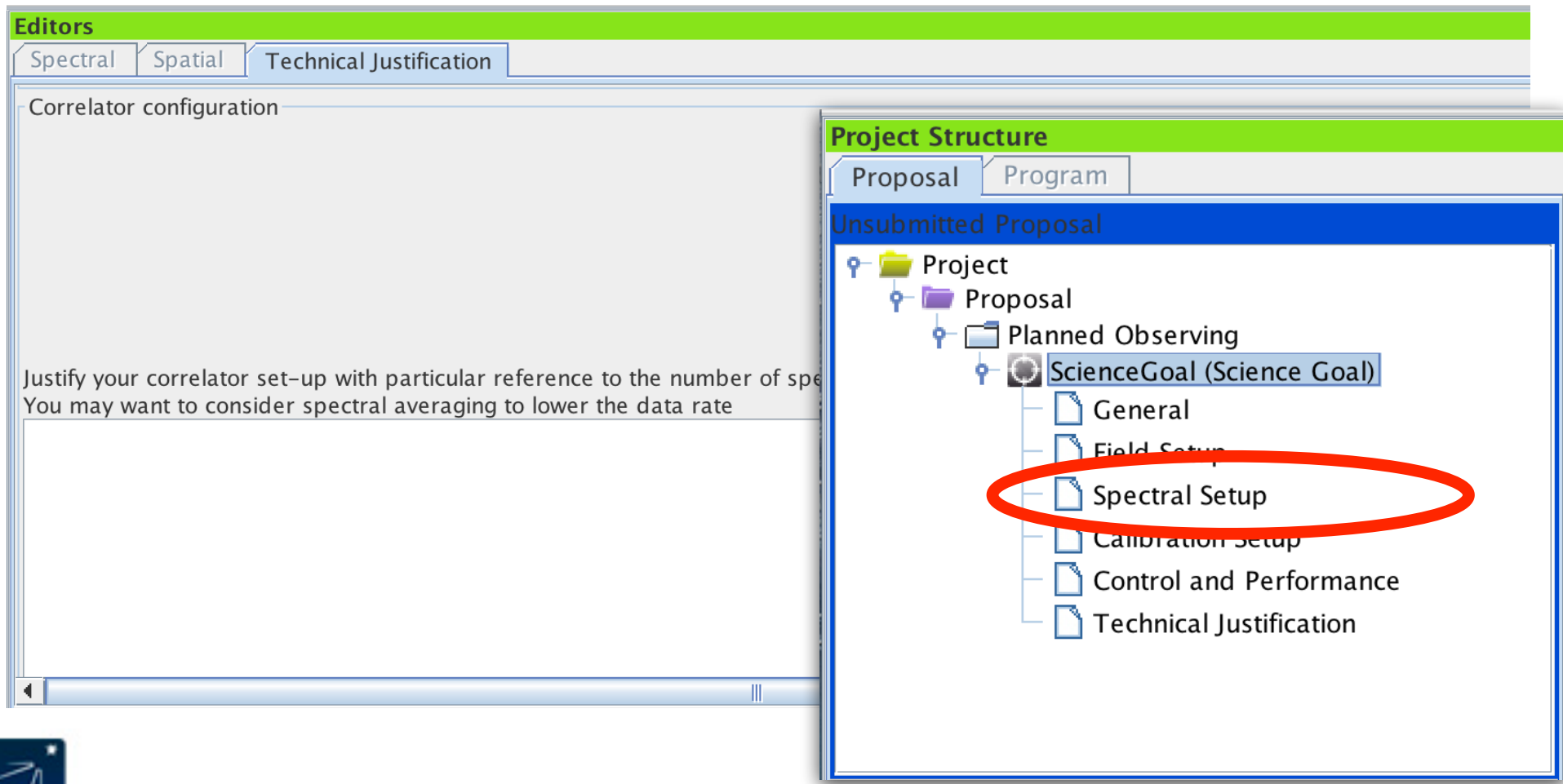
by [Dong-Chan Kim](#) — last modified Dec 18, 2015



Duration: 00:06:49

Three key elements:

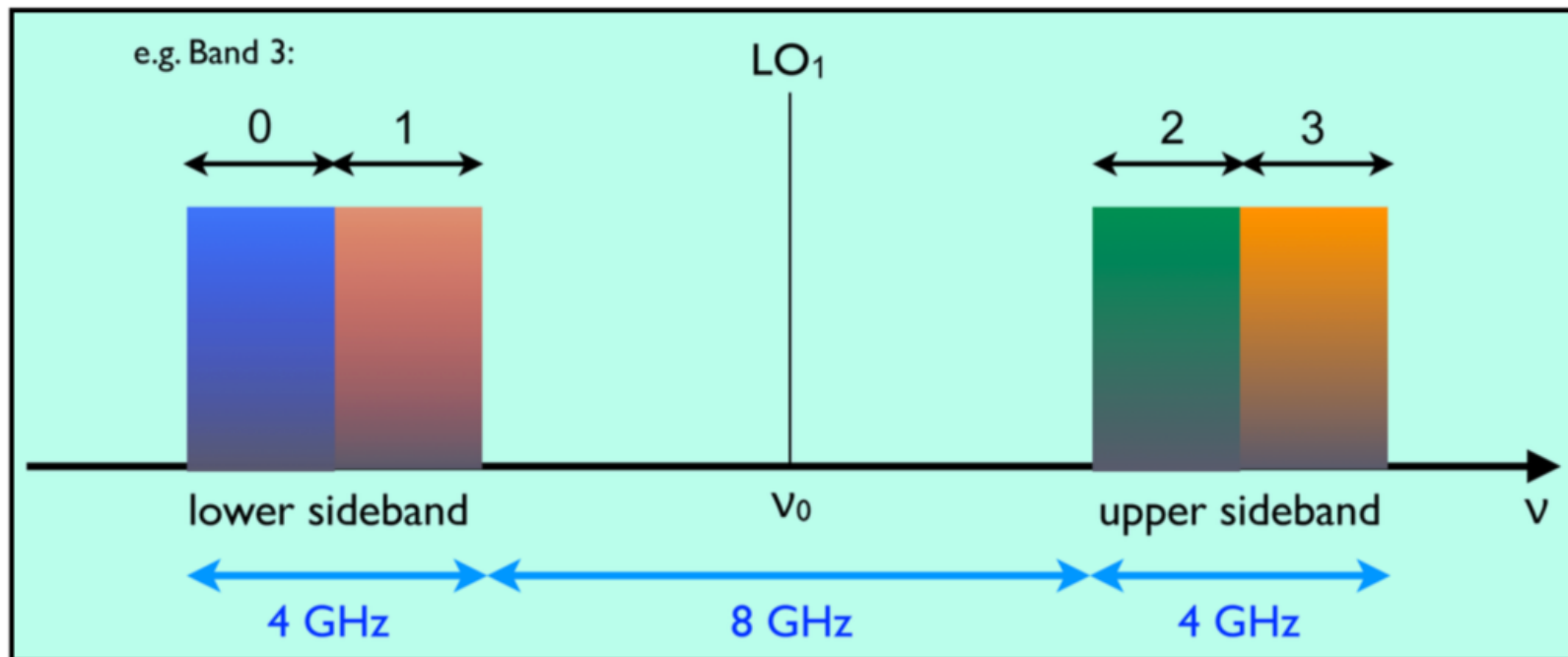
- Spectral Setup (spectral, continuum, or spectral scan observations?)



The screenshot displays the ALMA software interface. The 'Editors' panel on the left has tabs for 'Spectral', 'Spatial', and 'Technical Justification'. The 'Spectral' tab is active, showing a 'Correlator configuration' section with a text area containing the instruction: 'Justify your correlator set-up with particular reference to the number of spectral lines. You may want to consider spectral averaging to lower the data rate'. The 'Project Structure' panel on the right has tabs for 'Proposal' and 'Program'. The 'Proposal' tab is active, showing a tree view of the project structure. The tree includes a 'Project' folder, a 'Proposal' folder, a 'Planned Observing' folder, and a 'ScienceGoal (Science Goal)' folder. Under 'ScienceGoal (Science Goal)', there are several sub-items: 'General', 'Field Setup', 'Spectral Setup', 'Calibration Setup', 'Control and Performance', and 'Technical Justification'. The 'Spectral Setup' item is highlighted with a red oval.

Three key elements:

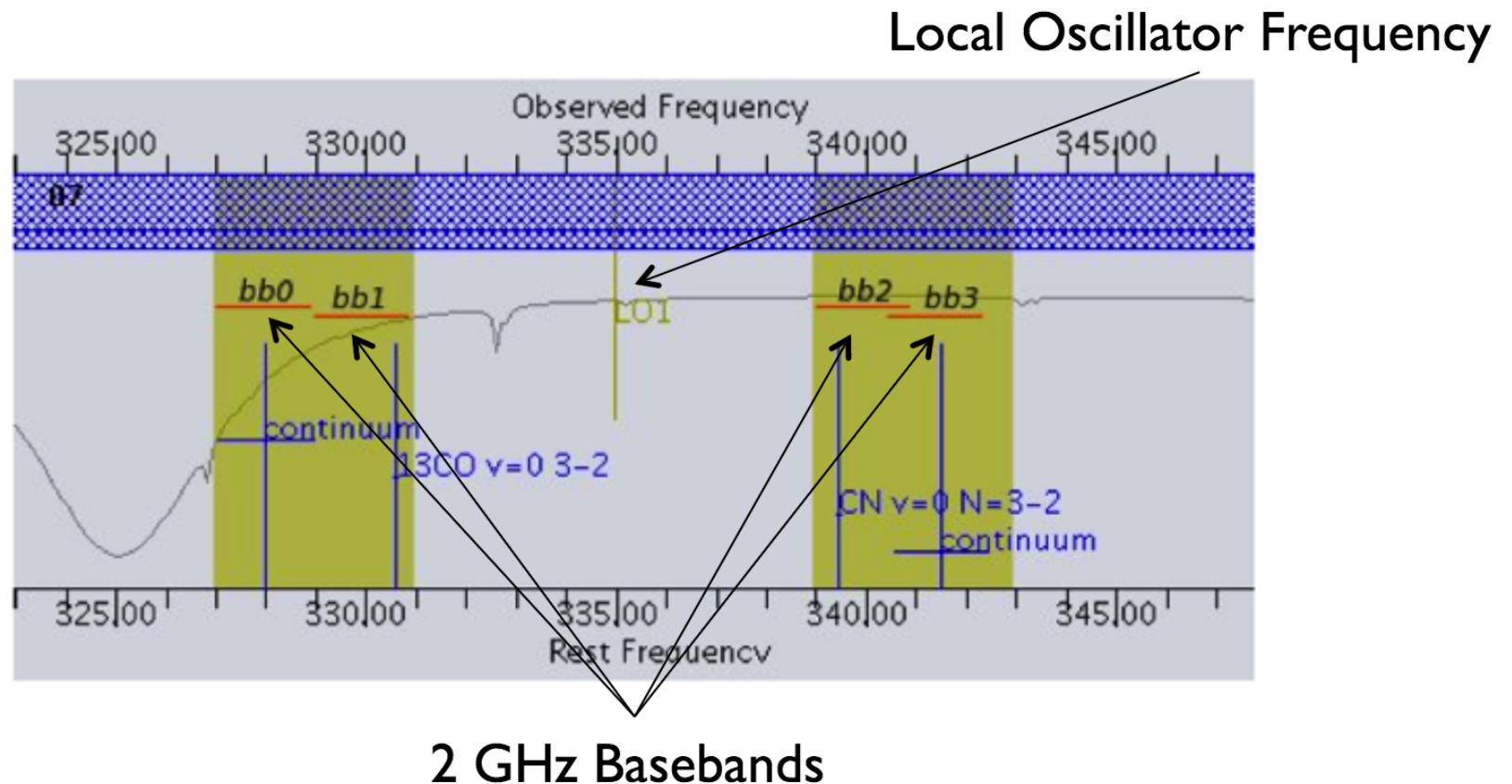
- Spectral Setup (spectral, continuum, or spectral scan observations?)



0,1,2,3: 2GHz Basebands

Three key elements:

- Spectral Setup (spectral, continuum, or spectral scan observations?)



Demo:
“Science Goal” in OT

When the time is ripe ... validate & submit

Project - Observing Tool for ALMA, version Cycle2Test2

Note the spiffy new icons!

Click here to make sure that your project can be validated by the OT. If it doesn't validate the archive will reject it.

When you are satisfied that your proposal is complete, click here to submit your proposal to the archive

File Menu:

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

Editors: Spectral | Spatial | Project

Project Information:

- Project: [Text Field]
- Assigned Priority: [Text Field]
- Project Code: None Assigned

Feedback:

Suggestion

Contextual Help

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

Phase I: Science Proposal

New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

Click on the overview steps to view the contextual help

Importing And Exporting | Template Library | Need More Help? | View Phase 2 Steps

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

File Edit View Tool Search Help Perspective 1

Project Structure

Proposal Program

Unsubmitted Proposal

- Observing Tool for ALMA Cycle3 Groundhog Day Test
- Proposal
 - Planned Observing
 - ScienceGoal (Science Goal)
 - General
 - Field Setup
 - Spectral Setup
 - Calibration Setup
 - Control and Performance
 - Technical Justification

Editors

Spectral Spatial ScienceGoal (Science Goal)

System J2000 Sexagesimal display? ☒ Parallax 0.00000 mas

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

Dec -42:16:39.978 PM DEC 0.00000 mas/yr

Source Radial Velocity 0.000 km/s hel z 0.000000000 Doppler Type RELATIVISTIC

Target Type ☒ Individual Pointing(s) ☐ 1 Rectangular Field

Expected Source Properties

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

Line Polarization Percentage 0.0 %

Field Center Coordinates

Offset ☒ arcsec 1

RA [arcsec] Dec [arcsec]

0.00000 0.00000

Clicking on a validation error usually takes you to the problem directly

Template library. Turn the keys on the J...

Template library. Turn the keys on the J...

Proposal

- Planned Observing
 - ScienceGoal (B3 spectral)
 - ScienceGoal (B7 continuum)
 - ScienceGoal (B7 CO(9-8))
 - ScienceGoal (B9 continuum)
 - ScienceGoal (B3 spectral)
 - ScienceGoal (B3 continuum)
 - ScienceGoal (B6 continuum)
 - ScienceGoal (B7 continuum)
 - ScienceGoal (B6 continuum)
 - ScienceGoal (B3 continuum)
 - ScienceGoal (B6 12CO (2-1))
 - ScienceGoal (B6 13CO (2-1))
 - ScienceGoal (B6 spectral)
 - ScienceGoal (B9 spectral)
 - ScienceGoal (B3 continuum)
 - ScienceGoal (B6 continuum)

Feedback

Validation Validation History Log

9 errors, 0 warnings

	Description	Suggestion
✖	No Principal Investigator specified	Select the top level Project node in the tree and fill in the Principal Investigator field
✖	No scientific category defined	Select Proposal node and set a scientific category
✖	No document found – you must add a Science Case to your proposal	Select the proposal node in the Proposal tab and add your document
✖	Must select a minimum of 1 science keywords	Select the Proposal node and then add some science keywords (minimum 1)
✖	Expected peak continuum flux is required for a single continuum	Select the Target Parameters (anti-bllac) in the Science Goal and enter a valid value
✖	Either a continuum or a line polarization percentage is required for	Select the Target Parameters (anti-bllac) in the Science Goal and enter a valid value

ALMA Science Archive Query

Query Form

Results Table

Search

Reset

<https://almascience.nrao.edu/aq/>

[Query Help](#)

Position

Source name (Resolver)
Source name (ALMA)
RA Dec
Galactic
Target list
Angular resolution
Largest angular scale
Field of view

Energy

Frequency
Bandwidth
Spectral resolution
Band

Time

Observation date
Integration time

Polarisation

Polarisation type

Observation

Line sensitivity (10 km/s)
Continuum sensitivity
Water vapour

Project

Project code
Project title
PI name
Proposal authors
Project abstract
Publication count
Science keyword

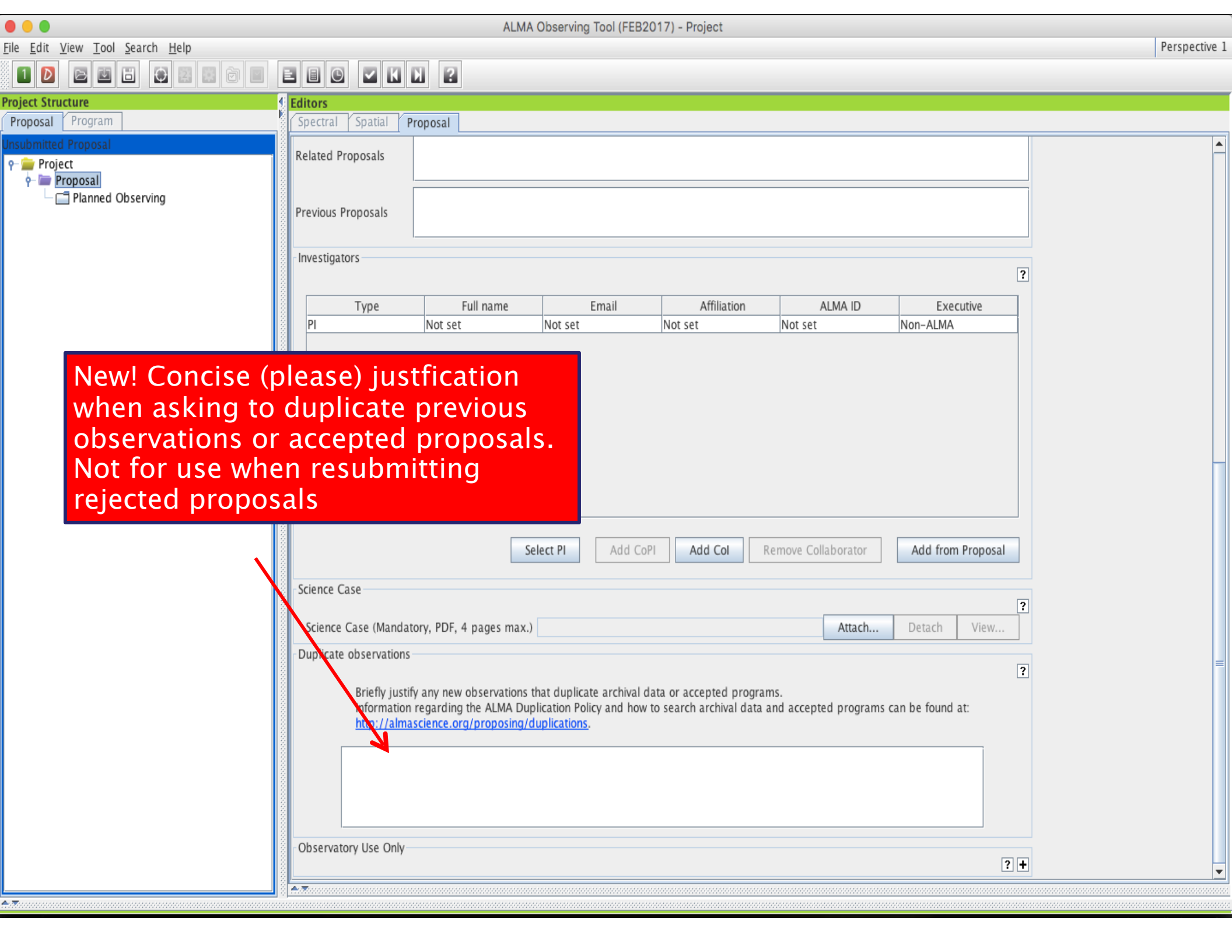
Publication

Bibcode
Title
First author
Authors
Abstract
Year

Options

View:

- ☒ observation
- ☐ project
- ☐ publication
- ☐ public data only
- ☒ science observations only



New! Concise (please) justification when asking to duplicate previous observations or accepted proposals. Not for use when resubmitting rejected proposals

Request Handler

ALMA Request Handler

[Login](#)

Anonymous User: Request #436233140 

Request Title: [Click to edit](#)

[Download Selected](#)

☐ Include Raw

Project / OUSet / Executionblock	File	Size	Accessible
▼  Request 436233140			
▼  Project 2012.1.00090.S			
▼  Science Goal OUS uid://A002/X5eed86/X25			
▼  Group OUS uid://A002/X5eed86/X26			
▼  Member OUS uid://A002/X5eed86/X27			
<input checked="" type="checkbox"/> product	2012.1.00090.S uid A002 X5eed86 X27 001 of 001.tar	374.9MB	
<input type="checkbox"/> raw	2012.1.00090.S uid A002 X7143f6 Xca4.asdm.sdm.tar	4.0GB	
▼  Science Goal OUS uid://A002/X5eed86/X29			
▼  Group OUS uid://A002/X5eed86/X2a			
▼  Member OUS uid://A002/X5eed86/X2b			
<input checked="" type="checkbox"/> product	2012.1.00090.S uid A002 X5eed86 X2b 001 of 001.tar	377.8MB	
<input type="checkbox"/> raw	2012.1.00090.S uid A002 X7143f6 Xf9b.asdm.sdm.tar	4.0GB	
		Total: 8.7GB	

Request Handler: Download options

002/X5eed86/X29

X5eed86/X2a

002/X5eed86/X2b

20

20

Download Script

The downloads are scripted for you. You just need to execute the script from the command line.

Download Manager

ALMA's download manager is launched as a browser applet. This is a simpler, more user-friendly way to download files in parallel, allowing you to pause and resume.

Web Start Download Manager

ALMA's download manager is launched as a desktop application via Java Web Start. It will not stop if you close your browser.

File List

View a text file containing a list of URLs. This is useful for using third-party download manager's such as *DownThemAll*.

QA2 Data Products Package: the processed data

Documentation: <https://almascience.nrao.edu/documents-and-tools/cycle3/ALMAQA2Products3.0.pdf>

Science
goal

Project code

```
2012.1.00437.S/  
├── science_goal.uid___A002_X5ce05d_X126/  
│   ├── group.uid___A002_X5ce05d_X127/  
│   │   └── member.uid___A002_X5ce05d_X128/
```

Group OUS:
combination of
member OUS's

```
├── README  
├── calibration/  
├── log/  
├── product/  
├── qa/  
└── script/
```

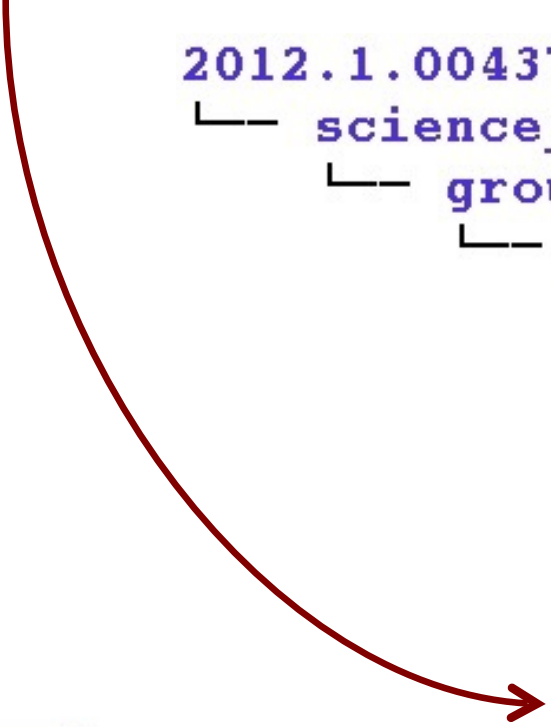
Member OUS: may contain
12-m array, ALMA Compact
Array (ACA), or Total Power
observation

Data delivery products...

QA2 Data Products Package: the processed data

If you want to redo the imaging, then you also need to download the “raw” data and then apply the scriptForPI.py script

```
2012.1.00437.S/  
└── science_goal.uid___A002_X5ce05d_X126/  
    ├── group.uid___A002_X5ce05d_X127/  
        ├── member.uid___A002_X5ce05d_X128/  
            ├── README  
            ├── calibration/  
            ├── log/  
            ├── product/  
            ├── qa/  
            ├── script/  
            └── raw/
```



Small group work:

- **Suggested timeline:**
(5 mins) Share your working goals with your teammates.
(until 12:25pm) work individually, discuss with teammates.
(5 mins) Wrap up, share your achievements with teammates.

Group 1:

Brendan
Laurence
Patrick
Rebecca

Group 2:

Andrew
Jackie
Meghana
Intae
Taylor

Group 3:

Kristy
Nathan
Rachael
Sam
Sydney

Group 4:

Caprice
Peter
Richard
Yao-Lun



For more info:
<https://almascience.nrao.edu/>

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership of Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere (ESO), in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC) and the National Science Council of Taiwan (NSC), and in East Asia by the National Institutes of Natural Sciences (NINS) of Japan in cooperation with the Academia Sinica (AS) in Taiwan. ALMA construction and operations are led on behalf of Europe by ESO, on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI), and on behalf of East Asia by the National Astronomical Observatory of Japan (NAOJ). The Joint ALMA Observatory (JAO) provides the unified leadership and management of the construction and operation of ALMA.

