## **Observing with ALMA**

### **George Bendo**

UK ALMA Regional Centre Node Jodrell Bank Centre for Astrophysics The University of Manchester

The second s

Many of the participants in this workshop may not be planning to submit observing proposals (yet).

However, this session is still useful for:

- Understanding ALMA's capabilities.
- Understanding how ALMA can be configured.
- Understanding how observing programs are executed.

ALMA uses the same timeline in every cycle for handling proposals.

March Call for proposals

April Proposals due

August Grades for proposals are announced

September Phase 2 of proposal submission (review of the Scheduling Blocks); end of observations from the previous cycle

October

Observations start for new cycle

## 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.

ALMA Observing Tool (Cycle8(MainCall-Phase1)) - e Edit View Tool Search Help	Project	− □ × Perspective 1
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submitted Proposal	Principal Investigator	
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	Project Code None Assigned	
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rview		
	Contextual Help Phase I: Science Proposal	
	<ol> <li>Please ensure you and your co-Is are registered with the ALMA Science Portal</li> <li>Create a new proposal by either:         <ul> <li>Selecting File &gt; New Proposal</li> <li>Clicking on the index</li> <li>Or clicking on this link</li> <li>Click on the proposal tree node and complete the relevant fields.</li> </ul> </li> </ol>	

## 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

OK

Do not show this message again

## In the OT, proposals can be created or opened by either selecting the options from the File menu or button bar.

Image: Search Help	ed -	o x
Eile <u>I</u> ool <u>S</u> earch <u>H</u> elp		Perspective 1
	Editors	
Proposal Program	Spectral Spatial Project	
Unsubmitted Proposal	Principal Investigator (7)	
Project		
Planned Observing	Select PL	
	Main Project Information	
	Project	
	Assigned Priority Project Code None Assigned	
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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.

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		Student project	t 🔲								
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	Please ensure that y Science Case (Mano	datory, PDF, 4 pag ons	ges max.) Briefly justify any new ob:	servations that duplicate archival ALMA Duplication Policy and how	ce Portal data or accepted pri	ograms.				[?	

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

### 1 Scientific justification



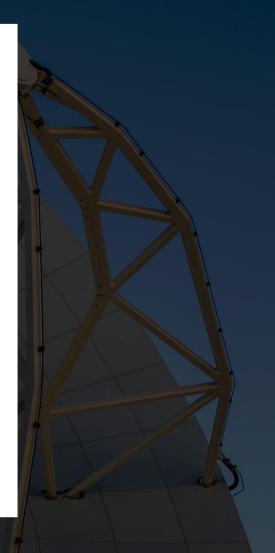
Figure 1: The CO(1-0) velocity field of NGC 3256, with contours of the total line emission map overlaid (ALMA Science Verification Data).

Frequency (GHz)	Sensitivity (mJy)	
100	0.01	
300	0.10	

### 2 Description of observations

### 3 References

Author1 et al. year, journal, vol, page
 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.

Oposal     Program	Editors Spectral Spatial Prope						
Unsubmitted Proposal Project Proposal Planned Observing		se select one o keywords					
		ent project					
	Investigators						?
	Type	Full name Not set	Email Not set	Affiliation Not set	ALMA ID Not set	Executive Non-ALMA	
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### Each Science Goal consists of a set of six tabs.

### The General tab describes the Science Goal.

ALMA Observing Tool (Cycle8(MainCall-Phase1)) -	- Project	- 🗆 🗙
Eile Edit View Tool Search Help		Perspective 1
Project Structure	f Editors	
Proposal Program	Spectral Spatial General	
Proposal Program Unsubmitted Proposal Profet	Petrol         Spiral             Here a name and description for the purpose of this science goal.             Description             Description	
Q ^ ?		
6 M		

## 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.

Project Structure Proposal Program	Editors     Spectral Spatial Field Setup		
Unsubmitted Proposal	Special Spawa Preu Secup		
9 🖮 Project	2		
9 Proposal			? -
<ul> <li>Planned Observing</li> <li>ScienceGoal (Science Goal)</li> </ul>	Source Name M83		Resolve
General	Choose a Solar System Object? Name of object Unspecified	-	
Field Setup	System ICRS V Sex agesimal Parallax 0.00000	0 mas 💌	
Spectral Setup     Calibration Setup	System display?		
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Technical Justification	Dec -29:51:56.739 PM DEC 0.00000		
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	Representative Frequency (Sky)     146.715 GHz     Coords Type ® Relative ○ Absolute       Anterna Diameter     12m ○ 7m     Field Center     Offset(Longitude)     0.00000     arcsec ▼       Anterna Beamsize (HPBW)     39.689 arcsec     Coordinates     Offset(Latitude)     0.00000     arcsec ▼		
	-Image Query plength 1.0000 arcmin V		
	Image Server Digitized Sky (Version II) at ESO 🔻 q length 1.00000 arcmin 🔻		
	Image Size(arcmin) 10.0 Query Position Angle(0.00000 deg 🔻		
	Spacing 0.51093 fraction of antenna beamsize V Reset to	o Nyquist	
	#Pointings 12m Array 14 7m Array 3		

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.

MainCall-Phase1)) -	- Project	- 🗆 X
<u>Eile Edit ⊻iew Tool Search Help</u>		Perspective 1
Project Structure	4 Editors	
Proposal Program	Spectral Spatial Field Setup	
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	FOV Parameters     Rectangle       Representative Frequency (Sky)     146.715 GHz       Antenna Biameter     12m       Antenna Beamsze (HPBW)     30.689 arcsec       Show Antenna Beamsze Z     Offset(Latitude)       0 00000     arcsec	7 -
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Q ^ ?	#Pointings 12m Array 14 7m Array 3 Export	•

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

Multiple spectral and polarization settings are available.

ALMA Observing Tool (Cycle8(MainCall-Phase1)) - Pr	– –	□ ×
<u>Eile Edit ⊻iew Tool Search Help</u>		Perspective
Project Structure	4 Editors	
Proposal Program	Spectral Spatial Spectral Setup	
Unsubmitted Proposal	Visualisation	
Project     Proposal     Proposal     Control and Performance     Control and Performance     Control and Performance     Technical Justification	In the table below, it is possible to define up to 10 spectral windows, 4 per baseband as long as the total Fraction per baseband is no more than 1. Each baseband is 20Hz wide and can be separately configured i.e. each spectral window can have a different bandwidth and resolution. Note that for bands 31 to 8, it is not possible to µt 3 basebands in one sideband and the fourth one in the other. Leftifright cick to zoom inviout, grab sliding bar to pan Note. Moving LO1 here is for experimentation only - actual setup determined by the windows 100[000 200]000 300[0000 400]0000 500[0000 700[0000 200]000 900[0000 300]0000 100]0000 100[0000 100[0000 100]0000 100[0000 100[0000 100]0000 100[0000 100[0000 100]000[0000 100[0000 100]0000 100[0000 100[0000 100]000[0000 100[0000 100]000[0000 100[0000 100]000[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100]00[0000 100[0000 100[0000 100]00[00000 100]00[0000 100[0000 100]000[0000 100[00000 100]00[0000 10	2 <u>1000</u> =
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	Spectral Line     Spectral Type     Single Continuum     Spectral Scan  Produce image sidebands (Bands 9 and 10 only) Polarization products desired     XX      DUAL     FULL	7 -
	Spectral Setup Errors	
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	Spectral Line Baseband-1	? -
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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.

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<ul> <li>Project</li> <li>Proposal</li> <li>Planned Observing</li> <li>ScienceGoal (Science Goal)</li> <li>General</li> <li>Field Setup</li> <li>Spectral Setup</li> </ul>		Spectral Type Produce image sidebands (Bands 9 a Polarization products desired	Spectral Line     Single Continuum     Spectral Scan  nd 10 only)     XX      DUAL     FULL		? -
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	Baseband-4				
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When the spectral type is set to spectral line, the individual spectral windows need to be created by the user.

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General					Spectral Scan		
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Control and Performance	Spectral Setup E	Errors					
Technical Justification	Spectral Line						
	Baseband-1						?
	Fraction	Centre Freq	Centre Freq	-		Spec.	Representative
		(rest,hel)	(sky,hel)	Transition	Bandwidth, Resolution (smoothed)	Avg.	Window
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	Add spectral	I window centred on a spe	ectral line Add sp	ectral window manually	Delete Show image spectral windows		
		I window centred on a spe	Add spe	ectral window manually	Delete Show image spectral windows		
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roject Structure	t Editors							
Proposal Program	Spectral Spatial S Spectral Type	Spectral Setup						
submitted Proposal Project Pier Proposal Pier Proposal Pier Planned Observing Pier ScienceGoal (Science Goal) ☐ General ☐ Field Setup	Specual type			Spectral Type Produce image sidebands	Spectral Line Single Continuum Spectral Scan (Bands 9 and 10 only)		?	9 8
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Calibration Setup     Control and Performance	Spectral Setup Errors							
Technical Justification	- Single Continuum			Receiver Ban Sky Frequenc	Reset to Standard Frequency		?	] (=
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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							
ransition Filter	Transitions matching your filter settings:							
	(double-click column header for primary sort, single-click s	subsequent columns for secondary sorting. Single of	licks will reverse sort order of a	lineady selected colu	mns.)			
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	- CH3OH v t=1 11(10,1)-11(11,0)	Methanol	84.158571 GHz	84.012974 GHz	1066.119 K		1.459 D <sup>2</sup>	Offline
equency Filters	U-84163	UNIDENTIFIED	84.163000 GHz	84.017395 GHz		0.06		Offline
.MA Band	30SiO v=1 2-1	Silicon Monoxide	84.164253 GHz	84.018646 GHz	1753.828 K		19.441 D <sup>2</sup>	Offline
1	c-H13CCCH 2(1,2)-1(0,1)	Cyclopropenylidene	84.185621 GHz	84.039977 GHz	6.331 K		17.24 D <sup>2</sup>	Offline
	U-84215	UNIDENTIFIED	84.215000 GHz	84.069305 GHz		0.08		Offline
2 3 4 5 6 7 8 9 1	0 CH3CN v8=1 J =36-36, K =3-1	Methyl Cyanide	84.271390 GHz	84.125598 GHz	1139.034 K		0.122 D <sup>2</sup>	Offline
	SO2 v=0 32(5,27)-31(6,26)	Sulfur dioxide	84.320876 GHz	84.174998 GHz	549.36 K		13.463 D <sup>2</sup>	Offline
y Frequency (GHz)	U-84356	UNIDENTIFIED	84.356000 GHz	84.210061 GHz		0.07		Offline
	U-84385	UNIDENTIFIED	84.385000 GHz	84.239011 GHz		0.08		Offline
	1 34SO 2(2)-1(1)	Sulfur Monoxide	84.410690 GHz	84.264657 GHz	19.233 K		3.534 D <sup>2</sup>	Offline
1 31.3 Max 950	CHOON V (-0 15(-5,11)-14(-2,15)	Methanol	84.423776 GHz	84.277720 GHz	273.898 K	0.8	4.303 D <sup>2</sup>	Offline
		Methanol	84.444140 GHz	84.298049 GHz	269.033 K		3.267 D <sup>2</sup>	Offline
ceiver/Back End Configuration	U-84468	UNIDENTIFIED	84.468000 GHz	84.321867 GHz		0.18		Offline
· · · · · · · · · · · · · · · · · · ·	U-84478	UNIDENTIFIED	84.478000 GHz	84.331850 GHz		0.18		Offline
All lines	CH3CN v8=1 J =69-69, IK = -1-1	Methyl Cyanide	84.495766 GHz	84.349586 GHz	2655.452 K		0.823 D <sup>2</sup>	Offline
Potentially selectable lines	U-84496	UNIDENTIFIED	84.496000 GHz	84.349819 GHz		0.1		Offline
	CH3OH v t=0 5(-1,5)-4(0,4)	Methanol	84.521169 GHz	84.374944 GHz	40.391 K	2.8	3.083 D <sup>2</sup>	Offline
Lines in defined spws	CH3OH v t=1 12(10,2)-12(11,1)	Methanol	84.540414 GHz	84.394156 GHz	1093.861 K		2.786 D <sup>2</sup>	Offline
Filtering unobservable lines	NH2CHO 4(0,4)-3(0,3)	Formamide	84.542329 GHz	84.396068 GHz	10.158 K		52.272 D <sup>2</sup>	Offline
	C6H J=61/2-59/2, Ω=3/2, I=e	1,3,5-Hexatriynyl	84.549688 GHz	84.403414 GHz	63.662 K	0.04	1867.725 D <sup>2</sup>	Offline
per-state Energy (K)	CH3OH v t=0 19(2,17)-18(-3,16)	Methanol	84.574024 GHz	84.427708 GHz	463.489 K		0.424 D <sup>2</sup>	Offline
	C6H J=61/2-59/2, Ω=3/2, I=f	1,3,5-Hexatriynyl	84.574600 GHz	84.428283 GHz	63.675 K	0.03	1867.562 D <sup>2</sup>	Offline
Min 0 Max 0	29SiO v=2 2-1	Silicon Monoxide	84.575291 GHz	84.428973 GHz	3505.399 K	0.07	19.687 D <sup>2</sup>	Offline
	t-CH3CH2OH 4(2,3)-4(1,4)	trans-Ethanol	84.595868 GHz	84.449514 GHz	13.41 K	0.06	4.328 D <sup>2</sup>	Offline
olecule Filter / Environment	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-2	Methylamine	84.597540 GHz	84.451183 GHz	10.875 K		0.246 D <sup>2</sup>	Offline
	CH3NH2 2(1)E1+1-2(0)E1+1, F=3-2	Methylamine	84.597605 GHz	84.451248 GHz	10.875 K		0.055 D <sup>2</sup>	Offline
ow all atoms and molecules		Methylamine	84.597641 GHz	84.451284 GHz	10.875 K		0.053 D <sup>2</sup>	Offline
	CH3NH2 2(1)E1+1-2(0)E1+1	Methylamine	84.598202 GHz	84.451844 GHz	10.875 K		1.065 D <sup>2</sup>	Offline
we are seen at a second second sector and the second secon	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-3	Methylamine	84.598326 GHz	84,451968 GHz	10.876 K		0.055 D <sup>2</sup>	Offline
n't find the transition you're looking for in the	CH3NH2 2(1)E1+1-2(0)E1+1, F=3-3	Methylamine	84.598391 GHz	84.452033 GHz	10.876 K		0.442 D <sup>2</sup>	Offline
ine pool? Find more in the online Splatalogue.	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-1	Methylamine	84 598763 GHz	84.452404 GHz	10.876 K		0.053 D <sup>2</sup>	Offline
Search Online	CH3NH2 2(1)E1+1-2(0)E1+1, F=1-1	Methylamine	84.598864 GHz	84.452505 GHz	10.876 K		0.16 D <sup>2</sup>	Offline
Granet Grants	U-84608	UNIDENTIFIED	84.608000 GHz	84.461625 GHz	10.0.2.1	0.12		Offline
	U-84616	UNIDENTIFIED	84.616000 GHz	84.469611 GHz		0.1	1	Offline
Reset Filters	U-84628	UNIDENTIFIED	84.628000 GHz	84 481591 GHz		0.08		Offline
Thomas T and a	CH30CH3 3(2,1)-3(1,2) AE	Dimethyl ether	84.631897 GHz	84.485481 GHz	11.091 K	0.00	16.386 D <sup>2</sup>	Offline
	CH3OCH3 3(2,1)-3(1,2) AL	Dimethyl ether	94.637037 GHz	94.405461 GH2	11.091 K	14	10.000 D	Offline
								-
		Add to	spectral window list					
	Spectral windows in this baseband (maximum of four)	1						
	Transition 👄	Description	Deate	requency $rightarrow$		01- 5	requency	

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

## The catalogue is also available on the web at <a href="https://splatalogue.online/">https://splatalogue.online/</a> .

Create spectral windows centred on spectral lines								
Transition Filter	Transitions matching your filter settings:							
•	(double-click column header for primary sort, single-click	subsequent columns for secondary sorting. Single cli	cks will reverse sort order of a	already selected colu	imns.)			
e.g. CO*2-1* or *oxide*	Transition -	Description	Rest Frequency	Sky Frequency	Upper-state Energy	Leune Intensity	Sij µ²	Catalo
Include description	CH3CH2CN v=0 11(0,11)-10(1,10)	Ethyl Cyanide	84.151838 GHz	84.006252 GHz	28.102 K		5ij µ* 10.328 D²	Offline
Micidae acacipation	CH3CH2CN V=0 11(0,11)-10(1,10) CH3CH v t=1 11(10,1)-11(11.0)	Methanol	84.158571 GHz	84.012974 GHz	1066.119 K	0.1	1.459 D <sup>2</sup>	Offline
The second s	U-84163	UNIDENTIFIED	84.163000 GHz	84.012974 GHz	1000.119 K	0.06		Offline
requency Filters	30SiO v=1 2-1	Silicon Monoxide	84.164253 GHz	84.018646 GHz	1753.828 K	0.00	19.441 D <sup>2</sup>	Offline
LMA Band	c-H13CCCH 2(1,2)-1(0,1)	Cyclopropenylidene	84.185621 GHz	84.039977 GHz	6.331 K	0.12	17.24 D <sup>2</sup>	Offline
	U-84215	UNIDENTIFIED	84.215000 GHz	84.069305 GHz	0.331 K	0.08	17.24 0	Offline
	CH3CN v8=1 J =36-36, K =3-1	Methyl Cyanide	84.271390 GHz	84.125598 GHz	1139.034 K		0.122 D <sup>2</sup>	Offline
2 3 4 5 6 7 8 9 10	SO2 v=0 32(5.27)-31(6.26)	Sulfur dioxide	84.320876 GHz	84.174998 GHz	549.36 K		13.463 D <sup>2</sup>	Offline
	U-84356	UNIDENTIFIED	84.356000 GHz	84.210061 GHz	048.00 K	0.07	13.403 D*	Offline
y Frequency (GHz)	U-84385	UNIDENTIFIED	84.385000 GHz	84.239011 GHz		0.07		Offline
)		Sulfur Monoxide	84.410690 GHz	84.264657 GHz	19.233 K		3.534 D <sup>2</sup>	Offline
<u> </u>	34SO 2(2)-1(1)	Methanol	84.423776 GHz	84.277720 GHz	273 898 K		4 303 D <sup>2</sup>	Offline
n 31.3 Max 950	CH3OH v t=0 13(-3,11)-14(-2,13)					0.0	4.303 D <sup>2</sup> 3.267 D <sup>2</sup>	Offline
	13CH3OH v t=0 13(-3,11)-12(-4,9) U-84468	Methanol	84.444140 GHz	84.298049 GHz 84.321867 GHz	269.033 K	0.18	3.207 D*	Offline
ceiver/Back End Configuration	U-84408 U-84478	UNIDENTIFIED	84.468000 GHz 84.478000 GHz	84.321867 GHZ		0.18		Offline
All lines	CH3CN v8=1 J =69-69. IK = -1-1		84.495766 GHz	84.349586 GHz	2655.452 K		0.823 D <sup>2</sup>	Offline
		Methyl Cyanide			2655.452 K		0.823 D <sup>2</sup>	
Potentially selectable lines	U-84496 CH3OH v t=0 5(-1.5)-4(0.4)	UNIDENTIFIED	84.496000 GHz	84.349819 GHz 84.374944 GHz	10.004.1/	0.1	3.083 D <sup>2</sup>	Offline
Lines in defined spws		Methanol Methanol	84.521169 GHz 84.540414 GHz		40.391 K 1093 861 K		2 786 D <sup>2</sup>	Offline
	CH3OH v t=1 12(10,2)-12(11,1)			84.394156 GHz				
Filtering unobservable lines	NH2CHO 4(0,4)-3(0,3)	Formamide	84.542329 GHz	84.396068 GHz	10.158 K		52.272 D <sup>2</sup>	Offline
	C6H J=61/2-59/2, Ω=3/2, I=e	1,3,5-Hexatriynyl	84.549688 GHz	84.403414 GHz	63.662 K		1867.725 D <sup>2</sup>	Offline
pper-state Energy (K)	CH3OH v t=0 19(2,17)-18(-3,16)	Methanol	84.574024 GHz	84.427708 GHz	463.489 K		0.424 D <sup>2</sup>	Offline
Min 0 Max 0	C6H J=61/2-59/2, Ω=3/2, I=f	1,3,5-Hexatriynyl	84.574600 GHz	84.428283 GHz	63.675 K		1867.562 D <sup>2</sup>	Offline
Min U Max U V	29SiO v=2 2-1	Silicon Monoxide	84.575291 GHz	84.428973 GHz	3505.399 K		19.687 D <sup>2</sup>	Offline
	t-CH3CH2OH 4(2,3)-4(1,4)	trans-Ethanol	84.595868 GHz	84.449514 GHz	13.41 K		4.328 D <sup>2</sup>	Offline
olecule Filter / Environment	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-2	Methylamine	84.597540 GHz	84.451183 GHz	10.875 K		0.246 D <sup>2</sup>	Offline
now all atoms and molecules	CH3NH2 2(1)E1+1-2(0)E1+1, F=3-2	Methylamine	84.597605 GHz	84.451248 GHz	10.875 K		0.055 D <sup>2</sup>	Offline
now all atoms and molecules	CH3NH2 2(1)E1+1-2(0)E1+1, F=1-2	Methylamine	84.597641 GHz	84.451284 GHz	10.875 K		0.053 D <sup>2</sup>	Offline
	CH3NH2 2(1)E1+1-2(0)E1+1	Methylamine	84.598202 GHz	84.451844 GHz	10.875 K		1.065 D <sup>2</sup>	Offline
in't find the transition you're looking for in the	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-3	Methylamine	84.598326 GHz	84.451968 GHz	10.876 K		0.055 D <sup>2</sup>	Offline
fline pool? Find more in the online Splatalogue.	CH3NH2 2(1)E1+1-2(0)E1+1, F=3-3	Methylamine	84.598391 GHz	84.452033 GHz	10.876 K		0.442 D <sup>2</sup>	Offline
	CH3NH2 2(1)E1+1-2(0)E1+1, F=2-1	Methylamine	84.598763 GHz	84.452404 GHz	10.876 K		0.053 D <sup>2</sup>	Offline
Search Online	CH3NH2 2(1)E1+1-2(0)E1+1, F=1-1	Methylamine	84.598864 GHz	84.452505 GHz	10.876 K		0.16 D <sup>2</sup>	Offline
	U-84608	UNIDENTIFIED	84.608000 GHz	84.461625 GHz		0.12		Offline
	U-84616	UNIDENTIFIED	84.616000 GHz	84.469611 GHz		0.1		Offline
Reset Filters	U-84628	UNIDENTIFIED	84.628000 GHz	84.481591 GHz		0.08		Offline
	CH3OCH3 3(2,1)-3(1,2) AE	Dimethyl ether	84.631897 GHz	84.485481 GHz	11.091 K		16.386 D <sup>2</sup>	Offline
	CH30CH3 3/2 1) 3/1 2) EA	Dimathul athar	RA 632275 GH7	94 495959 GH7	11 002 K	4.4	10 004 02	Offline
		Add to	spectral window list					
	······································							
	Spectral windows in this baseband (maximum of four	)						
	Transition 👄	Description	Deet F	requency -		Char E	requency	

ernove 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.

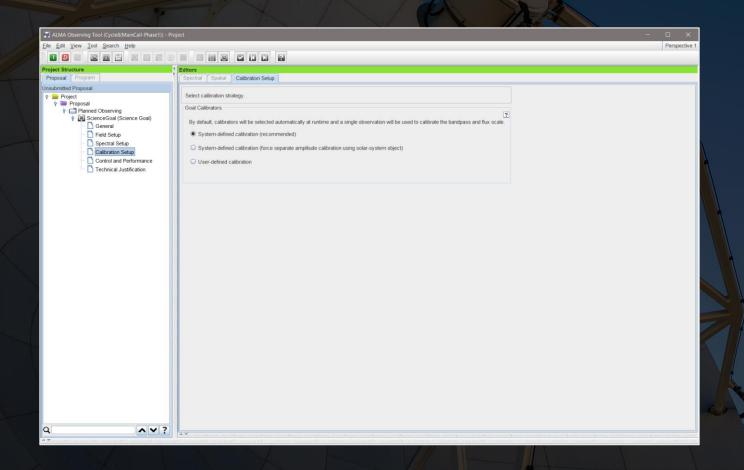
ALMA Observing Tool (Cycle8(MainCall-Phase1)) -	hoject	- 🗆 x
Eile Edit View Tool Search Help		Perspective
Project Structure	f Editors	
Proposal Program	Spectral Spatial Spectral Setup	
Unsubmitted Proposal	Visualisation	
Project     Proposal     Proposal     Panned Observing     Pasned	In the table below, 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 26Hz wide and can be separately configured i.e. each spectral window can have a different bandwidth and resolution. Note that for bands 3 to 8, it is not possible to put 3 basebands in one sideband and the fourth one in the other. Leftright click to zoom invout, grab sliding bar to pan Note. Hoving LO1 here is for experimentation only - actual setup determined by the windows	2
Calibration Setup	Observed Frequency 125/0000, 130/0000, 135/0000, 140/0000, 145/000	0. 150 0000 155 0000
Control and Performance		
	Continuum2	25.9=0 3-2 graun 1
	125/0000 130/0000 135/0000 140/0000 145/0000 Rest Frequency	1500000 1550000
	Overlays:   Receiver Bands  Transmission  DSB Image  Spectral Lin Water Vapour Column Density:  Automatic Choice  Automa	es Select Lines to Overlay
	Viewport: Pan to Spectral Window Zoom to Band Reset	
	Spectral Type     Spectral Line     Spectral Type     Single Continuum     Spectral Scan  Produce image sidebands (Bands 9 and 10 only)	78
	Polarization products desired O XX   DUAL O FULL	
	Spectral Setup Errors	
	Spectral Line Baseband-1	? —
	Fraction Centre Freq Centre Freq Transition Bandwidth, Resolution (smort	othed) Spec. Representative Avg. Window
	1(Full) 146.96903 GHz 146.71476 GHz CS v=0 3-2 1875.000 MHz( 3831 km/s), 1.129 MHz( 2.307 km/s)	s) 2 🔍
۹ <b>^ ?</b>		

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

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

MainCall-Phase1)) - P	roject	- 🗆 🗙
Eile Edit View Tool Search Help		Perspective 1
Project Structure	Editors	
Proposal Program	Spectral Spatial Calibration Setup	
Proposal Program Insutunited Proposal Project	Spectral       Calibration         Select calibration       strategy:         Gold Calibrators       Image: Calibrators         System defined calibration (recommended)       System defined calibration (increaseparate amplitude calibration using solar-system object)         User defined calibration       System defined calibration	
Q ^ ?	a la constante de la constante	
A. 9	F.	

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



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.

Project Structure Proposal Program	f Editors	and Performance				
Unsubmitted Proposal Project	These parameters are used to	control various aspects of the	observations, including the re	quired antenna configurations and integra	ation times.	
Proposal     Planned Observing	Control and Performance					
🕈 💽 ScienceGoal (Science Goal)	Configuration Information				?	
General	Antenna Beamsize (1.13 * λ /	D 1 12m 39 689 arcsec	7m 68.038 arc	Sec		
Spectral Setup	Number of Antennas	12m 43	7m 10	TP 3		
Calibration Setup	Number of Antennas					
Control and Performance		ACA 7m configuration		onfiguration Most extended 12m configu	uration	
	Longest baseline	0.049 km	0.161 km	8.548 km		
	Synthesized beamsize	8.523 arcsec	2.313 arcsec	0.065 arcsec		
	Shortest baseline	0.009 km	0.015 km	0.113 km		
	Maximum recoverable scale	45.617 arcsec	19.554 arcsec	0.972 arcsec		
	Desired Performance					
	Largest Angular Structure Desired mosaic sensitivity	0.5 n source 45.0	arcsec V to 2 arcsec V Jy V equiv	alent to 908.85 mK @ 2.50 *		
	Bandwidth used for Sensiti		gateBandWidth	and 22.721 K @ 0.500 " Frequency Width 7.439763 GHz		
	Override OT's sensitivity-b time estimate (must be jus	tified)	s 🖲 No			
	Science Goal time estimat (includes configuration and		e Estimate			
	Simultaneous 12-m and A		s 🖲 No			
	Are the observations time-	constrained? O Ye	s 🔍 No			

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

le Edit View Tool Search Help		and large				Pers
oject Structure	Editors	-				
Proposal Program	Spectral Spatial Control and	Performance				
Project	These parameters are used to con	trol various aspects of	f the observations, including the rec	quired antenna configurations and	I integration times.	
Proposal     Panned Observing	Control and Performance					
ScienceGoal (Science Goal)	Configuration Information				2	
General	Antenna Beamsize (1.13 * λ / D )	12m 39.689 arcsec	c 7m 68.038 arcs	ec		
Spectral Setup	Number of Antennas	12m 43	7m 10	TP 3		
Calibration Setup	Humber of Antoniaa					
Control and Performance		ACA 7m configuratio		nfiguration Most extended 12m	I configuration	
	Longest baseline	0.049 km	0.161 km	8.548 km		
	Synthesized beamsize	8.523 arcsec	2.313 arcsec	0.065 arcsec		
	Shortest baseline	0.009 km	0.015 km	0.113 km		
	Maximum recoverable scale	45.617 arcsec	19.554 arcsec	0.972 arcsec		
	Largest Angular Structure in so	urce 45				
	Desired mosaic sensitivity				2.50 "	
	Bandwidth used for Sensitivity	Ag	1	and 22.721 K @ 0.5		
	Override OT's sensitivity-base time estimate (must be justified		Yes 🖲 No			
	Science Goal time estimate (includes configuration and bea	im information)	Time Estimate			
	Simultaneous 12-m and ACA o	bservations O	Yes 🖲 No			
	Are the observations time-cons	strained?	Yes 🖲 No			

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

Project Structure								
Proposal Program	Spectral Spatial Control and	Performance						
Proposal [Program] Unsubmitted Proposal      Proposal      Proposal      Proposal      Procect      Procect      Procect      Procect      Procect      Procect      Procect      Procect      Control and Performance      Technical Justification	Spectral Spatial Control and These parameters are used to cor Control and Performance Configuration Information Anterna Beamsize (1.13 * Å / D) Number of Anternas Longest baseline Synthesized beamsize Shortest baseline Maximum recoverable scale Desired Angular Resolution (S) Desired Magular Resolution (S) Desired mosaic sensitivity Bandwidth used for Sensitivity-base time estimate (must be justified	12m         39.669 arc           12m         39.669 arc           12m         43           ACA 7m configu         0.049 km           8.523 arcsec         0.009 km           45.617 arcsec         rthesized Beam)	ration M 0. 2: 0.1 15 Single O R	7m         68.038 arcsec           7m         10           ost compact 12m configuration         10           161 km         313 arcsec           315 km	ration Mos 2.517 km 0.209 arc 0.015 km 2.815 arc lone ACA equivalent to and 129	TP 3 extended 12m configuration sec 1.0615 K	s. 2	
	time estimate (music be patient Science Goal time estimate (includes configuration and bec Simultaneous 12-m and ACA of Are the observations time-com	m information) bservations	Time Estimat	•				

If the source is extended and if that extended emission is important for the science, then specifying the larges 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 (Cycle8(MainCall-Phase1)) -	Project						- 0
ile Edit View Tool Search Help		-					Perspect
		H ?					
Project Structure	Editors     Spectral Spatial Control and						
Proposal Program Insubmitted Proposal	Spectral Spatial Control and	Performance					
Project	These parameters are used to co	ntrol various aspects of the	observations, including the re-	uired antenna configurations	and integration times.		
Proposal     Planned Observing	Control and Performance						
Planned Observing     Planned Observing     ScienceGoal (Science Goal)	Configuration Information					2	
General	Antenna Beamsize (1.13 * λ / D)	12m 20.690 proper	7m 68.038 arcs				
<ul> <li>Field Setup</li> <li>Spectral Setup</li> </ul>							
Calibration Setup	Number of Antennas	12m 43	7m 10	TP 3			
Control and Performance		ACA 7m configuration	Most compact 12m co	nfiguration Most extended 1	12m configuration		
- 🗋 Technical Justification	Longest baseline	0.049 km	0.161 km	8.548 km			
	Synthesized beamsize	8.523 arcsec	2.313 arcsec	0.065 arcsec			
	Shortest baseline	0.009 km	0.015 km	0.113 km			
	Maximum recoverable scale	45.617 arcsec	19.554 arcsec	0.972 arcsec			
	Desired Performance			1.1000000000			
	Largest Angular Structure in s	ource 45.0	arcsec				
	Desired mosaic sensitivity	0.1	Jy 🔻 equiv	elent to 908.85 mK	@ 2.50 "		
	Bandwidth used for Sensitivity	Anore		and 22.721 K @	0.500 " 9763 GHz		
			gatebanarnaan	( requere) read	into one		
	Override OT's sensitivity-base time estimate (must be justifie		s 🖲 No				
	Science Goal time estimate						
	(includes configuration and be	am information)	e Estimate				
	Simultaneous 12-m and ACA		s 🗩 No				
	Are the observations time-con	strained? O Ye	s 🖲 No				
	1						

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.

Proposal Program	Editors     Spectral Spatial Control an	id Performance					
Insubmitted Proposal የ 冲 Project	These parameters are used to co	ontrol various aspects of the	e observations, including the re	quired antenna co	nfigurations and integratior	n times.	
Proposal     Proposal     Planned Observing	Control and Performance						
ScienceGoal (Science Goal)     General	Configuration Information					?	
General     Field Setup	Antenna Beamsize (1.13 * λ / D	) 12m 39.689 arcsec	7m 68.038 arc	sec			
- D Spectral Setup	Number of Antennas	12m 43	7m 10		TP 3		
Calibration Setup     Control and Performance		ACA 7m configuration	Most compact 12m c	onfiguration Mos	st extended 12m configurat	tion	
Technical Justification	Longest baseline	0.049 km	0.161 km	8.548 km			
	Synthesized beamsize	8.523 arcsec	2.313 arcsec	0.065 arc	csec		
	Shortest baseline	0.009 km	0.015 km	0.113 km			
	Maximum recoverable scale	45.617 arcsec	19.554 arcsec	0.972 arc			
	Desired Performance	10.011 00000	10.001 00000	U.O.L. U.C.			
	Largest Angular Structure in	source 45.0	arcsec 💌	alent to 908.85 m	K @ 2.50 *		
				and 22.721 K	@ 0.500 "		
	Bandwidth used for Sensitivit	y Aggre	gateBandWidth	<ul> <li>Frequency V</li> </ul>	Midth 7.439763 GHz		
	Override OT's sensitivity-bas time estimate (must be justifi		es 🖲 No				
	Science Goal time estimate (includes configuration and b	eam information)	ne Estimate				
	Simultaneous 12-m and ACA		es 🖲 No				
	Are the observations time-co	nstrained? O Ye	es 🖲 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.** 

### Time Estim

### 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

### Bandwidth used for sensitivity Representative frequency (sky, first source)

### Estimated Total time for Science Goal

### Cluster 1

Source Name	RA	Dec	Velocity
183	13:37:00.9189	-29.51.56.739	519,100 km/s

100.0 mJy

7.440 GHz 146.715 GHz

58.04 min

		Po	ssible Config	uration Combinations	
12-m (1)	12-m (2)	7-m	TP	Nominal Beam(")	Max expected axial ratio
C43-1	None	Yes	No	2.151 x 2.488	1.5
C43-2	None	Yes	No	1.461 x 1.69	1.5
C43-3	None	Yes	No	0.879 x 1.065	1.5

### Input Parameter

Precipitable water vapour (all sources) 2.748mm (6th Octile)

### Time required for 12m (1) [C43-3]

Time on source per pointing (first source)	24.18 s [ 18.90 us]
Total number of pointings (all sources)	14
Number of tunings	1
Total time on source	5.64 min [264.55 us]
Total calibration time	13.17 min
Other overheads	2.02 min
Total time for 1 SB execution	20.83 min
Number of SB executions	1
Total time to complete SB	20.83 min

### Calibration Breakdown per SB exec

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

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**.

### Time Estin

### 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 M anual for more details

### Input Parameters Requested sensitivity

Representative frequency (sky, first source)

Randwidth used for sensitivity

Estimated Total time for Science Goal

al

18.90 us] 264 55 us] 100.0 mJy

7.440 GHz 146.715 GHz

58.04 min

### Cluster 1

Input Parameters

Precipitable water vapour (all sources) 2.748mm (6th Octile)

e	required	for	12m	(1)	[C43-3]

Time on source per pointing (first source)	24.18 S [
Total number of pointings (all sources)	14
Number of tunings	1
Total time on source	5.64 min (
Total calibration time	13.17 min
Other overheads	2.02 min
Total time for 1 SB execution	20.83 min
Number of SB executions	1
Total time to complete SB	20.83 min

### Calibration Breakdown per SB execution

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

Additional Arrays	
ACA 7-m on-source time	13.61 n
Total 7-m time	37.21 n
Total ACA time (max[t 7-m,t TP])	37.21 n

Estimated total time for cluster 1 58.04 min

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.

le Edit View Iool Search Help		Perspective
Project Structure	Editors	
Proposal Program	Spectral Spatial Technical Justification	
hsubmitted Proposal	Enter a Technical Justification for this Science Goal, paying special attention to the parameters reproduced below.         Sensitivity       ?         Requested RMS over 7.440 GHz is 100.00 mJy       For a peak flux density of 100.00 mJy , the SN is 1.0         Achieved RMS over the total 7.440 GHz bandwidth is 88.39 uJy, 0.80 mK-20.08 mK       For a continuum flux density of 100.00 mJy , 908.86 mK-22.72 K , the achieved SN is 1131.3         For a peak line flux of 10.00 mJy , the achieved SN over 1/3 of the source line width ( 50.00 km/s / 3 = 16.67 km/s ) is 3.7       Note that one or more of the SN esimates are < 3. Please double-check the RMS and/or line fluxes entered and/or address the issue below.         Line width / bandwidth used for sensitivity ( 50.00 km/s / 15202 19 km/s ) = 0.003       Note that the bandwidth used for sensitivity is larger than 1/3 of the linewidth.         The SN achieved Fra resolution element that allows the line to be resolved will be lower than that reported.       Spectral Dynamic Range (continuum flux / line rms): 37.46         Justity your requested RM S and resulting SN for the spectral line and/or continuum observations.       For line observations also justify the bandwidth used for the sensitivity calculation.	-
	Imaging       [7]         Requested angular resolution 2.50 arcsec - 500.00 mas       [7]         Requested Largest Angular Scale 45.00 arcsec       Justify the chosen angular resolution and largest angular scale for the source(s) in this Science Goal	_

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.

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Project Structure	Editors		
Proposal Program	Spectral Spatial Technical Justification		
Proposal Program Proposal Calibration Setup Calibration Setup Calibration Setup Calibration Setup Calibration Setup Calibration Proposal Setup Calibration Proposal Setup Calibration Proposal Setup Proposal Pro	Special Special technical Justification  Terr mile conservators also posity the conditional tased for the sensavity calculation.  Imaging Requested angular resolution 2.50 arcsec - 500.00 mas Requested Largest Angular Scale 45.00 arcsec Justify the chosen angular resolution and largest angular scale for the source(s) in this Science Goal	2	<u></u>
	Correlator configuration Ine width / representative spectral window resolution: 50.00 km/s / 2.31 km/s = 21.68	7	-
	Representative spectral window width : 3831.32 km/s Justfy 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.

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Project Structure	Editors	
Proposal Program	Spectral Spatial Project	
Unsubmitted Proposal	Principal Investigator	
Visutification	Project Information Project Code None Assigned	
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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.

🖸 ALMA Observing Tool (Cyclet 🔶e1))		- 🗆 🗙
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Proposal Program	Spectral Spatial Project	
Insubmitted Proposal	Principal Investigator  Project Information  Project Code None Assigned	
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### 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. 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 proposal can be resubmitted multiple times before the proposal deadline.

After the deadline, the proposal will be reviewed. Typically, all people on a proposal will be notified about the outcome in the following July or August.

After this, Phase 2 of the proposal process starts. This is when the proposal is converted into instructions for the observatory. The observations will be subdivided into Scheduling Blocks.

In this phase, **PIs should check that the observations** (including the source coordinates and spectral settings) are accurate. For reference, a Scheduling Block (SB) is a set of observations grouped together according to the following criteria:

- Specific array / array configuration
- Specific spectral tuning
- Specific set of fields / targets
- Specific sensitivity and angular resolution goals

One Science Goal from a proposal may be subdivided into multiple SBs.

Each SB may need to be executed multiple times. Each of these executions are called Execution Blocks (EBs).

The proposals are all inserted into an observing queue. Each EB will be performed according to the following criteria:

- Proposal grade
- For the 12m array, array configuration / angular resolution
- Observing conditions
- Elevation in the sky

Each array (the main 12m array, the ACA, and the total power array) has its own observing queue.

Observations can be tracked using SnooPl (https://asa.alma.cl/snoopi/).

Pls communicate with their Contact Scientists through the ALMA Helpdesk (https://help.almascience.org/).