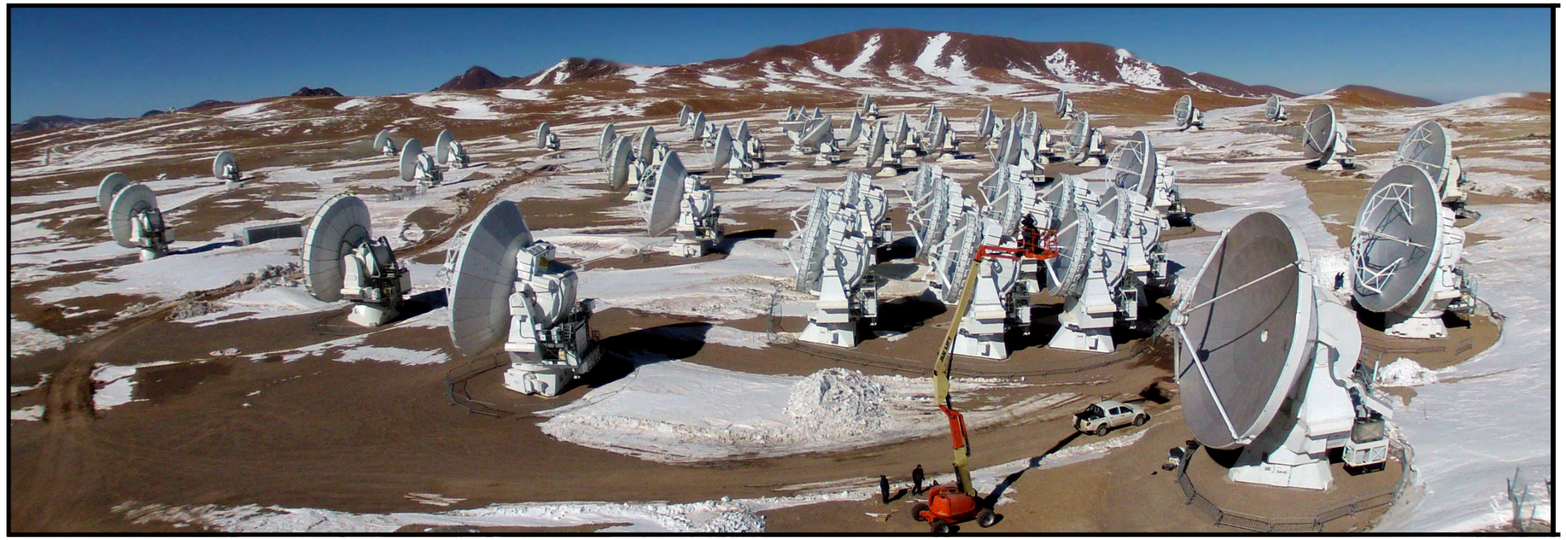
ALMA Telescope Status Report



Figure 1: *A panoramic view of the ALMA antennas under the Milky Way. (Credit: Y. Beletsky (LCO)/ESO)*

Jihyun Kang (KASI)

ALMA Telescope Specification

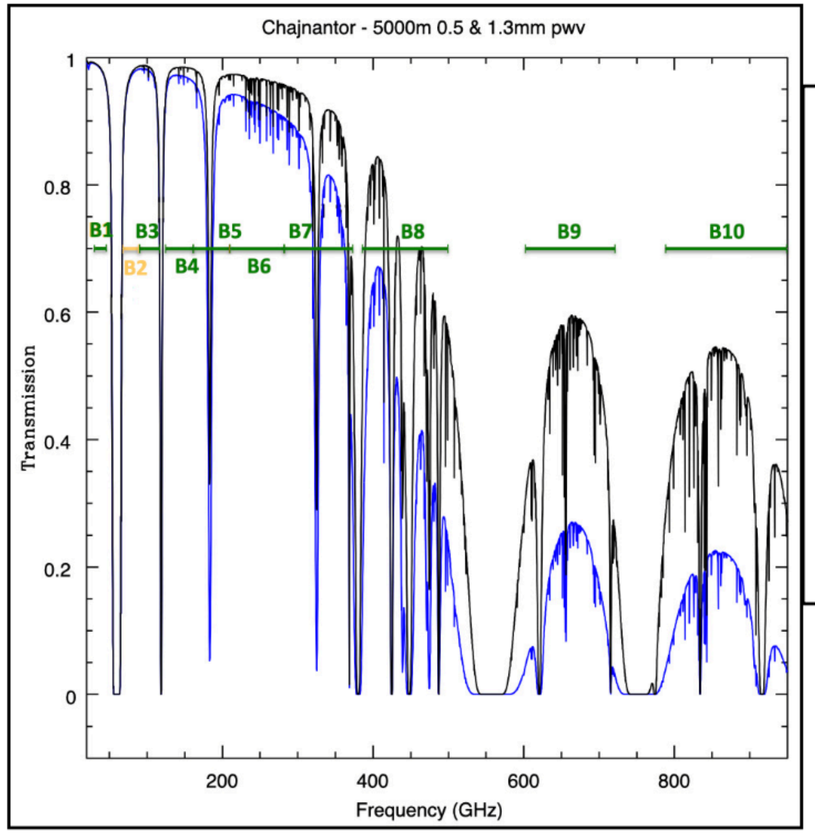


	Specification
Number of Antennas	*50×12 m (12-m Array), plus 12×7 m & 4×12 m (ACA)*
Maximum Baseline Lengths	*0.16 - 16.2 km*
Angular Resolution (")	*~0.2" × (300/ν GHz) × (1 km / maximum baseline)*
12 m Primary beam (")	*~19.4" × (300/ν GHz)*
7 m Primary beam (")	*~33.3" × (300/ν GHz)*
Number of Baselines	*Up to 1225 (ALMA correlators can handle up to 64 antennas)*
Frequency Coverage	*All atmospheric windows from 35 GHz - 950 GHz (excluding 67 GHz - 84 GHz until Band 2 is deployed)*
Correlator: Total Bandwidth	*16 GHz (2 polarizations × 4 basebands × 2 GHz/baseband)*
Correlator: Spectral Resolution	*As narrow as 0.008 × (300/ν GHz) km/s*
Polarimetry	*Full Stokes parameters*



Figure 3: *Map of Chile, showing the location of ALMA (red star).*

Frequency Coverage and Angular Resolution



Cycle 10 Receiver Bands					
Band	Frequency (GHz)	Wavelength (mm)	Primary Beam (FOV; ″)	Continuum Sensitivity (mJy/ beam)	Angular Resolution (mas)
1	35-50	8.5-6	166-117	0.058	271-190
3	84-116	3.6-2.6	69-50	0.082	113-81
4	125-163	2.4-1.8	46-36	0.089	76-58
5	158-211	1.9-1.4	37-28	0.12	60-45
6	211-275	1.4-1.1	28-21	0.12	45-34
7	275-373	1.1-0.8	21-16	0.22	34-25
8	385-500	0.78-0.6	15-12	0.40	24-19
9	602-720	0.5-0.42	9.7-8.1	1.4	16-13
10	787-950	0.38-0.32	7.4-6.1	3.3	12-10

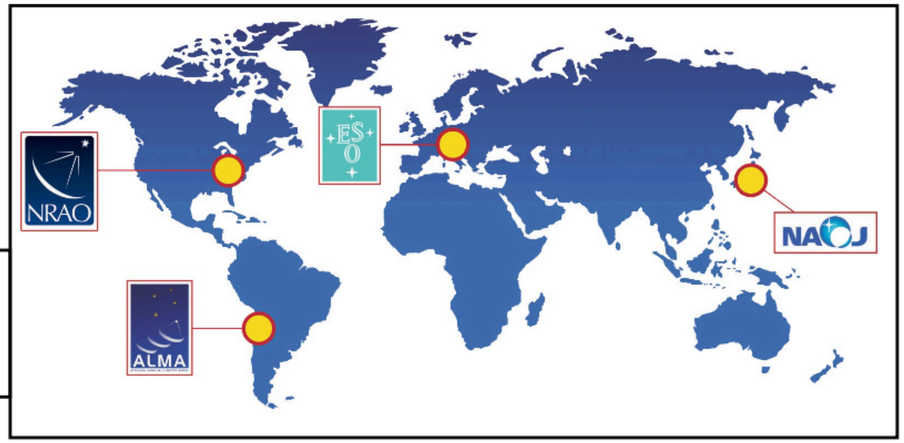
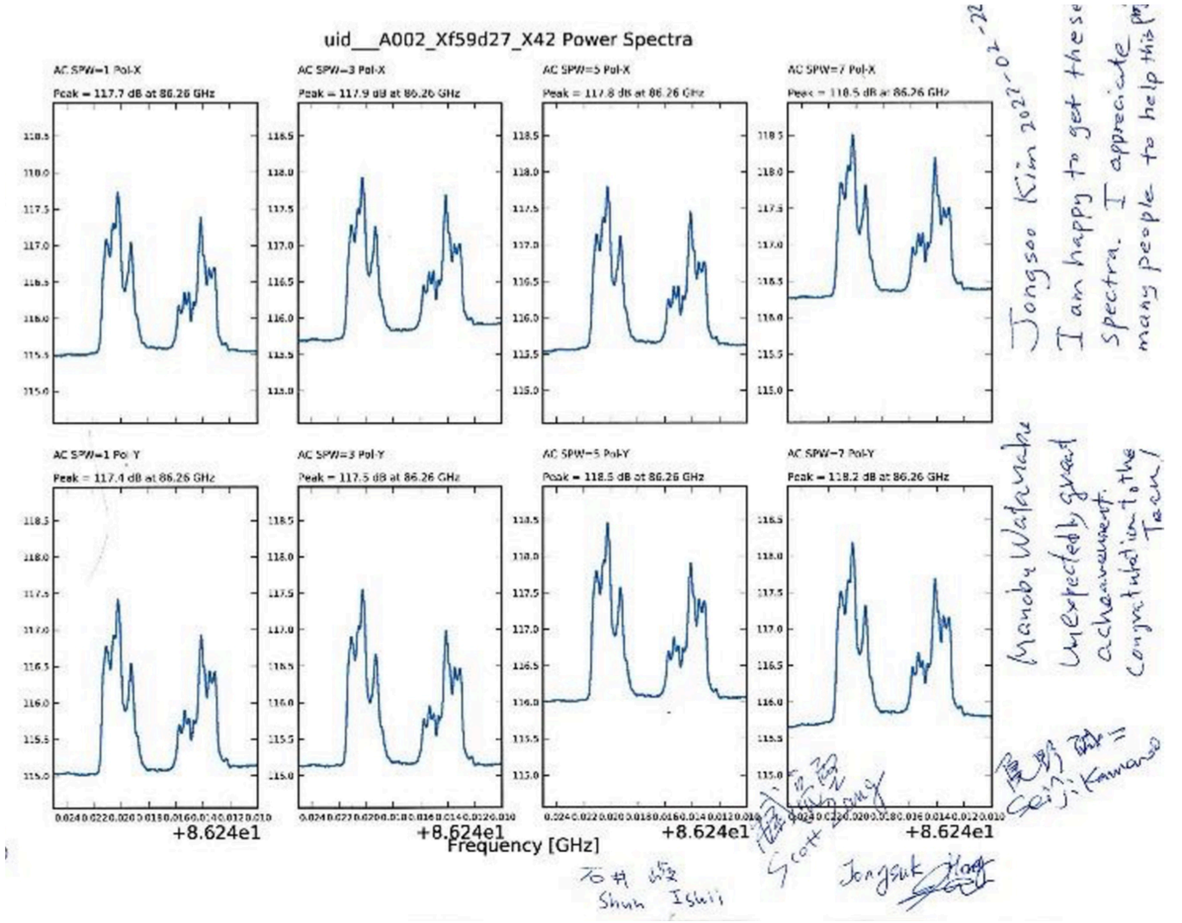


Figure 5: *ARCs are located in North America, Europe, and East Asia. The ALMA headquarters are located in Santiago, Chile. (Credit: ALMA (ESO/NAOJ/NRAO))*

Milestones ACA Spectrometer

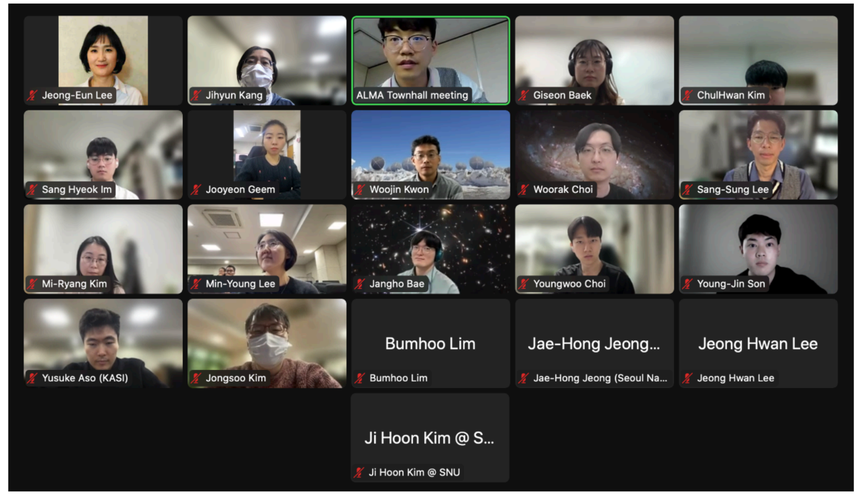
- Concept Design Review at Indian Wells,
  - September 24, 2016
- Preliminary Design Review at KASI
  - February 20~21, 2017
- Critical Design and Manufacturing Review at KASI
  - December 4~5, 2019
- Preliminary Acceptance In-House Review
  - November 29~30, 2021
- Installation of ACA Spectrometer
  - First light: Febuary 22, 2022
- Acceptance on-Site Review
  - July, 2022
- Commission and Science Verification
  - April and May 2022
- On-site Training Session
  - April 2023
- ACA Spectrometer has just been used from Cycle 10 (October 1, 2023)



Korean ARC Activities

- Regular QA2/P2G/CS activities.
- AoD in May, 3 shifts.
- User support activities :
  - Cycle 10 proposal preparation meeting, 2023/4/18, in KASI + virtual
  - ALMA proposal lecture support in SNU : 2023/3/29, 4/19 - introduction to ALMA + proposal preparation processes and tips.
  - The 7th ALMA summer school, 2023/07/31 - 8/4 in the Sobaeksan observatory
  - Proposal planning mini-workshop for proposal preparation planned in Feb. 2024





Cycle 10 proposal preparation meeting
2023/4/18

Program

Place: KASI Jangyoungsil-hall room 331-2 & online (Zoom link at the end of this program)
9:30~10:00 AM: EA ALMA Joint Session for the proposal review process (Andrea Corvilon English)
10:20~10:50 AM: Cycle 10 capability (Jihyun Kang; English) (PDF)
10:50~11:30 AM: Joint proposal (ALMA + JWST/VLA/VLT) & Q&A for the proposal review process (Aran Lyo; Korean/English) (PDF)
2~3 PM: Observing Tool hands-on session (Seokho Lee; Korean) (PDF)
3~4 PM: ALMA archive & CARTA hands-on session (Hyeong-Sik Yun; Korean)



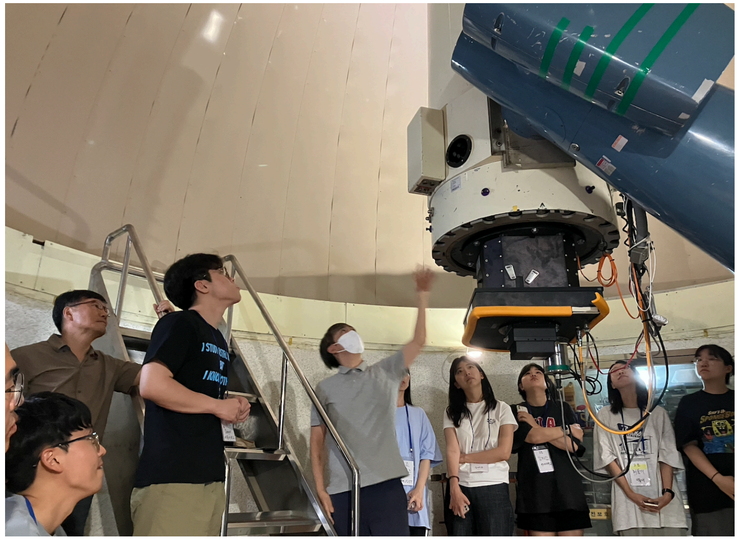
The 7th ALMA Summer School was held at Seobaeksan Observatory for July 31-August 04. The following program was conducted:

Program

July 31 (1:30-2:30 pm): Moving from the Jukryeong service area to the observatory
July 31 (3:30-5:00 pm): Introduction of radio astronomy and ALMA (Jongsoo Kim)
July 31 (5:00-6:00 pm): Computer setting
July 31 (6:00 pm): Welcome reception
August 01 (9:00 am-12:00 pm): ALMA imaging tutorial (Aran Lyo)
August 01 (1:00 pm): Start the group projects
August 02-03: Group projects, morning hiking, and stargazing
August 04 (10:00 am-12:00 pm): Group presentation
August 04 (12:00 pm): Lunch and going down the mountain

The 7th ALMA Summer School

- July 31-August 04
- Sobaeksan observatory
- 15 students from 9 institutions + 7 staffs.
  - SNU, UNIST, KPNU, Ewha Womans U, Sejong University, University of Seoul, UST, Yonsei University
- 5 groups: multi-configuration, self-calibration, polarization, line analysis.






Contents and Reference



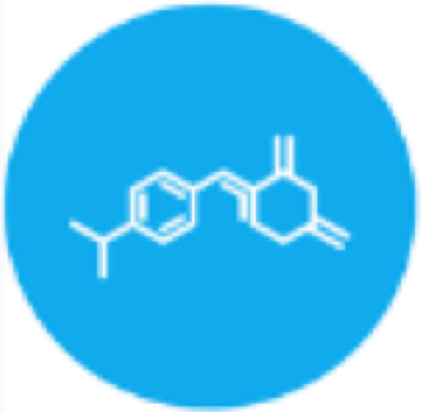



Result. 12m data imaging
Mom0 maps of interactive cleaning (robust =0.5) - Auto cleaning (robust = -2 & 2)
Beam size: 1.12"×0.84" - 1.19"×0.83" - 1.16"×0.86"
RMS: 2.15 - 2.22 - 2.19 mJy/beam (in the same central region at channel:s)


小白山
毘雲

ALMA Science

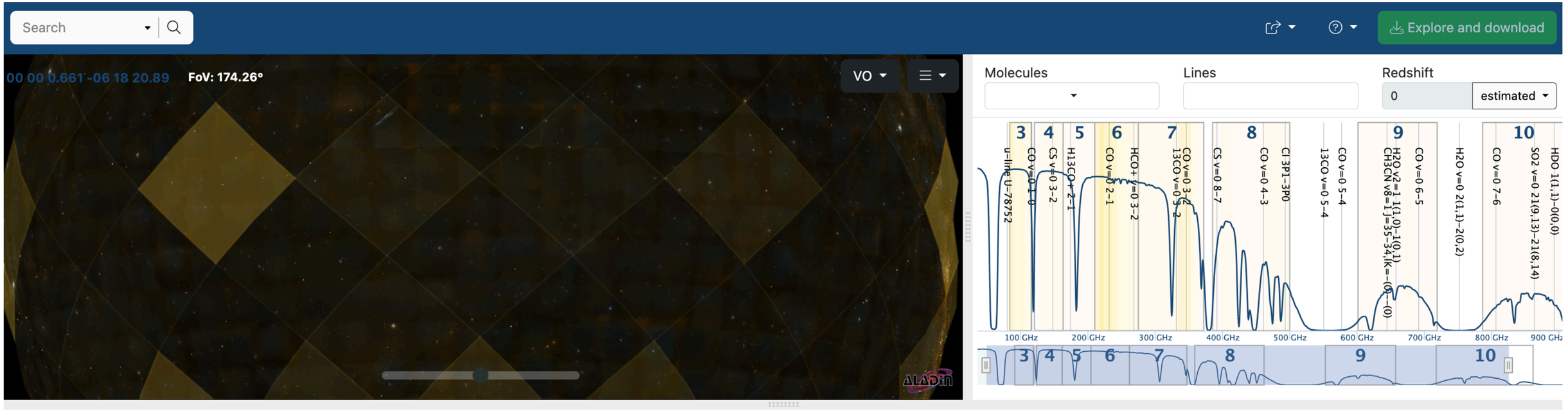
<차세대 과학연구 주제 3가지>

은하 기원	화학적 복합성의 기원	행성 기원
		
○ 최초은하 탄생 시기부터 별탄생 최고조 시기의 주요 원소의 진화를 밝혀 은하 기원 규명	○ 별과 행성의 형성과정에서 유기분자가 복잡한 분자로 진화하는 과정을 밝혀 화학적 복합성의 기원 규명	○ 행성이 형성되면서 나타나는 세부구조를 관측하여 행성의 기원 규명

Large Program

Nickname	PIDs	Cycle	Title (Abstracts)	Primary Investigator - Institution	Primary Article	Team's Site	Data Deliveries
Cosmology and High Redshift Universe							
ASPECS	2016.1.00324.L	4	ASPECS: The ALMA SPECtral line Survey in the UDF - An ALMA Large Program	Fabian Walter / MPIA Heidelberg	link	link	link
ALPINE	2017.1.00428.L	5	ALPINE: The ALMA Large Program to INvestigate CII at Early Times	Olivier Le Fèvre / Laboratoire D'Astrophysique de Marseille	link	link	link
ALCS	2018.1.00035.L	6	ALCS: ALMA Lensing Cluster Survey	Kotaro Kohno / University of Tokyo	link	link	
REBELS	2019.1.01634.L	7	REBELS: An ALMA Large Program to Discover the Most Luminous [CII]+[OIII] Galaxies in the Epoch of Reionization	Rychard Bouwens / University of Leiden			
CRISTAL	2021.1.00280.L	8	CRISTAL: a survey of gas, dust and stars on kiloparsec scales in star-forming galaxies at z~4-5	Rodrigo I Herrera-Camus / Universidad de Concepción		link	
ASPIRE	2022.1.01077.L	9	A SPectroscopic survey of biased halos In the Reionization Era (ASPIRE): A Quasar Legacy Redshift Survey	Feige Wang / University of Arizona			
MUSE-ALMA	2023.1.00127.L	10	MUSE-ALMA Haloes: Probing the molecular gas -- the missing puzzle piece to the baryon cycle	Celine Peroux / ESO		link	
CHAMPS	2023.1.00180.L	10	The COSMOS High-z ALMA-MIRI Population Survey (CHAMPS): A Wide-Area Comprehensive Survey of the Dusty Universe	Andreas Faisst / Caltech			

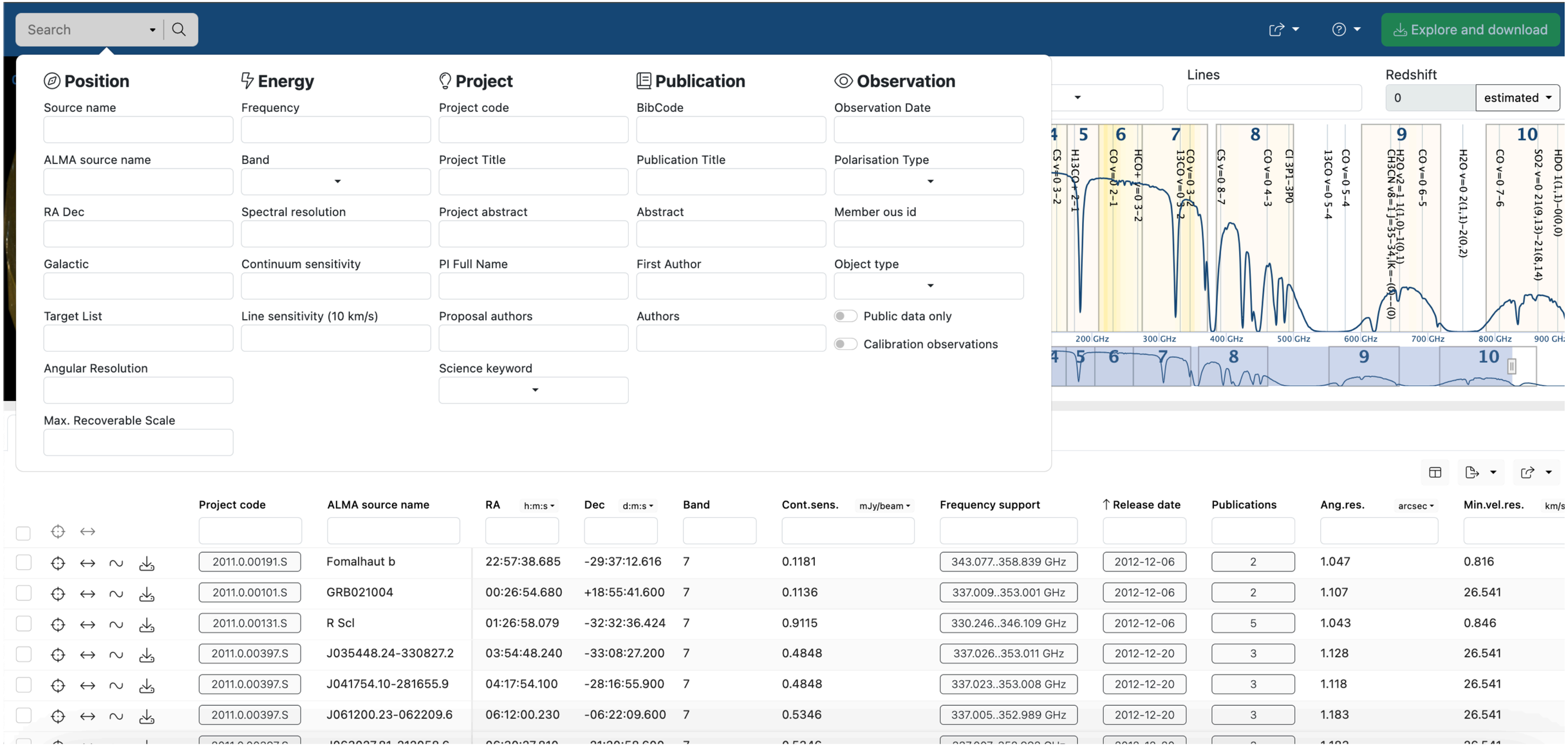
ALMA Archive



Observations (69434) | **Projects** (4559) | **Publications** (3595)

Project code	ALMA source name	RA h:m:s	Dec d:m:s	Band	Cont.sens. mJy/beam	Frequency support	↑ Release date	Publications	Ang.res. arcsec	Min.vel.res. km/s
2011.0.00191.S	Fomalhaut b	22:57:38.685	-29:37:12.616	7	0.1181	343.077..358.839 GHz	2012-12-06	2	1.047	0.816
2011.0.00101.S	GRB021004	00:26:54.680	+18:55:41.600	7	0.1136	337.009..353.001 GHz	2012-12-06	2	1.107	26.541
2011.0.00131.S	R Scl	01:26:58.079	-32:32:36.424	7	0.9115	330.246..346.109 GHz	2012-12-06	5	1.043	0.846
2011.0.00397.S	J035448.24-330827.2	03:54:48.240	-33:08:27.200	7	0.4848	337.026..353.011 GHz	2012-12-20	3	1.128	26.541
2011.0.00397.S	J041754.10-281655.9	04:17:54.100	-28:16:55.900	7	0.4848	337.023..353.008 GHz	2012-12-20	3	1.118	26.541
2011.0.00397.S	J061200.23-062209.6	06:12:00.230	-06:22:09.600	7	0.5346	337.005..352.989 GHz	2012-12-20	3	1.183	26.541
2011.0.00397.S	J063027.81-212058.6	06:30:27.810	-21:20:58.600	7	0.5346	337.007..352.992 GHz	2012-12-20	3	1.183	26.541

ALMA Archive



Announcement for early proposal planning for Cycle 11

ALMA is making the following information available to assist with early proposal planning for Cycle 11.

- **Key dates (anticipated) for Cycle 11**

  21 March 2024: Release of the ALMA Cycle 11 Call for Proposals and Observing Tool, and opening of the archive for proposal submission

  25 April 2024: Proposal submission deadline

  October 2024: Start of Cycle 11 observations, spanning 12 months

- **New observing capabilities**

  The following technical capabilities are anticipated to be available for the first time in Cycle 11:

  - Full polarization in Band 1 on the 12-m Array with the same polarization capability and accuracy as in Band 3 – 7
  - Band 1 on the 7-m Array for Stokes I only (no Stokes Q/U/V)
  - High-frequency and long-baseline observations with Band 9 in C-10 configuration, and Band 10 in configurations of C-9 and C-10

- **Observing modes for Large Programs**

  Large Programs are proposals with an estimated execution time of greater than 50 hours on the 12-m Array (with or without accompanying ACA time) or 150 hours on the 7-m Array in stand-alone mode. Large Programs should not involve time-critical or ToO observations, and may not include observations in full polarization measurements, solar observations, VLBI, Phased Array mode, Astrometric observations or observations requiring band-to-band calibration or bandwidth switching calibration.

Start date	Configuration	Longest baseline	LST: Best conditions
1-Oct-2024	C-3	0.50 km	22-10
20-Oct-2024	C-2	0.31 km	23-11
10-Nov-2024	C-1	0.16 km	1-13
30-Nov-2024	C-2	0.31 km	2-14
20-Dec-2024	C-3	0.50 km	4-15
10-Jan-2025	C-4	0.78 km	5-17
1-Feb-2025	No observations due to maintenance		
1-Mar-2025	C-4	0.78 km	8-21
20-Mar-2025	C-5	1.4 km	9-23
20-Apr-2025	C-6	2.5 km	11-1
20-May-2025	C-7	3.6 km	13-3
20-Jun-2025	C-8	8.5 km	14-5
11-Jul-2025	C-9	13.9 km	16-6
30-Jul-2025	C-10	16.2 km	17-7
20-Aug-2025	C-9	13.9 km	19-8
10-Sep-2025	C-8	8.5 km	20-9