ASTE TELESCOPE
: Recent Status and Future Plans

Atacama Submillimeter Telescope Experiment, ASTE, is a 10m, single-dish radio telescope located at Atacama desert in Chile. The prime objectives of the project is to promote submm science as well as development of new instruments and techniques as a precursor to next generation telescopes including LST/AtLAST. The current heterodyne system allows us to observe the [CI] $^3P_1$–$^3P_0$ and ^{12}CO (J = 4–3) lines simultaneously, and to switch quickly between the Band 7 and Band 8 receivers according to the weather conditions.

Telescope Site & Base Facility





Hotel Takha Takha (2023-)
in San pedro de Atacama



10-m telescope since 2002 at Pampa la Bola 4800m alt. (inside the ALMA Concession)

- Diesel generator (150kW-220V ×2)
- Fuel tank (15kL ×2, consumption 300L/d)
- Satellite network (1Mbps)
- Monitor (weather station, web cameras, etc.)



- Surface accuracy: 19μm (➡ ~50μm)
- Aperture efficiency ~55% @345GHz† ~45% @460 GHz†
- Phase-correction plate for compensating thermal deformation of the main antenna is now under construction (P.I. Sugimoto: NAOJ)

†Ito et al. (2018)

- Pointing accuracy: ~2" (rms)
- Scan speed: 1.5 arcsec/sec to 3.0 deg/sec
- Scan acceleration: < 4.0 deg/sec^2 (Az), < 6.0 deg/sec^2 (El)

Google map ASTE 3D Paper craft

Heterodyne System

	Freq. (GHz)	HPBW (arcsec.)	Npix	Npol.		Tsys (K) in SSB	Status
DASH345	321 - 376	22	1	2	2SB	~250	Available 2015-
CAT8W	387 - 498	17	1	2	2SB	600 - 1000	Available 2021-
CAT10	787 - 950	8	1	2	DSB	1500 – 4000	Available 2019-

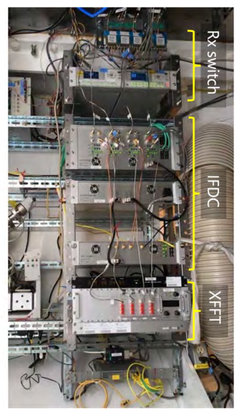
DASH345 ➡ CO J=3-2/HCO+ J=4-3 simultaneously
CO J=3-2/13CO J=3-2 simultaneously

CAT8W ➡ CO J=4-3/[CI] 3P1-3P0 simultaneously

Digital Spectrometer

XFFTS (P.I. Tosaki; JUEN)

- 2.5 GHz BW / 32K channels [/Spw]
- Δv=0.047 km/s, V width ~1500 km/s @492 GHz
- 10-bit ADC, 5Gsps

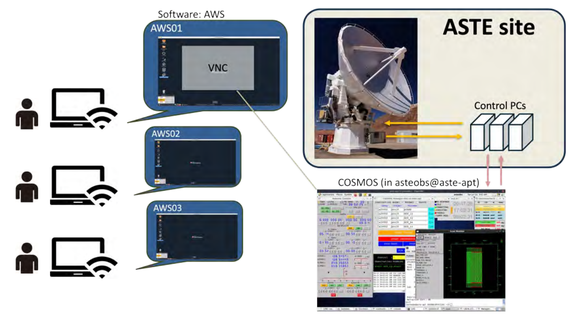


IF Down Converter

- 4 spectral windows (2.5 GHz BW) from 4 IF signals of a receiver
- Support of
  IF BW = 4-8GHz (DASH345, CAT10)
  4-18 GHz (CAT8W)

Remote Observations

Using Amazon WorkSpaces, you can now carry out observations from anywhere in the world with an internet connection.



Data Delivery & Reduction

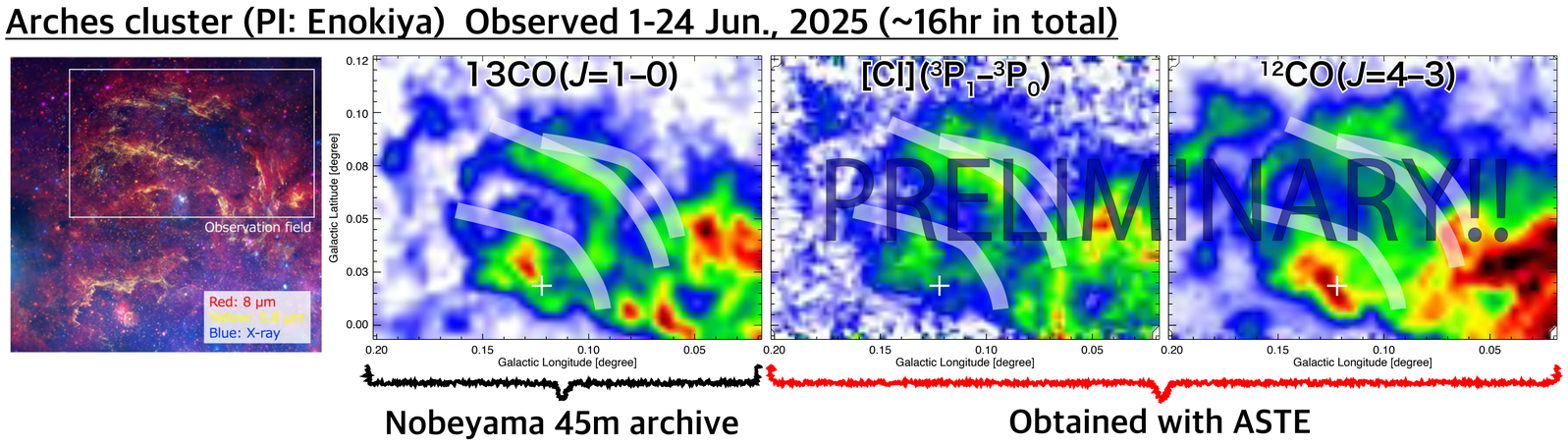
- Observed datasets are delivered through Nobeyama-45m / ASTE Science Data Archive
- XFFTS data are reduced with CASA through Python software (Fujita & Kamazaki)

Highlights of FY2025

Progress for FY2025

- **Scientific observations (6th Jun-Oct)**
  - Carry-over from 2020
  - Externally funded project (Oka, Tosaki, Sano; Sugimoto)
- Site blackout due to snow on 31st Jul.
- End on 1st Oct

Arches cluster (PI: Enokiya) Observed 1-24 Jun., 2025 (~16hr in total)



Combining datasets from these two observatories is a really powerful way to study the ISM!

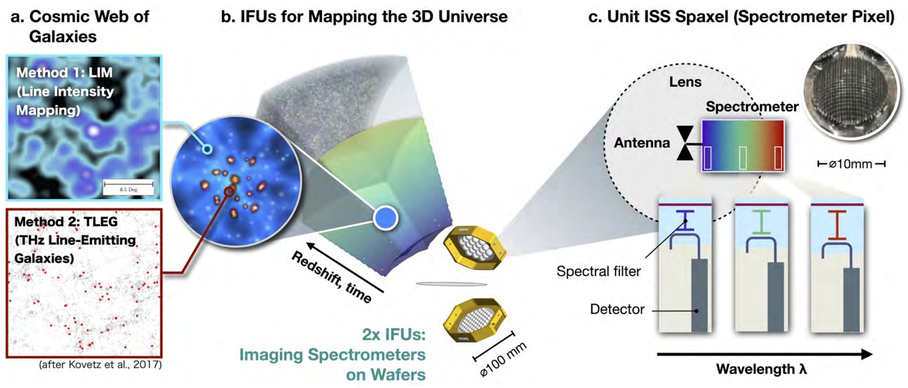
Current Status

We experienced two theft incidents in FY2025, during which many tools, a few cameras, cables, etc. were stolen. Nevertheless, the staff, the telescope, and all instruments remained safe, and telescope operations were not affected. In addition, we experienced numerous instrumental failures—possibly caused by a lightning strike—following the blackout at the end of July. The affected devices included servo amplifiers, an angle detector, control computers, the cryocooler compressor, and a generator. **To realize the start of open-use observations in FY2026, we are now concentrating on recovery efforts!**

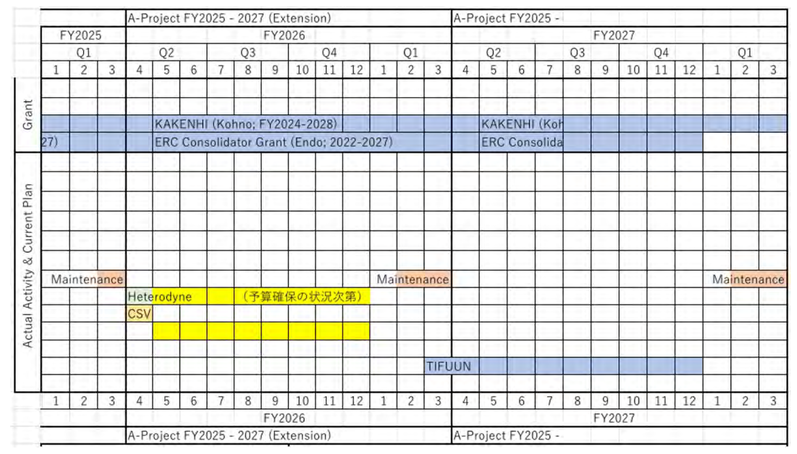
FUTURE PLANS

Upcoming Projects: SUBLIME-TIFUUN

Study of the Universe By Line Intensity Mapping using Terahertz Integral Field Unit with Universal Nanotechnology



Using a new technology based on the Integrated Superconducting Spectrograph (ISS), this project aims to perform sub/mm-wave dual-band line-intensity mapping to trace the cosmic large-scale structure and the buildup of galaxies during cosmic reionization. The two IFUs simultaneously cover 130-178 GHz with 19 spaxels and 195-319 GHz with 61 spaxels, with spectral resolution R~100-500.



Multi-beam Heterodyne RX?

JSPS grants (International Leading Research 国際先導研究 FY2023-2029 + Specially Promoted Research 特別推進研究 FY2024-2028, PI: K. Kohno)
ERC Consolidate grant (2022-2027, PI: A. Endo) are awarded to TIFUUN/ASTE