



From AtLAST to AtLAST2 (2025-2028)



Francisco M. Montenegro-Montes



MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES



Cofinanciado por
la Unión Europea



AGENCIA
ESTATAL DE
INVESTIGACIÓN

This work is supported by project
I+D+i PID2022-138621NB-I00
funded by MCIN/AEI/10.13039/
5011000110033



This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No 951815

Previously... in chapter 1



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951815



UNIVERSITY
OF OSLO



UK Research
and Innovation

University of
Hertfordshire **UH**

- Horizon 2020 project “Towards an Atacama Large Aperture Sumillimeter Telescope” successfully completed (March 2021 – August 2024)
- Developing a mature concept for a next-generation 50-m class single-dish sub-mm astronomical observatory, run as a facility telescope by an international partnership and powered by renewable energy.

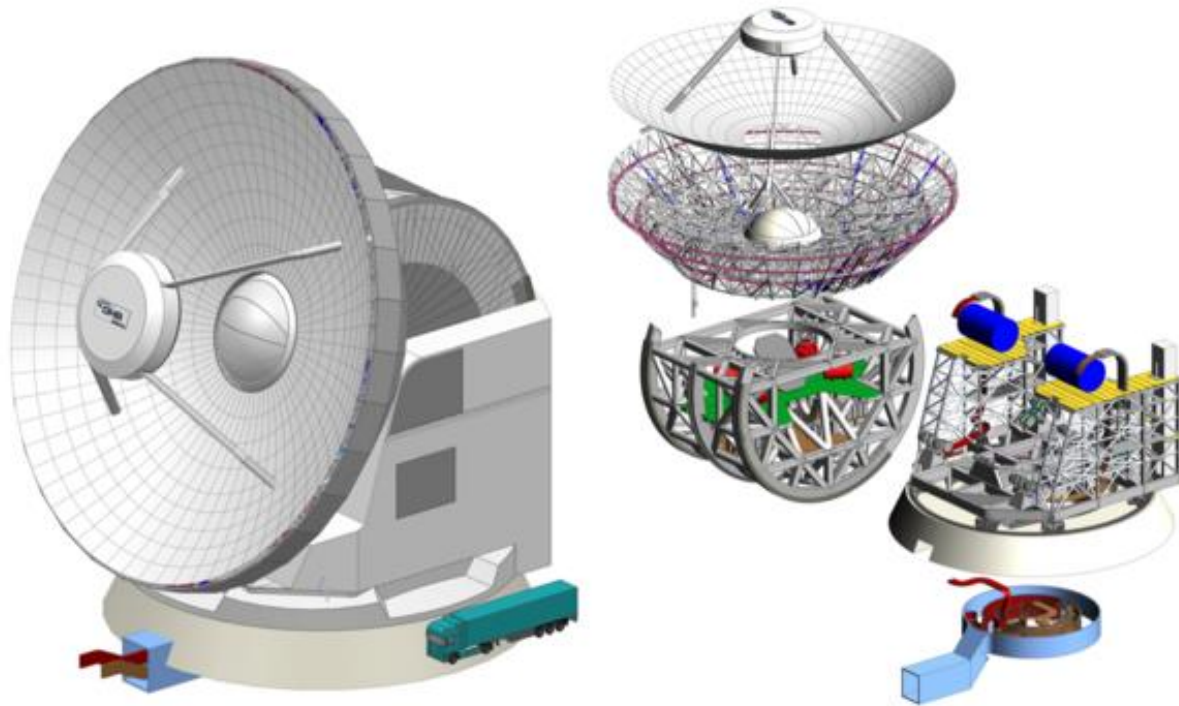


Deliverables (highlights)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951815

WP2: Telescope design



- Preliminary design concept:
 - Optics. Maximize FoV, minimize mass.
 - Beam shape and sidelobe levels
 - Mechanical structure (rocking chair) with FEA
 - 6 instrument bays (2 Nasmyth cabins, 1 Cassegrain platform)
- Energy recovery system for large telescopes
 - DC supercapacitors to store kinetic energy
- Active optics
 - Active surface with metrology

- Tony Mroczkowski+, A&A, in review, 2024. On [arXiv:2402.18645](https://arxiv.org/abs/2402.18645)
- A. Kiselev+ 2024, Proc of SPIE, Vol 13094, id. 130940E 9 pp. On [arXiv:2404.17311](https://arxiv.org/abs/2404.17311)
- P. A. Gallardo+, 2024, Proc of SPIE, Vol 13094, id. 1309428 11 pp. On [arXiv:2406.11502](https://arxiv.org/abs/2406.11502)
- R. Puddu+, 2024, Proc. of SPIE, id 13094, id. 130944S 22 pp. On [arXiv:2406.16602](https://arxiv.org/abs/2406.16602)

Deliverables (highlights)

WP3 & 5: Energy study, site

- Preferred sites (I and II) on Chajnantor plateau
- Renewable energy and sustainability
 - Off-grid system
 - Trade-offs mixing energy systems (photovoltaics, batteries, hydrogen storage, diesel). Reduces 95% CO₂ emissions.
 - Synergies with the local communities
- Talk to the communities looking for their needs looking for synergies.

- C. De Breuck, A. Otárola, et al. (2024) [Deliverable 3.2. “Site selection report”](#)
- I. Viole+ 2024a, “Sustainable astronomy: A comparative life cycle assessment of off-grid hybrid energy systems to supply large telescopes.” [Int. J. Life Cycle Assess. 29, 1706-1726](#)
- I. Viole+ 2024b, “Integrated life cycle in off-grid energy system design – uncovering low hanging fruit for climate mitigation” [Applied Energy Vol. 367, 123334](#)
- I. Viole+ 2023 “A renewable power system for an off-grid sustainable telescope fuelled by solar power, batteries and green hydrogen. [Elsevier Energy, 2023, 128570.](#)
- G. Valenzuela-Venegas+, 2024, “A renewable and socially accepted energy system for astronomical telescopes”. Nature Sustainability (2024), [doi:10.1038/s41893-024-01442-3](#)

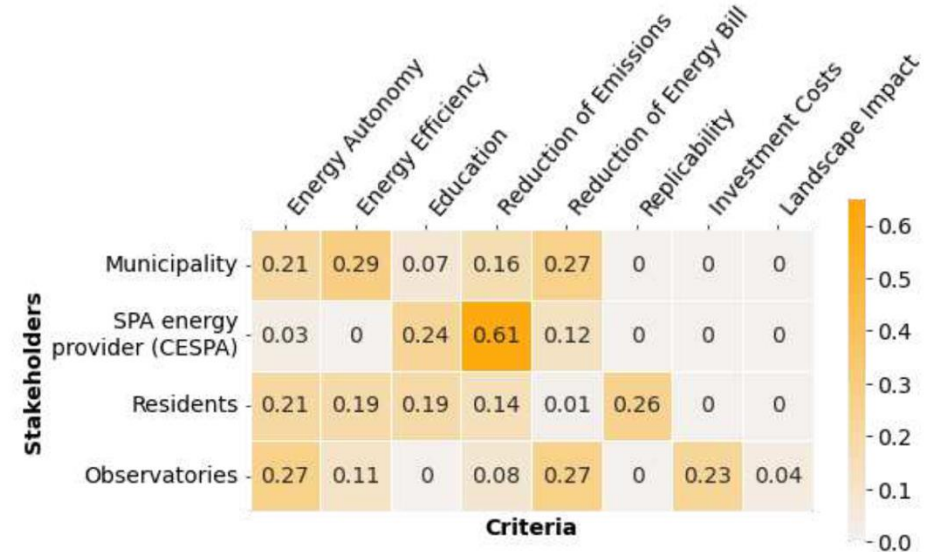
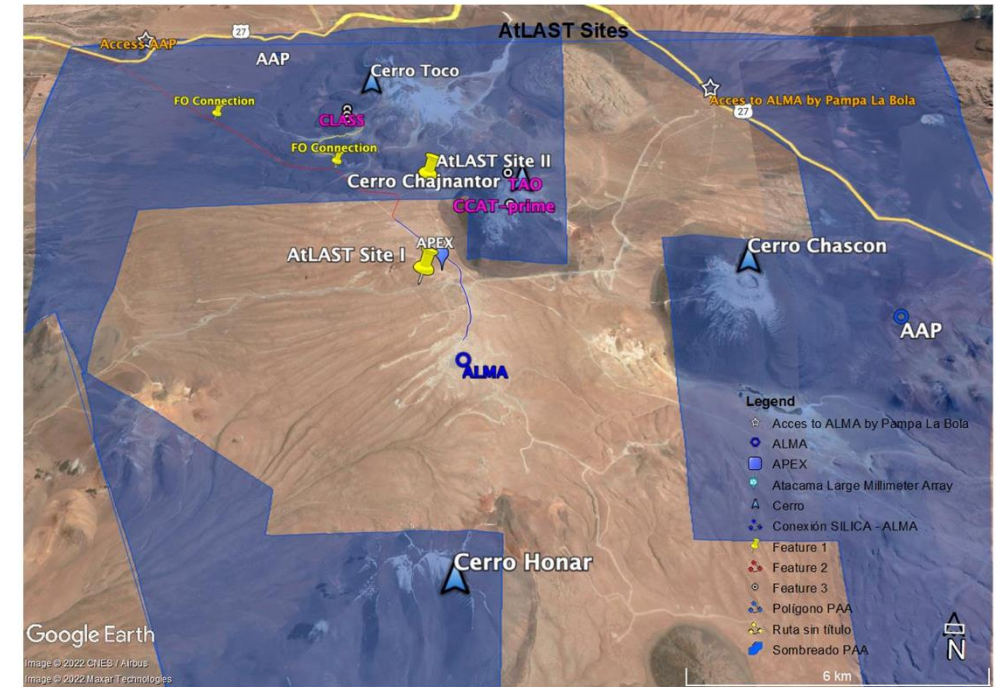


Figure 2: Stakeholders' weighted criteria according to the survey.

Deliverables (highlights)

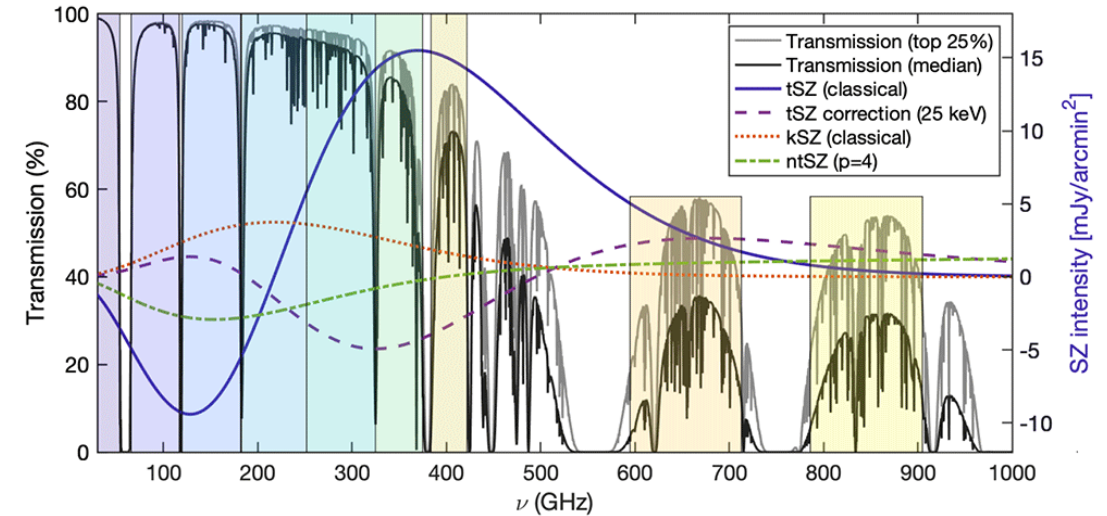
WP6: Science cases

- Large community involved
- Covering many areas of astrophysics: Sun, solar system, our Galaxy, nearby and high- z galaxies.

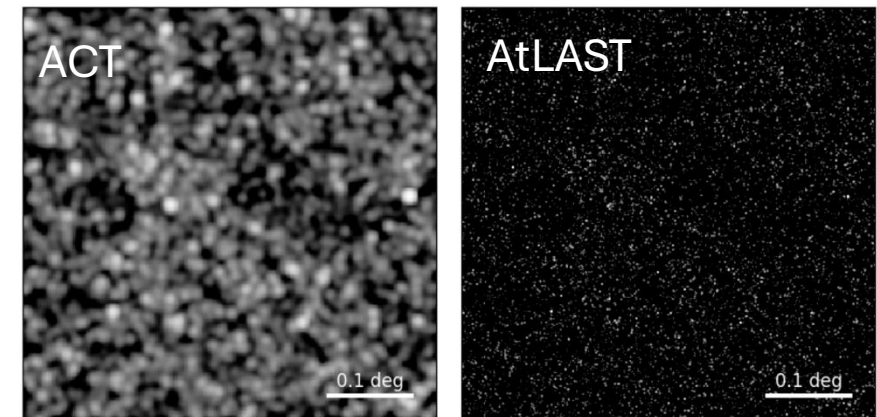
Examples (extragalactic science)

- Resolve out the CIB
- Access the bulk of the population of sub-mm galaxies
- Study of ICM through thermal and kinetic SZ (kSZ) effect

- M. Booth, P. Klaasen, C. Cicone, et al. (2024) *AtLAST Science Overview Report* Deliverable 6.7 and on [arXiv:2407.01413](https://arxiv.org/abs/2407.01413)
- A. Schimek et al. (2024a). *High resolution modelling of [CII], [CI], [OIII] and CO line emission from the ISM and CGM of a star forming galaxy at $z \sim 6.5$* . [A&A, 682, A98](#)
- A. Schimek et al. (2024b). *Constraining the physical properties of gas in high- z galaxies with far-infrared and submillimetre line ratios*. [A&A, 687, L10](#)
- [AtLAST Science cases](#) collection (8 papers). *Open Research Europe*.



L. Di Mascolo+ “AtLAST Science: Resolving the hot and ionized Universe through the SZ effect” (in review) [Open Research Europe 2024, 4:113](#).



E. Van Kampen+ “AtLAST Science: Surveying the distant Universe” [Open Research Europe 2024, 4:122](#).

Deliverables (highlights)



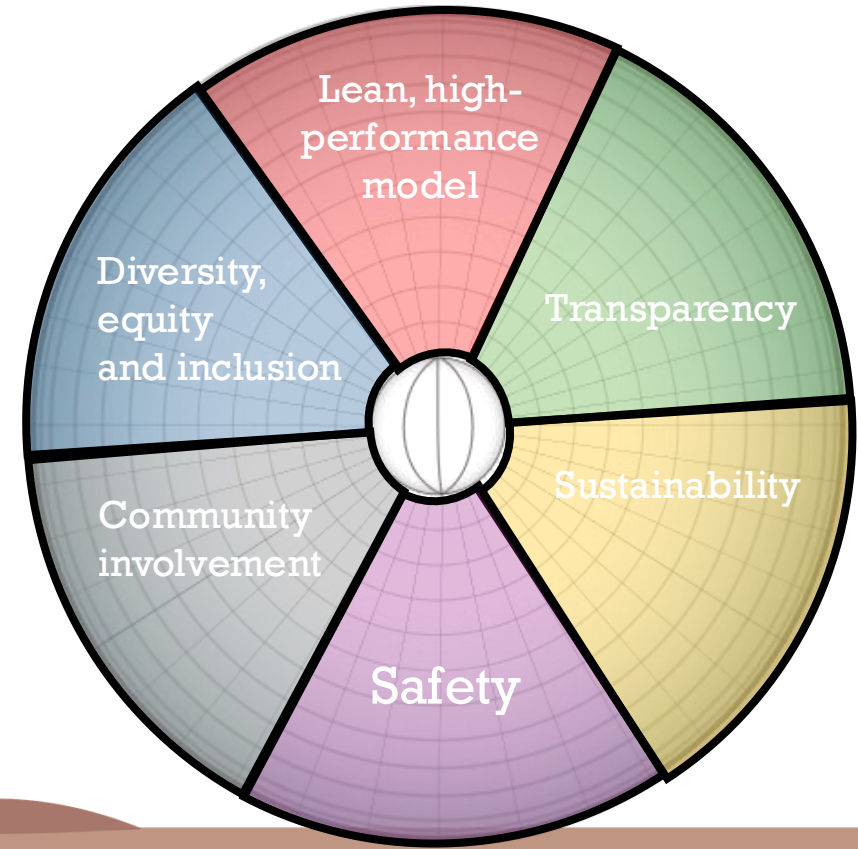
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 951815

WP4: Operations plan

- Remote distributed operations
- Proposal lifecycle
- AtLAST archive
- AtLAST data management plan
- User support interface
- Maintenance
- Addressing crises
- Communications

- E. Hatziminaoglou, F.M. Montenegro-Montes (2024)
[Deliverable 4.1. "AtLAST Operations plan"](#)
- F. M. Montenegro-Montes, E. Hatziminaoglou, C. De Breuck (2024)
[Deliverable 4.2 "On the Use of existing infrastructures"](#)

Operations Principles



AtLAST2

Consolidating plans for the Atacama Large Aperture Submillimeter Telescope

- Consolidate the AtLAST concept
- Prototype and test technology solutions
- Perform a full lifecycle assessment of the facility
- Expand our user community
- Increase TRL of crucial components
- Be ready for the implementation phase



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101188037



UNIVERSITY
OF OSLO



UK Research
and Innovation

University of
Hertfordshire **UH**



MAX-PLANCK-GESELLSCHAFT



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

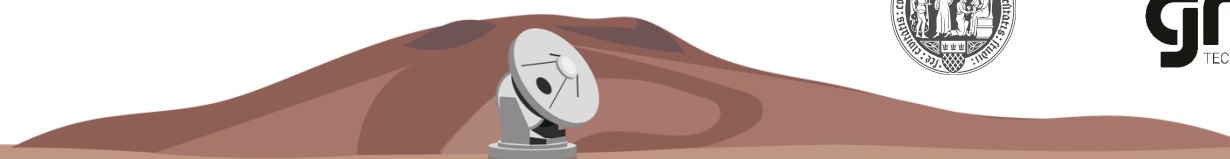


Delft University of Technology

Institute of
Space Sciences



CHALMERS
UNIVERSITY OF TECHNOLOGY



AtLAST2 (UCM node)



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101188037

WP4.1. Remote and distributed operations

- Definition of a remote operations distributed system for AtLAST, producing a **prototype simulated node at UCM** as a proof of concept.

WP4.2. Data infrastructure, data archiving and user access

- Development of concept for the **AtLAST Interface for Remote Exploration** (AIRE) platform introduced at the phase of the AtLAST Design Study.

WP4.3. Investigation of possible user model supports

- Develop the AtLAST user support model that will **aspire** to maximize the scientific output of the facility, by:

