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The **Atacama Large Aperture Submillimeter Telescope (AtLAST)** is a proposed single-dish full-steerable 50 m telescope that would be located at 5100m altitude in the Chilean Andes near ALMA [1].

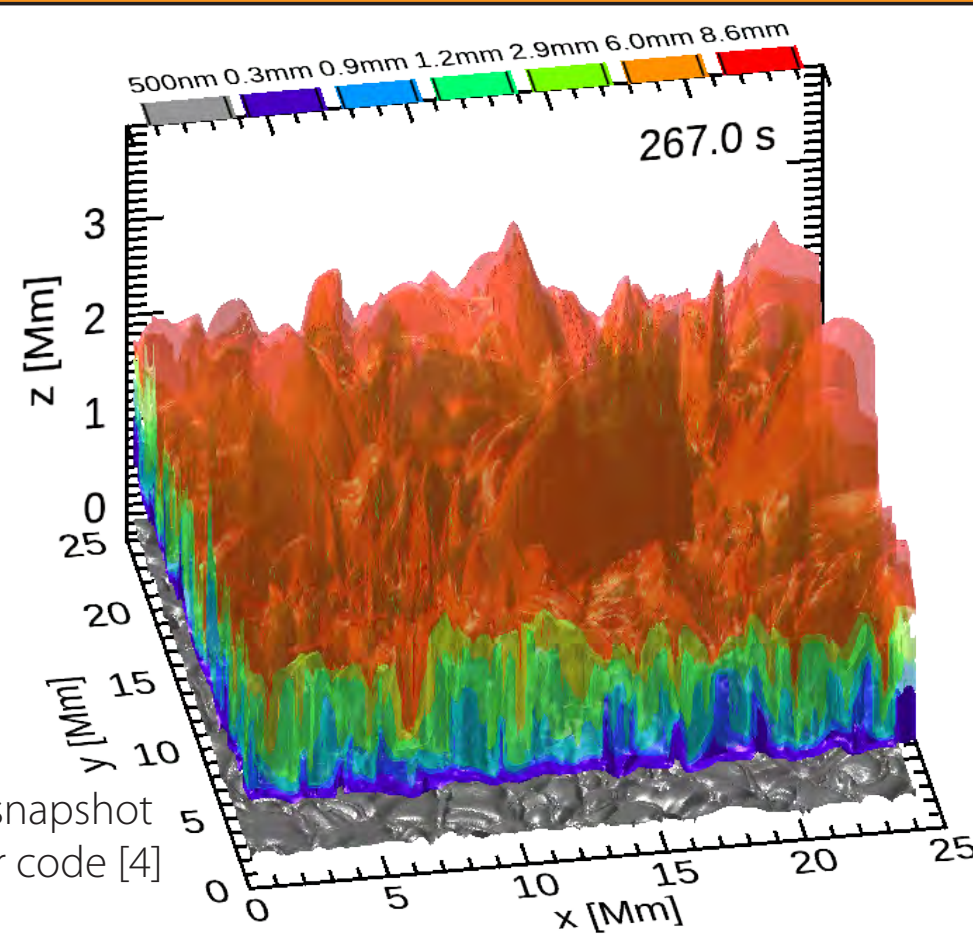
Among a large range of scientific topics, AtLAST would be able to observe the Sun, probing the thermal and magnetic structure of the solar chromosphere, chromospheric heating, flares, prominences, the solar activity cycle, and much more. See the White Paper by the AtLAST solar/stellar science working group for more details [2].

► **Interested in joining the AtLAST solar working group?**  
Send an e-mail to [sven.wedemeyer@astro.uio.no](mailto:sven.wedemeyer@astro.uio.no).

A truly novel observational aspect would be a **fast-scanning mode** to construct **full-disk maps at multiple frequencies**, resulting in **high-cadence sequences and daily maps**, thus covering the large range of relevant timescales with the same instrument, which would provide data complementary to observations at shorter wavelengths with, e.g., the European Solar Telescope (EST).

► **How to scan the solar disk?** See poster #100 by Mats Kirkaune for a first impression of solar observing with AtLAST.

AtLAST would observe at wavelengths from **~0.3mm to ~1cm**, thus probing the chromosphere from bottom to top, like ALMA but the whole range at the same time! This may facilitate reconstructing the **3D thermal structure** of the chromosphere at high cadence!



Continuum formation heights for a Bifrost [3] model snapshot calculated with the Advanced Radiative Transfer code [4]

## Meanwhile at ALMA ...

Atacama Large Millimeter/  
submillimeter Array

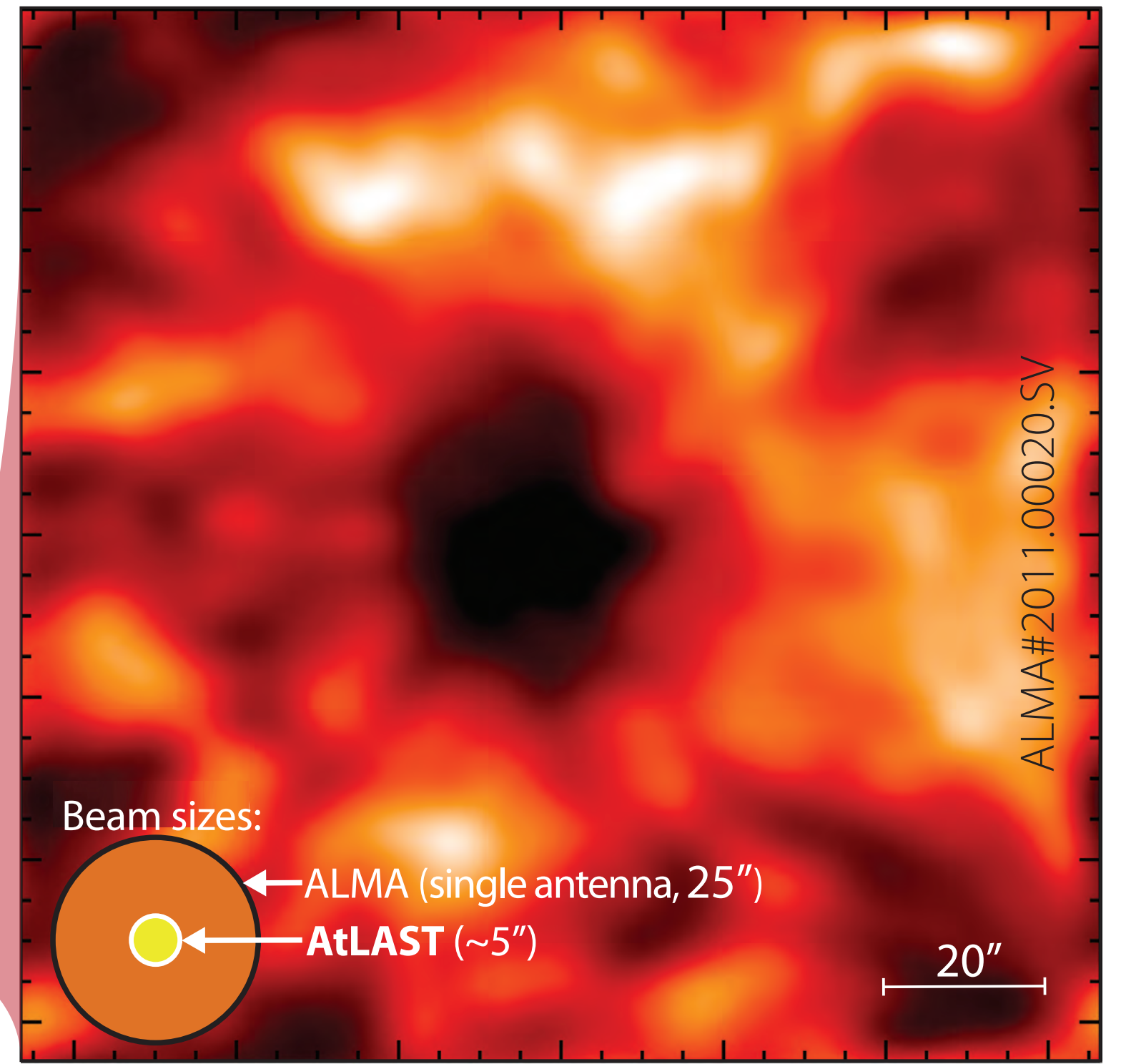
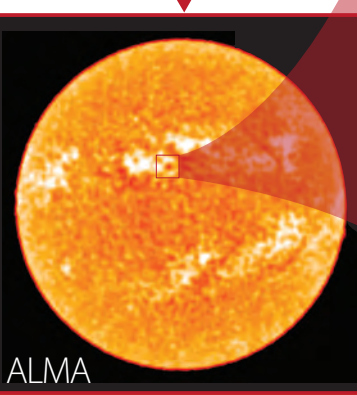
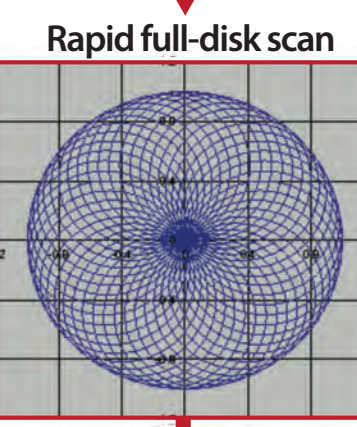
### • ALMA Wideband Sensitivity Upgrade

- Part of the ALMA 2030 Development Roadmap
- Major parts of the upgrade are foreseen to be finished by 2030
- Of particular interest for solar observing: Increase of the frequency bandwidth by a factor of 2-4, thus larger sampled height range in the chromosphere

### • First ALMA observations with full polarisation successfully carried out in spring 2024, processing and analysis currently in progress

Date	Project ID	Band	Obs. Time (UTC)	RA (J2000)	Dec (J2000)	Beam Size (arcsec)	Time Resolution (sec)	Detector	Cir. Obs.	Thumbnail	SD Thumbnail
2024-03-20	2024-03-20-01	3.1	14:00:00	14:00:00	00:00:00	1.0	1.0	ALMA	✓		
2024-03-21	2024-03-21-01	3.1	14:00:00	14:00:00	00:00:00	1.0	1.0	ALMA	✓		

- Interested in ALMA data? Have a look at the **Solar ALMA Archive (SALSA)**
  - <http://sdc.uio.no/salsa/>
  - More info: [5]
  - 26 data sets
    - science ready
    - open access



**Simulated AtLAST image of a sunspot** at  $\sim 1.3\text{mm}$  ( $\sim 230\text{GHz}$ , Band 6) based on an interferometric ALMA mosaic convolved with the AtLAST beam.

### Too blurry? Consider this:

- Amazing resolution for a single-dish telescope at mm wavelengths!
- This is only a close-up. You would get maps of the **whole disk** at high cadence for multiple wavelengths (alike SDO).
- These full-disk maps are great for context and provide complementary diagnostic information (temperature across the chromosphere).

### The first AtLAST design study just concluded in 8/2024, delivering:

- First full telescope design
- Science cases summarised in several White Papers
- Concepts for sustainable telescope operations

### AtLAST2 (the next phase, approved) will deliver in 2025-2028:

- Prototyping + testing of new technologies
- Independent review of the telescope design
- New services offered to a wider user community: software tools, operation models, instrumentation development work, ...

### More information: <https://www.atlast.uio.no/>

[1] Mroczkowski, T. et al. 2024, arXiv:2402.18645

[2] Wedemeyer et al. 2024, arXiv:2403.00920

[3] Gudiksen, B. et al. 2011, A&A, 531, A154

[4] Henriques, V. et al. 2022, A&A, 659, A31

[5] de la Cruz Rodríguez et al 2021, [10.5281/zenodo.4604825](https://doi.org/10.5281/zenodo.4604825)

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EST + AtLAST = ❤️

## Did you know ...

... that the **Square Kilometer Array (SKA)** will observe the Sun at lower frequencies, thus probing the corona and beyond?!

Interested? Contact the **Solar, Heliospheric & Ionospheric science working group:**

<https://www.skao.int/en/science-users/science-working-groups/115/solar-heliospheric-ionospheric-physics>

