The North American ALMA Science Center

ALMA

The Atacama Large Millimeter Array (ALMA) is now under construction on the Chajnantor plain of the Chilean Andes. ALMA will be a complete astronomical imaging and spectroscopic instrument operating at millimeter and submillimeter wavelengths (0.3 – 3.6 mm). Upon completion, ALMA will consist of at least 66 high-precision antennas and meet the following specifications:

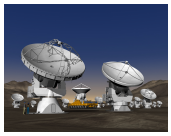
Hardware	*Specification*
Antennas	
…Number of Antennas	*At least 50 (12-m) [ALMA] + 12 (7-m) & 4 (12-m) [ACA]*
…Maximum Baseline Lengths	*0.15 – 16 km*
…Angular Resolution [arcseconds]	*0.2 arcseconds × (300 GHz / ν) × (1 km / max. baseline)*
…12-m Primary Beam [arcseconds]	*20.3 arcseconds × (300 GHz / ν)*
Correlator	
…Number of Baselines	*Up to 2016 (ALMA correlator hands up to 64 antennas)*
…Effective Bandwidth	*16 GHz (2 polarizations × 4 basebands × 2 GHz/baseband)*
…Velocity Resolution	*As narrow as 0.008 × (ν / 300 GHz) km/s*
…Polarimetry	*Full Stokes Parameters*

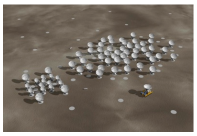
These specifications are designed to meet ALMA's "level one" science goals:

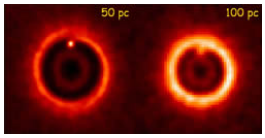
Detect CO or C^+ line emission from a normal galaxy at z=3 in less than 24 hours.

Image the gas kinematics in a solar mass proto-planetary/stellar disk at 150 pc.

Provide precise images at an angular resolution of 0.1 arcseconds.







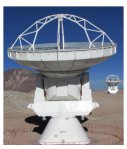
Early Science With ALMA

Even while under construction, ALMA will be one of the most powerful (sub-) millimeter-wave observatories in the world. During this phase, the astronomical community will be given the opportunity to use ALMA with growing, but already substantial, capability and somewhat less support than during full operations.

During Early Science, ALMA's capabilities will include at a minimum:

Hardware	*Specification*
…Number of Antennas	*At least 16 12-m antennas*
…Maximum Baseline Lengths	*0.25 km*
…Angular Resolution [arcseconds]	*0.8 arcseconds × (300 GHz / ν) × (0.25 km / max. baseline)*
…Receiver Bands Available	*Bands 3 (100 GHz), 6 (250 GHz), 7 (350 GHz), 9 (650GHz)*

All of which are expected to improve as Early Science progresses.



Key Dates as ALMA Comes Online
http://almaobservatory.org/en/about-alma/origins-of-the-alma-project/timeline

- **March 31, 2011:** Call for Early Science proposals
- **June 30, 2011:** Early Science proposal deadline
- **late-2011:** start of Early Science observing
- **late-2012:** Inauguration (50 telescopes)
- **mid-2013:** Full ALMA Operations

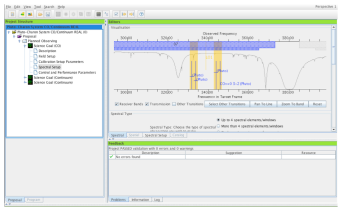
The NAASC

North America's ALMA Regional Center

The North American ALMA Science Center acts as the gateway to ALMA for North American and Taiwanese astronomers. Located at NRAO Headquarters in Charlottesville, Virginia, NRAO operates NAASC with the help of the Herzberg Institute of Astrophysics in Canada and ASIAA in Taiwan. NAASC will support users through all aspects of observing with ALMA, including:

Proposing and Observing:

NAASC will help users prepare proposals and observations. Both processes will be managed via the **ALMA Observing Tool** (*pictured at right*), a java-based application similar to tools used by *Spitzer*, Gemini, and *Herschel*.

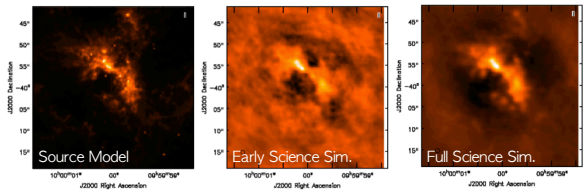


Information on the ALMA Observing Tool can be found at
http://science.nrao.edu/alma/tools.shtml

An overview of the entire process of observing with ALMA can be found at
http://science.nrao.edu/alma/using-alma.shtml

Data Reduction and Simulations:

ALMA data will be reduced using **CASA**, The Common Astronomy Software Applications. A pipeline, expected to be under development during Early Science, will provide baseline images that the project team may improve on with assistance from the NAASC. A practical introduction to CASA can be found at
http://science.nrao.edu/alma/tools.shtml

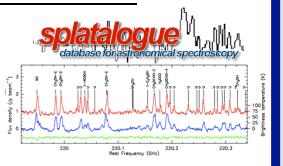


Simulations: CASA includes simdata, a powerful tool to simulate interferometric observations and a key aid for proposal preparation. In the example above, simdata simulates a "complex source" as observed by ALMA at different stages.

http://casaguides.nrao.edu includes a practical introduction to *simdata*.

Splatalogue:

ALMA's sensitivity and spectral coverage will usher in a new era in submm-wave spectroscopy. NAASC will help users make the most of their data via **splatalogue**, the online spectroscopy database at http://splatalogue.net



Tutorials, Helpdesk, and Finding out More:

In addition to the web pages linked here, other useful documentation can be found on the **NAASC website** at http://science.nrao.edu/alma/index.shtml. This website is your best starting point to find out about ALMA.

NAASC runs **tutorials** and **workshops** dedicated to preparing the community for ALMA. More on these can be found at:
http://science.nrao.edu/alma/community1.shtml

Questions? Need information or help with software? Contact the NRAO Helpdesk at
https://alma-help.nrao.edu/