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National Radio Astronomy Observatory

Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array

Observing with ALMA
Introduction: ALMA and the NAASC

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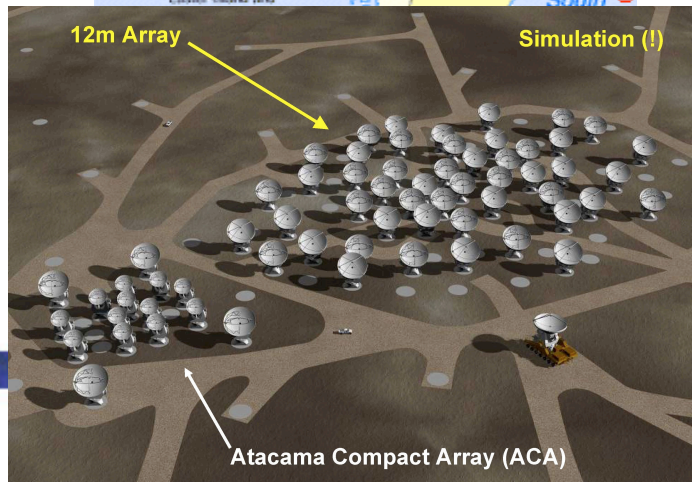
The Atacama Large MM/Submm Array : ALMA

- A global partnership to deliver a transformational millimeter/ submillimeter interferometer
  - North America (US, Canada, Taiwan)
  - Europe (ESO)
  - East Asia (Japan, Taiwan)

- 5000m (16,500 Ft) site in Chilean Atacama desert

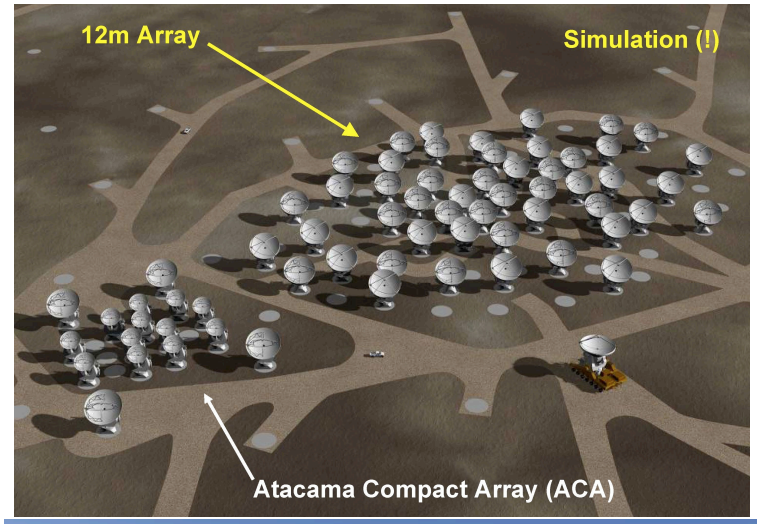
- Main Array: 50 x 12m antennas (up to 64)
  - + Total Power Array 4 x 12m
  - + ACA: compact array of 12 x 7m antennas

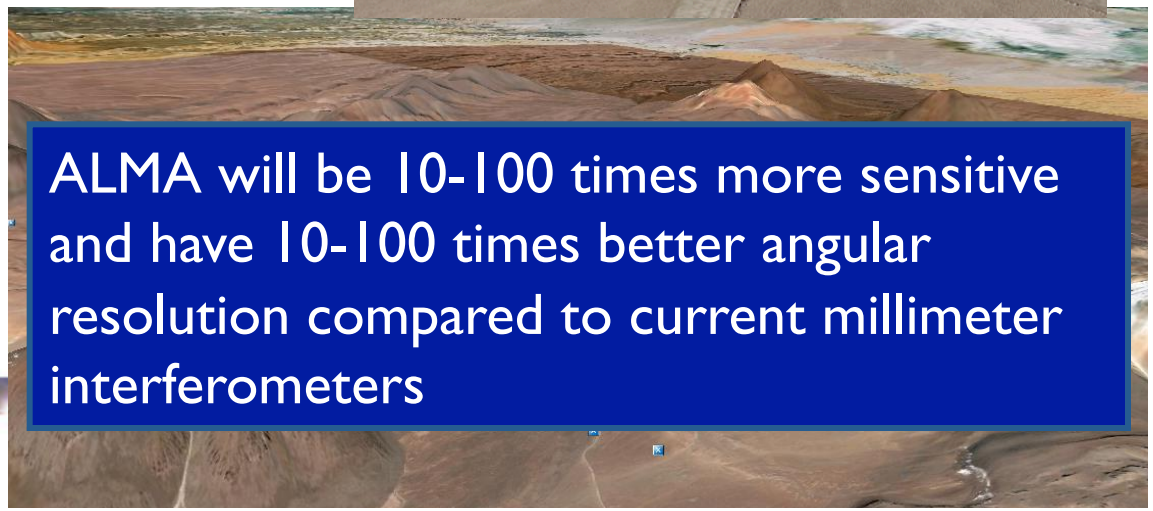
- Total shared cost ~1.3 Billion ($US2006)



ALMA in a Nutshell

- Baselines up to ~15 km (0.015" at 300 GHz) in "zoom lens" configurations
- Sensitive, precision imaging 84 to 950 GHz (3 mm to 315 μm)
- State of the Art low-noise, wide-band receivers (8 GHz bandwidth)
- Flexible correlator with high spectral resolution at wide bandwidth
- Full polarization capabilities
- Estimate 1 TB/day to be archived





- A resource for ALL astronomers

ALMA will be 10-100 times more sensitive and have 10-100 times better angular resolution compared to current millimeter interferometers

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ALMA Early Science Pre-announcement

1st Call Expected End March

At least:

- 16 antennas
- Receiver bands 3, 6, 7, 9 ➔ 100, 230, 345, 670 GHz
- Baselines up to 250m
- 21 Correlator Modes

➢ Additional capabilities **may** be announced with the call (limited mosaicing and polarization, somewhat longer baselines)

Process:

- Due date ~3 months after the call, observing begins Fall 2011
- Observing expected to span 9 months, with ~600 hours available
- A single international Proposal Review Committee, chaired by Neal Evans
- Off-line data reduction necessary
- User support from ALMA Regional Centers ARCs

The North American ALMA Science Center

- Three ALMA Regional Centers: ARCs
  - NA: Charlottesville, VA, USA
  - EU: Garching, Germany
  - EA: Mitaka, Japan
- North American ARC: US - Canada (7.25%) partnership for core support

http://science.nrao.edu/alma/

- Proposal Help and Submission
- Observation preparation
- Data archive
- Data processing

NAASC community support programs

- Science workshops, tutorials and summer schools
- Face-2-Face visitor support
- Publication page charge support
- Post-docs and students

Upcoming NAASC Supported Workshops & Tutorials

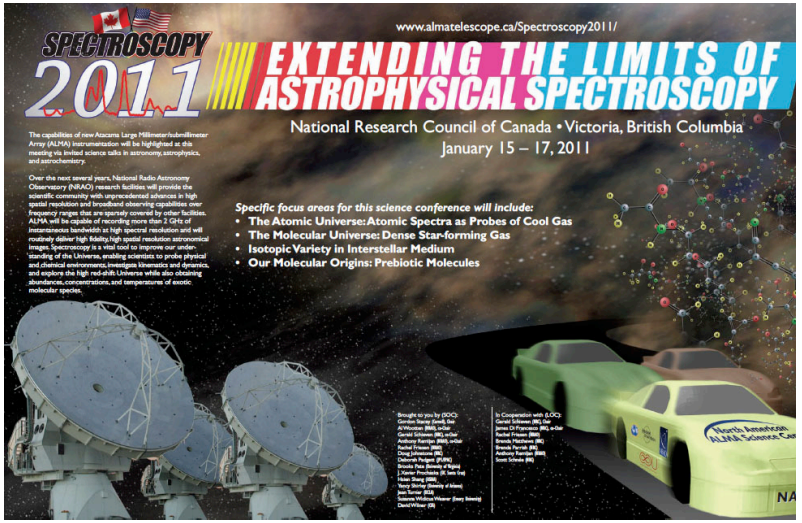
Training Tutorials

- Jan. 18: Victoria, BC (following "Extending the Limits of Astrophysical Spectroscopy")
- Feb. 24-25: Hands-on Tutorials (NRAO-CV)
- March 11: Santa Fe, NM (following "Building on New Worlds, New Horizons")
- April 26-27: Hands-on Tutorials (NRAO-CV)
- May 9-10: Hands-on Tutorials (NRAO-CV)
- May 22-26: Boston, MA (218th AAS Meeting)

➔http://science.nrao.edu/alma/training.php

Science Workshops

- 5th annual meeting next week



- Announcement soon for next year's meeting

ALMA Community Days

- Regionally located/organized and NAASC supported ALMA training workshops
- One or more per month leading up to the call
- Proposal deadline Feb. 1; see announcement: http://science.nrao.edu/alma/
  - Proposals received from Harvard-Smithsonian, Caltech and Hawaii, interest by several others – looking forward to more proposals!

Overview of the Session

- The Canadian Node and the ALMA Primer – James di Francesco
  - ALMA in Canada
  - The ALMA Primer: where to start for an introduction to ALMA
  - Science proposal examples for the Early Science array
- The Path to Early Science with ALMA – Al Wootten
  - Construction status and completion timeline
  - ALMA capabilities in Early Science and with the full array
  - A call for future ALMA development studies

Overview of the Session

- The Software Tools – Kartik Sheth
  - The Observing Tool & the Sensitivity Calculator
  - Simdata: Simulating ALMA observations
  - Splatalogue: a spectral line database
  - CASA & Casaguides: reducing and analyzing ALMA data
  - The Project Tracker and the Archive
- ALMA does Circumstellar Disks – David Wilner
  - ALMA Early Science capabilities for circumstellar disks
- ALMA does Galaxies! – Jean Turner
  - ALMA Early Science capabilities for Extragalactic Science
- Summary & Further Questions – Tony Remijan

Job Openings

A number of positions with the NAASC & JAO are advertised at the NRAO Careers page:

https://careers.nrao.edu/

NAASC

- Postdoctoral Fellows (2 positions)

Joint ALMA Observatory, JAO

- ALMA System Astronomer (2 positions)
- ALMA Operations Astronomer
- Head of the JAO Program Management Group
- Deputy Head of the JAO Program Management
- Deputy Manager of the ALMA Data Management Group

Summary

- Amazing scientific promise
- Tremendous progress in construction: 9 antennas at high site
- 1st Call for Early Science at the end of March,
  - already more collecting area and spectral coverage than current arrays
- Many training events coming up and proposals for ALMA community days being accepted
- One-Stop for community support at NAASC http://science.nrao.edu/alma/
- At the NRAO booth:
  - ALMA Primer, version of December 2010
  - Mouse pads and flash drives

This afternoon at AAS

•5:30PM RM304 Splinter Session: "Early Science Proposal Preparation Tutorial"

www.almaobservatory.org

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership among Europe, Japan and North America, in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere, in Japan by the National Institutes of Natural Sciences (NINS) in cooperation with the Academia Sinica in Taiwan and in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC). ALMA construction and operations are led on behalf of Europe by ESO, on behalf of Japan by the National Astronomical Observatory of Japan (NAOJ) and on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI).

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