

## **Telescopes Complementary and/or Competitive with the Atacama Telescope**

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1. Atacama Large Millimeter Array
2. Atacama Submillimeter Telescope Experiment (ASTE)
3. Atacama Pathfinder Experiment (APEX)
4. Atacama Cosmology Telescope (ACT)
5. South Pole Telescope (SPT)

## 1. Atacama Large Millimeter Array (ALMA)

**Partners:** ESO+Spain and NSF(NRAO)+NRC(Canada) and Japan (NAOJ)

**Description:** Array of 64 12-m antennas for high resolution imaging. Baselines provided from 150m to 15km giving resolutions from ~20 arcsec to ~10 mas with FLDV of 3' to ~10 arcsec.

**Frequencies:** (30) 84 – 950 GHz in 8 receiver bands.

**Site:** Chajnantor Plateau (5000 m)

**Science Program:** Facility telescope for European, American and Japanese communities. High resolution, and high sensitivity, heterodyne spectroscopy and photometry.

**Status:** Under construction. Completion 2012(?)

## 2. Atacama Submillimeter Telescope Experiment (ASTE)

**Partners:** Japan (NAOJ)

**Description:** 10-m single dish telescope used for technology tests of hardware NAOJ will provide to ALMA. RMS surface accuracy no better than 30 microns.

**Frequencies:** 350 – 950 GHz in 4 frequency bands. Hetrodyne systems, single beam.

**Site:** Pampa la Bola (4850 m)

**Science Program:** Some student research programs, particularly involving CI (492 and 809 GHz). Primary ASTE goal is not science but technology demonstration.

**Status:** Operational

### **3. Atacama Pathfinder Experiment (APEX)**

**Partners:** MPIfR, Sweden (Onsala), and ESO

**Description:** Vertex 12-m “ALMA” antenna used as a single dish and modified to accommodate Naysmith foci. Surface RMS 20-25 microns. Open air telescope.

**Frequencies:** 1300 and 850 micron MPIfR bolometer arrays, 460/490 GHz heterodyne array, other single beam heterodyne receivers.

**Site:** Chajnantor Plateau (5000 m)

**Science Program:** Facility telescope for European community to replace SEST.

**Status:** In commissioning phase with SEST receivers/backends.

#### 4. Atacama Cosmology Telescope (ACT)

**Partners:** UPenn, NASA/GFSC, NIST, Haverford, Columbia, Princeton, Rutgers, UToronto, UBC, Universidad la Catolica (Chile). Next generation effort led by Lyman Page and Mark Devlin.

**Description:** 6-meter diameter, clear aperture single dish.

**Frequencies:** 3-color (145, 225, 265 GHz) 32x32 pixel arrays

**Site:** Western face of Cerro Toco (5200m)

**Science Program:** CMB anisotropy on smaller angular scales than achievable by WMAP and Planck; find galaxy clusters from S-Z effect; find all mm-wave point sources with  $S > 1$  mJy; detect reionization of the universe using the Ostriker-Vishniac effect.

**Status:** Initial funding used for development phase work

## 5. South Pole Telescope (SPT)

**Partners:** University of Chicago, University of Illinois, UC Berkeley, Case Western Reserve University, CfA. John Carlstrom is PI.

**Description:** 8-m diameter off-axis Gregorian single dish.

**Frequencies:** 1000 element bolometer array (UC Berkeley)—wavelength ?

**Site:** South Pole

**Science Program:** S-Z effect in clusters as a function of redshift to investigate dark energy.

**Status:** Funded (\$15.5 NSF). To be operational in 4 years.

## **Telescopes Complementary and/or Competitive with the Atacama Telescope: Summary**

- 1. ALMA:** High angular resolution facility instrument serving a very large community (Europe, North America, Japan). Focus on spectroscopy.
- 2. ASTE:** Japanese technology development. Heterodyne systems.
- 3. APEX:** 12m single dish facility instrument, replacement for SEST. Emphasis on bolometer arrays at/near mm wavelengths. Large community to be served.
- 4. ACT:** Princeton/UPenn CMB anisotropy and SZ in galaxy clusters. Millimeter wavelengths, 6m telescope.
- 5. SPT:** UChicago south pole venture. 8m telescope, SZ in galaxy clusters.

### ***Atacama Telescope:***

- *Limited community to be served (Cornell and Caltech)***
- *Large collecting area***
- *True Submm capability***
- *Large format submm array sky surveys for point sources that are not limited by source confusion.***