



# ATACAMA

## CCAT : The Cornell-Caltech Atacama Telescope

A joint project of Cornell University,  
the California Institute of Technology  
and the Jet Propulsion Laboratory

Riccardo Giovanelli  
Study Review  
Pasadena, 17-18 Jan 2006

CCAT Feasibility/Concept Study Review 17-18 January 2006



## The CCAT:



- A 25m class FIR/submm telescope that will operate with high aperture efficiency down to  $\lambda = 200 \mu\text{m}$ , an atmospheric limit
- With large format bolometer array cameras (large Field of View  $> 15'$ ) and high spectral resolution heterodyne receivers
- At a very high (elevation  $> 5000\text{m}$ ), very dry (Precipitable Water Vapor column  $\text{PWV} < 1 \text{ mm}$ ) site with wide sky coverage

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# CCAT Drivers

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## 1. Scientific Excellence

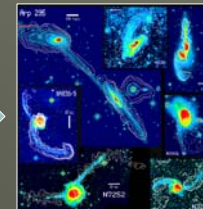
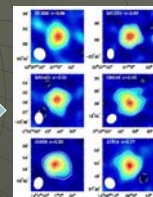
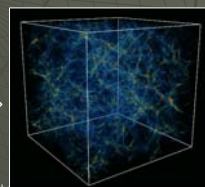
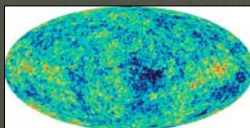
CCAT is a unique project geared towards the investigation of **cosmic origins**, from planets to galaxies, in the FIR/submm spectral region

- Early Universe Cosmology
- Galaxy Formation & Evolution
- Disks, Star & Planet Forming Regions
- Cosmic Microwave Background, SZE
- Solar System Astrophysics

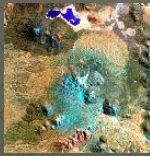


...to this? ↑

How did we get from this



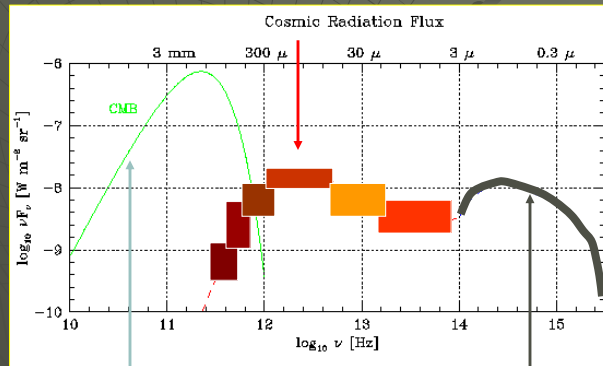
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Photospheric light  
Reprocessed by dust

### Why FIR/submm?

That's the energy regime  
at which most of the  
Universe's early light  
produced after the  
recombination  
era reaches us.



And at which  
radiation  
produced  
in star &  
planet  
forming  
regions  
emerges  
from the  
dust cocoons.

Microwave Background

Photospheric light  
from stars

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## 2. Internal Synergy

The focus of CCAT emphasizes our institutions' talents in  
instrument building, the operation of major observatories  
and the development of forefront technologies.



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Feasibility/Conce

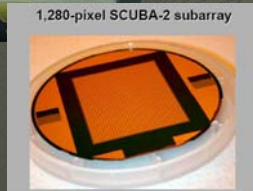


Forecast



### 3. Ride the technology wave

in one of the **most rapidly developing** technological fields in Astronomy: bolometer arrays

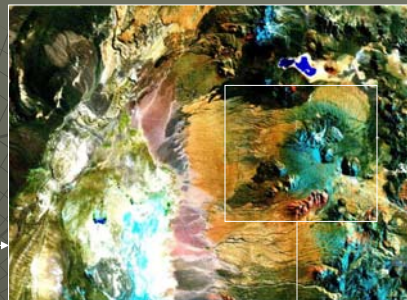
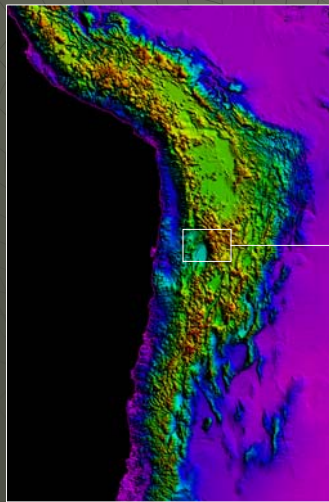


- ◆ Strawman First light instrument
  - ◆ Nyquist sampling a 5'x5' FOV at 350  $\mu\text{m}$ : 170  $\times$  170 pixel array
  - ◆ 30,000 pixels, or 6 times that of SCUBA-2
- ◆ Telescope designed with ~20'x20' FOV; future instruments will take advantage of the entire FOV

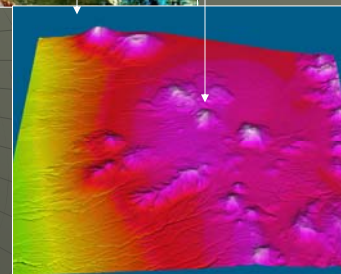
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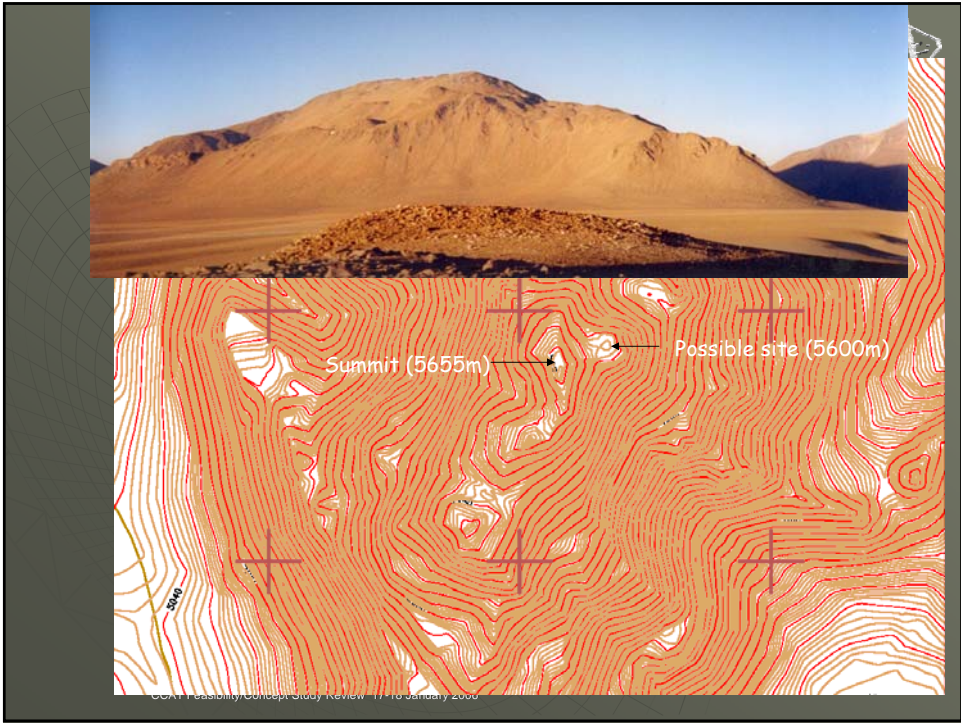
### 4. At the driest, high altitude site you can drive a truck to



Cerro Chajnantor (18,400 ft)



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## 5. A facility of huge synergy with, and enabler to ALMA



CCAT will match ALMA in point source, continuum sensitivity at 500  $\mu\text{m}$  and will be many orders of magnitude faster as a survey instrument. Although CCAT's beam will be a few arcsec, ALMA will have 100 times the spatial resolution.

→ ideal complementarity

Scientists with favored access to CCAT will have exceptional leverage arm for ALMA follow-up science.

Foresee joint, large scale projects coordinated between the two facilities.

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- Spring 2003 : Partnership initiated
- October 2003: Workshop in Pasadena
- Feb 2004: MOU signed by Caltech, JPL and Cornell
- Late 2004: Project Office established, PM, DPM hired, Study Phase pace accelerates
- July 2005: Study Phase Midterm Review
- Early 2006: Preliminary CDR
- 2006-2007: Detailed Conceptual Design finalize Site Selection
- 2007-2012: Engineering, Construction and First Light



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