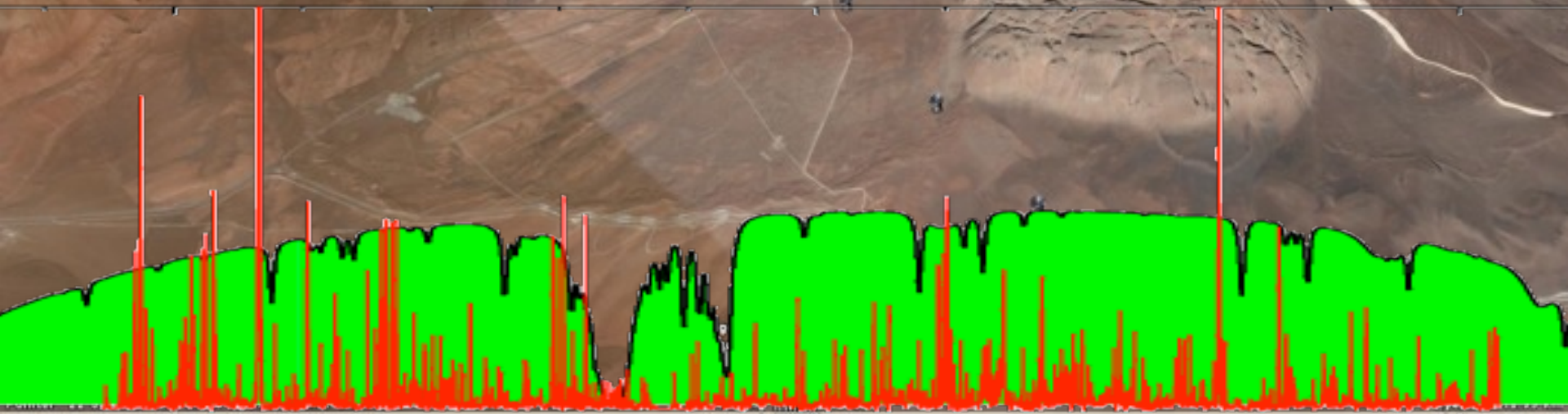
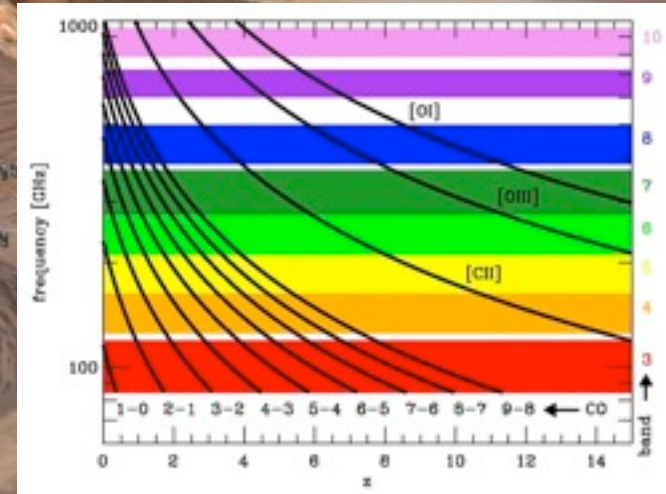
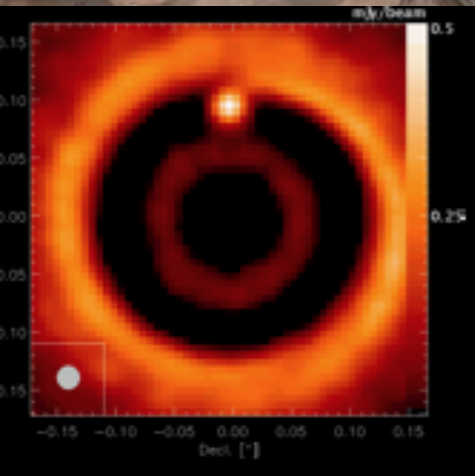


# ALMA Status and Development Plan

*Leonardo Testi*  
*ESO ALMA Program Scientist*



# Atacama Large Millimeter Array



- ♦ At least 50x12m Antennas
- ♦ Frequency range 30-1000 GHz (0.3-10mm)
- ♦ 16km max baseline (<10mas)
- ♦ ALMA Compact Array (4x12m and 12x7m)

1. Detect and map CO and [C II] in a Milky Way galaxy at  $z=3$  in less than 24 hours of observation
2. Map dust emission and gas kinematics in protoplanetary disks
3. Provide high fidelity imaging in the (sub)millimeter at 0.1 arcsec resolution



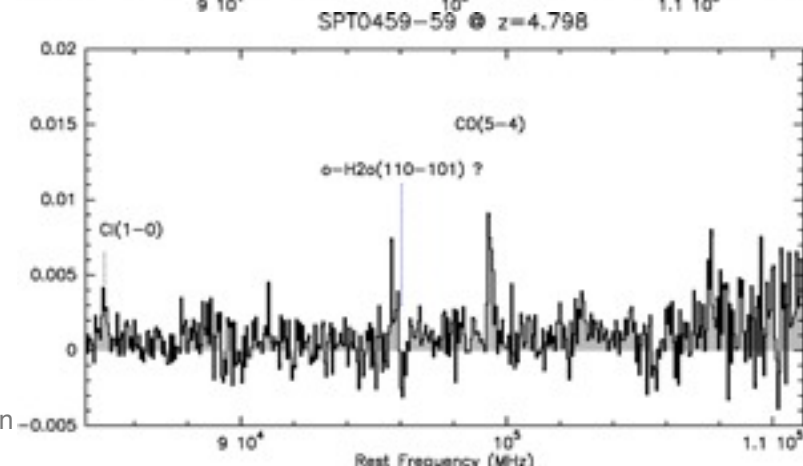
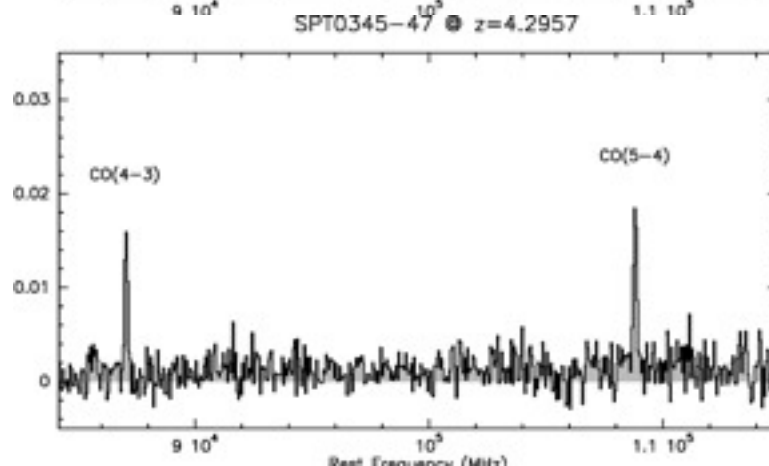
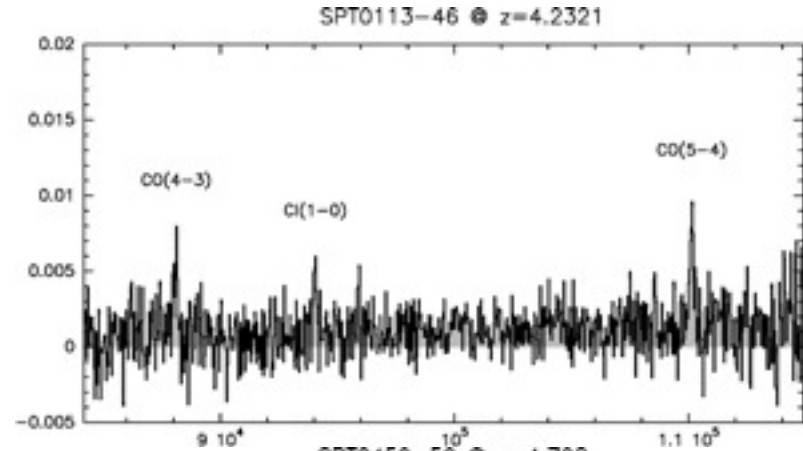
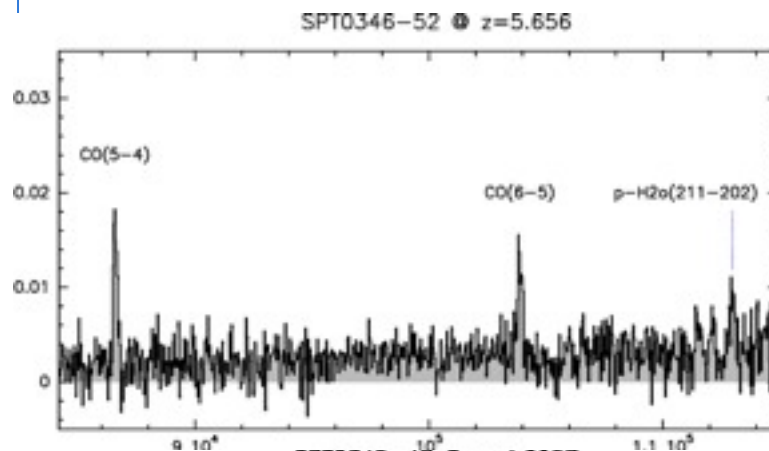


# 1-Page Overall Status

- Early Science (Cycle 0) ongoing
- Total of 58 antennas in Chile (46 x 12m, 12 x 7m)
  - In various stages (from accepted to parts)
  - 32 antennas at 5000m site
- Good progress on Front Ends
  - 52 FE Assemblies in Chile (11 from Europe)
  - Increasing number of component production completed
  - Band 5 first “light” at AOS
- Back End deliverables on track
- Permanent Power System approaching operations
- ALMA Residence design underway

# Early Science Results

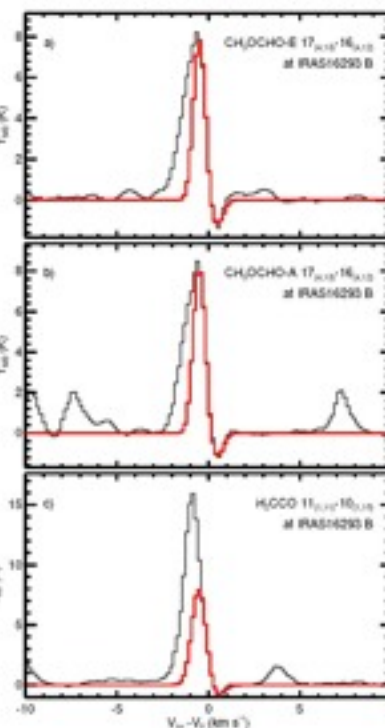
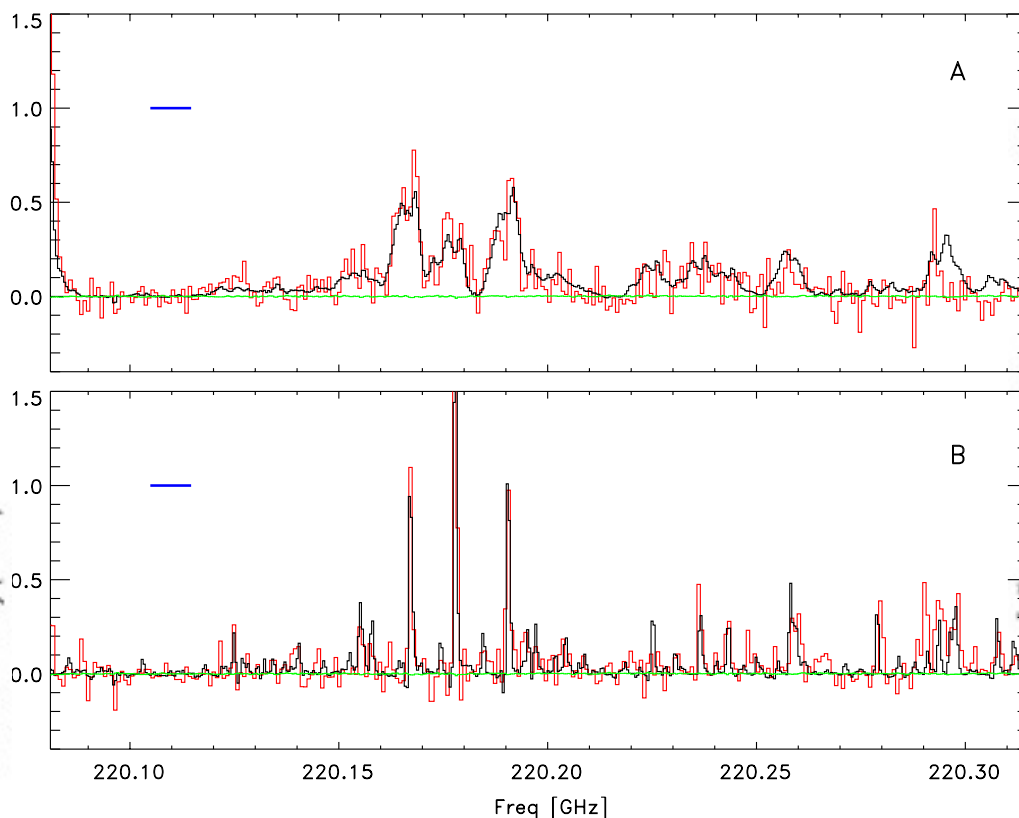
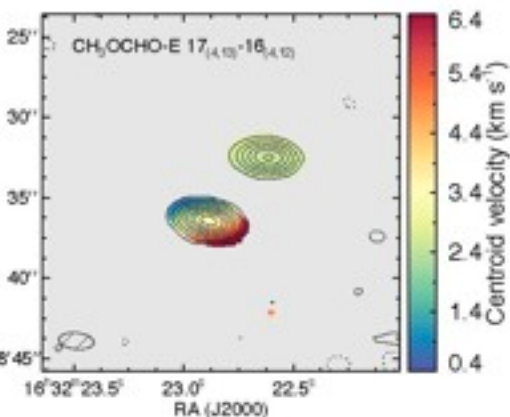
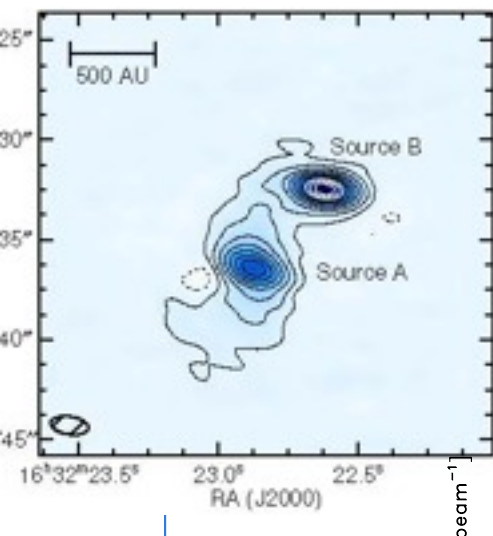
- Water, CI and CO in SPT submillimetre galaxies,  $z \sim 3-5$ ; B3 spectral survey
  - Weiss et al. 2012, in prep



# ALMA SV Science Results

## ■ The multiple solar-mass protostellar system IRAS16293

➤ Pineda et al. 2012, arXiv:1206.5215; Jorgensen et al. 2012







# The First Year of **ALMA Science**

Puerto Varas, Chile  
December 12-15, 2012

Exciting results from ALMA Early Science observations,  
from the Solar System to the high-redshift Universe,  
with an outlook to the future

## Scientific Organising Committee

Leonardo Testi (ESO, Chair)  
Paola Andreani (ESO)  
Lewis Ball (JAO)

<http://www.almasc.org/2012/>



# Cycle 1 capabilities

- Antennas/Configurations
  - 32 Antennas
  - Baselines up to ~1km, in six configurations
- Frequency Bands
  - 3,6,7 and 9 as for Cycle 0
- Correlator
  - Increased flexibility (line+cont), but not full flexibility yet
- Mosaicing/Pointings
  - Max 150 pointings/proposal
  - Max 5 Science Goals/max 15src per sg (max 5 vel)
- ACA
  - 9x7m antennas (no stand alone projects)
  - 2x12m Single dish line (no stand alone projects)



# Outlook on future

- Starting from Cycle 1 ALMA will try to move to regular 1year cycles
- Additional capabilities will be tested in the coming year beyond Cycle 1, with an outlook into Cycle 2 and Full Science
  - Polarization, Solar, Long baselines, additional bands
- Inauguration/FullScience
  - Expected for 2013



# ALMA Development Plan

- ADP Principles approved by Board in July 2011
- Key principle:
  - ALMA Development Program is Science Driven
- Important to have a single, coherent Program
- ADP budget is ramping up to reach ~13M\$/yr in 2015
- Development projects and expenditure on projects will be approved by the ALMA Board
- ALMA Development Steering Committee (ADSC)
  - Forum of Executives and JAO for coordination
  - Specific advice to ALMA Director on
    - Progress towards the delivery of approved projects
    - Proposals for new development projects
    - Status of identification of ADP ideas and/or feasibility studies
- Possibility of GTO

# ALMA Development Studies

- Upgrade studies are initiated and funded regionally to develop possible ideas into ADP proposals
- ALMA Upgrade Studies in Europe:
  - Preparations for ALMA B5 Full Production - Completed
  - Upgrade Options for ALMA B9 - Completed
  - Phasing up ALMA for mm-VLBI
  - Design and components for ALMA B2(+3)
  - Scientific opportunities for supra-THz interferometry with ALMA
  - Options for upgrading the instantaneous bandpass
- Science Case, Technical Readiness, Cost, Timeline
  - Getting ready to implement the upgrades from 2013-2015



# Initial projects

- The ADSC recommended to proceed with
  - ALMA Band 5 – outfit the entire array
  - Fibre connection from OSF to SCO
  - In planning: VLBI capability
  - In planning: ALMA Band 1
  
- Band 5 full production starting in 2012
  - Production completed by 2017

# VLBI upgrade

- The VLBI upgrade project still need to be formally approved by the Board
  - The exciting possibilities are recognized
- Needs a strong Science Case and a broad community base support
- Needs detailed plan, timeline and costing
  - ↘ From ESO this is especially important for the Eu part
- Need options on how to allocate/schedule time

# Timeline summary

