



Progetto Premiale iALMA

Scopo, Stato e Prospettive

Leonardo Testi



iALMA

- Proposta sottomessa in risposta alla chiamata per Progetti Premiali 2012 (Deadline 15 Feb, 2013)
- i+something=iSomething
- i(nstant) S(uccess)
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21/11/2014

Leonardo Testi – Progetto Premiale iALMA

Science and Technology in Italy for the upgraded ALMA Observatory - iALMA

Science and Technology in Italy for the upgraded ALMA Observatory - iALMA

Linea di intervento:

N.3: Programmi e/o progetti legati al potenziamento delle infrastrutture di ricerca esistenti che abbiano una valenza europea ed internazionale, anche in termini di impatto e che permettano di consentire la migliore partecipazione italiana ai programmi europei congiunti. Sono pertanto favorite quelle infrastrutture che: si autofinanziano almeno in parte attraverso servizi o altri progetti di ricerca; fanno parte di una rete europea; fanno parte di un ERIC (European Research Infrastructure Consortium) o sono in procinto di divenirlo; coinvolgono altre organizzazioni pubbliche o private distribuite sul territorio nazionale; non hanno già altre fonti di finanziamento in corso del MIUR per la stessa annualità e tipologia di spesa o siano ad esse complementari.





iALMA long term goal

- Build a coherent infrastructure at INAF to support Italian involvement in ALMA
 - Strengthen ALMA Science in Italy combining observations and innovative laboratory experiments on ices
 - Develop innovative receivers for ALMA upgrades to study complex and pre-biotic molecules in disks and probe the high-redshift Universe
 - Train a new generation of researchers in Italy
 - Support and expand the ARC node in Bologna
 - Develop outreach activities for ALMA at INAF
 - Investigate in Italy the possibility of Green energy production for ALMA



iALMA institutes

- IASF
- IRA
- OA-Arcetri
- IAPS
- Sede Centrale
- OA-Catania



21/11/2014

Leonardo Tes

Base 802973AI (C00562) 12-04

INAF ISTITUTO



Goals for year 1

- Acquire the new lab instrumentation in Catania
- Set up the Cryo-facility in Bologna
- Start producing prototype components
- Expand activities of the ARC node
- Develop science and hire students
- Produce the a new set of outreach material
- Start investigating the Green Energy options



Re-scope year 1

- 20% scale-down following the reduced allocation
- Priority is given to
 - Acquire instrumentation in Catania
 - Setup Cryofacility
 - Produce design/prototypes for Band 2+3
 - Hire staff/postdocs/students
 - Start developing science and collaborations



Kick-off and EAB reports

RAPPORTI DI ATTIVITÀ/ACTIVITY REPORTS

Il Colle di
Galileo

INAF Progetto Premiale iALMA and the ALMA Band 2+3 project

Villa il Gioiello, Arcetri, Florence

March 25-28, 2014

Organizer: Leonardo Testi

INAF-Osservatorio Astrofisico di Arcetri,

Largo E. Fermi 5, I-50125 Firenze, Italy

ESO, Karl Schwarzschild str. 2, D-85748 Garching, Germany

Excellence Cluster Universe, Boltzmann str. 2, D-85748 Garching, Germany



Abstract. On March 25 and 26, 2014, the kick-off of the INAF Progetto Premiale 2012 iALMA took place in the beautiful and historic location of the Villa Il Gioiello. iALMA workpackage leaders from several Italian institutes gathered together to carefully plan the first year activities for the project and to discuss the detailed project implementation with the iALMA External Advisory Board. The iALMA kick-off meeting was followed by an international workshop attended by participants from all ALMA partners in Chile, Europe, Japan and North America, and focused on developing the foundations of an upgrade of the ALMA Observatory aimed at equipping all 66 antennas with the a new receiver: the so-called Band 2+3. Here I provide a brief account of the goals of the iALMA project and of the ALMA Band 2+3 project.

Keywords. ALMA, Complex and Pre-Biotic Organic Molecules in Space, Star Formation in the Universe, Laboratory Astrophysics

The ALMA observatory and the Italian contribution

The Atacama Large Millimeter/submillimeter Array (ALMA, Figure 1), an international astronomy facility, is a partnership of Europe, North America and East

REPORT OF THE iALMA EXTERNAL ADVISORY BOARD

1. Introduction

The members of the iALMA External Advisory Board (EAB) are:

Prof. Cecilia Ceccarelli, IPAG Grenoble, France (chair)

Prof. Gary Fuller, University of Manchester, United Kingdom

Dr. Robert Laing, ESO Garching, Germany

Dr. Alessandro Navarrini, IRAM Grenoble, France

The iALMA EAB was provided with the proposal text and was invited to a 1-day presentation of the project the 26th March 2014 at Florence, Italy, where the EAB members had the opportunity to ask questions and discuss in depth with the iALMA members. A meeting restricted to the EAB members followed. The following report is the result of those discussions.

2. Recommendations

First and foremost, the EAB wishes to praise the iALMA team for the excellent project and presentations.

The EAB thinks that iALMA will have a great impact on the Italian ALMA community, helping it to grow and to ensure the best possible scientific return. Furthermore, iALMA will enhance the capabilities of exploitation and visibility of ALMA of the entire Italian community.

Therefore, the EAB strongly and without ambiguity supports the iALMA project. It recommends securing its full funding for the four planned years. The EAB emphasizes the essential role of the requested PhDs and post-Docs for the accomplishment of the project as well as the training of the new generation and, consequently, the growth of the Italian ALMA community.

The project is organized in 9 Work Packages (WPs), whose specific recommendations are listed below.



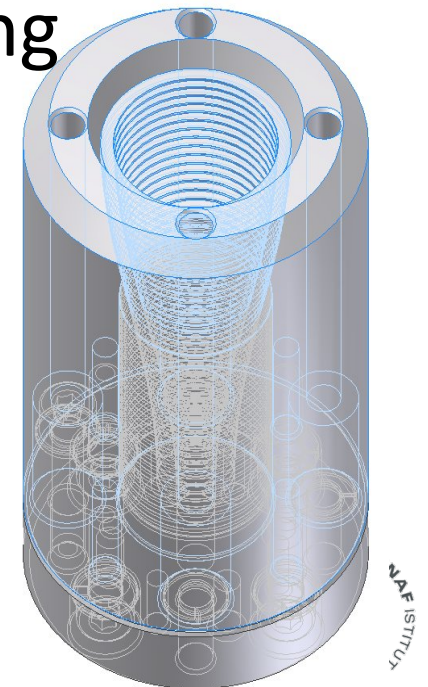
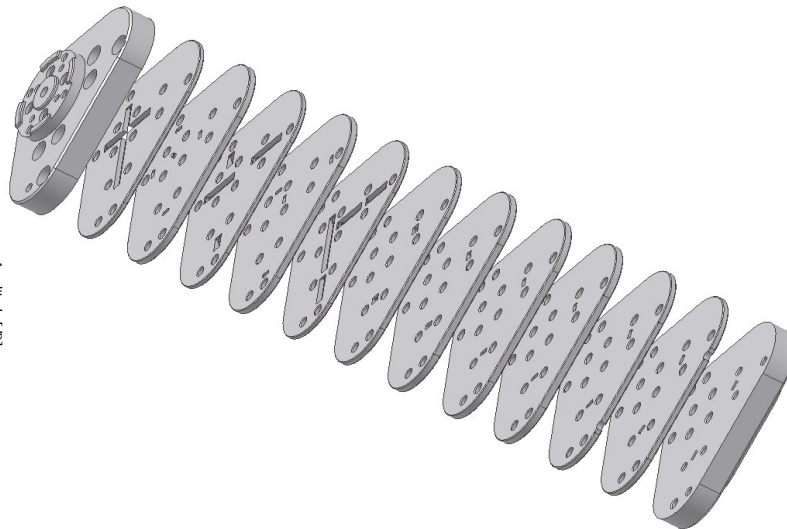
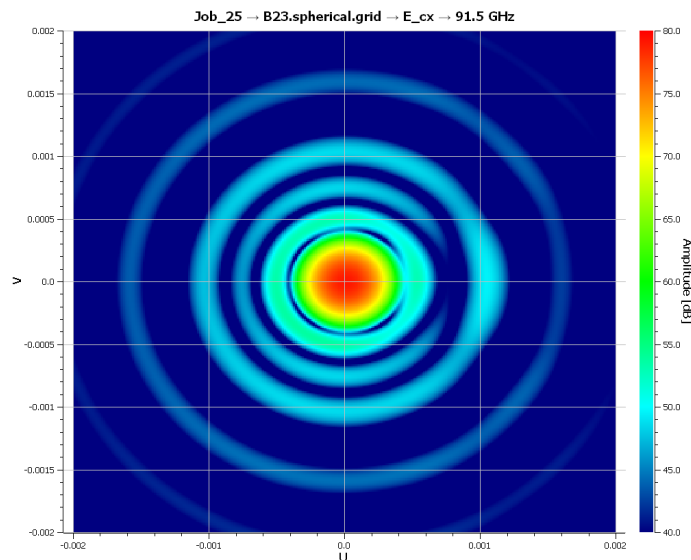
Status

1. Receiver development
 - Cryofacility, electronics and instruments
2. Laboratory Astrophysics
 - Design, acquisition, hiring
3. Science, Training, ARC development
 - Postdocs, students, workshops and documents
4. Outreach and Green Energy
 - Initial filming activities, GE decision delayed



Band 2/3 receiver (Villa - IASFB0, Nesti - Arcetri)

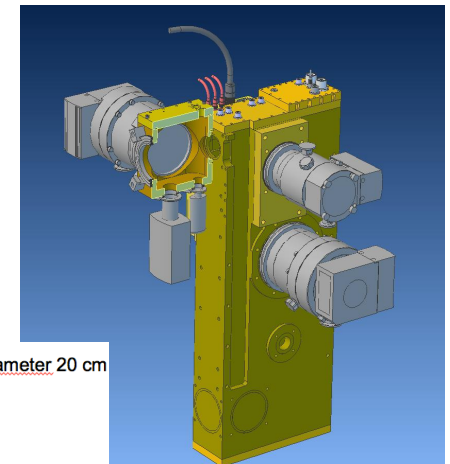
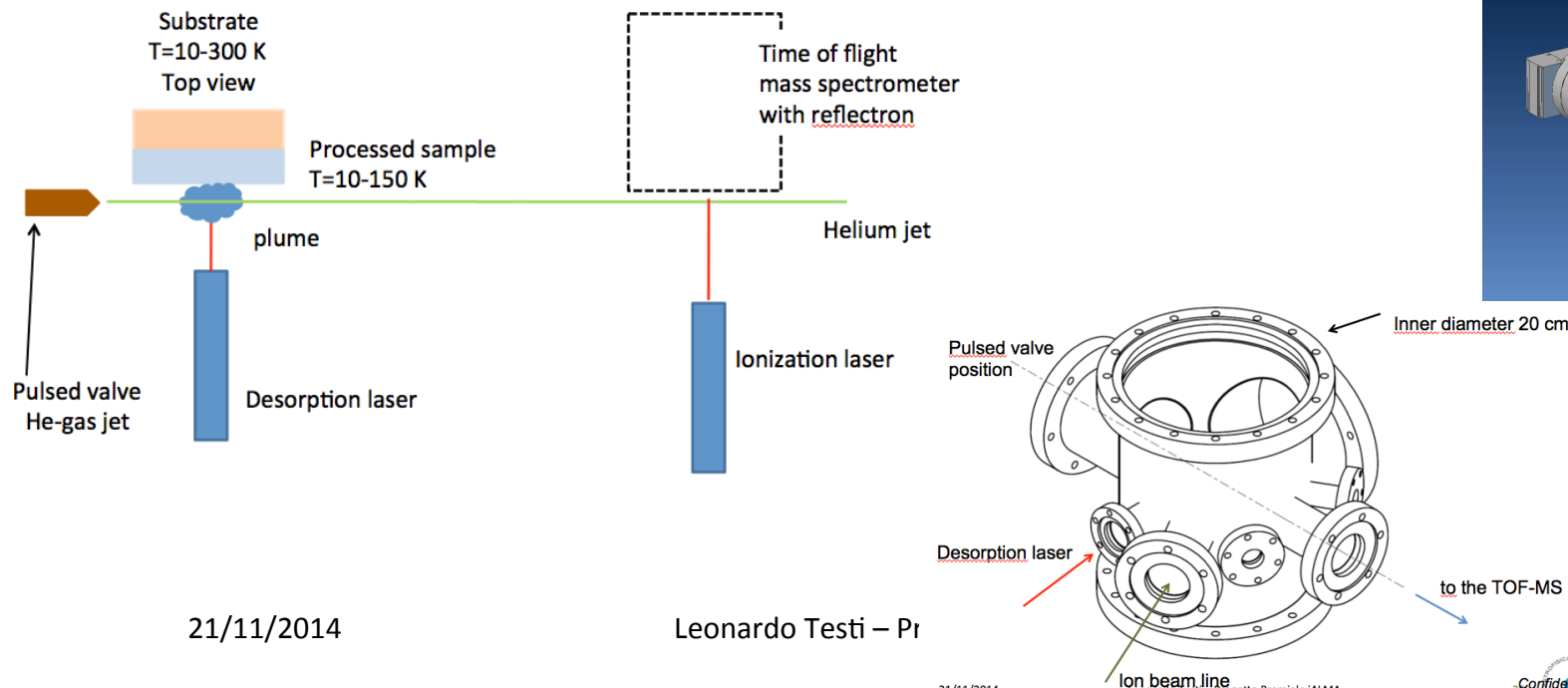
1. Agreement with STFC and ESO being finalized
2. Labs refurbished, cryofacility tests Mar 2015
3. Components advanced designs and prototypes
4. System design, VNA acquisition, hiring





Laboratory Astrophysics (Palumbo - Catania)

1. Design of new equipment/setup completed
2. (Complex) call for tender almost completed
3. Student hired, postdoc ad prepared



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Leonardo Testi – Pr

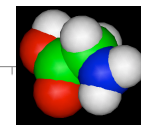
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Science & Training

(Beltran - Arcetri, Gregorini - UniBo)

1. ALMA Band 2+3 Science Case (Fuller+)
2. COMs with ALMA & SKA (Codella+/Testi+)
3. 4 Students and 2 Postdocs selected
4. Lecture series, observations, models



Protoplanetary disks and the dawn of planets with SKA

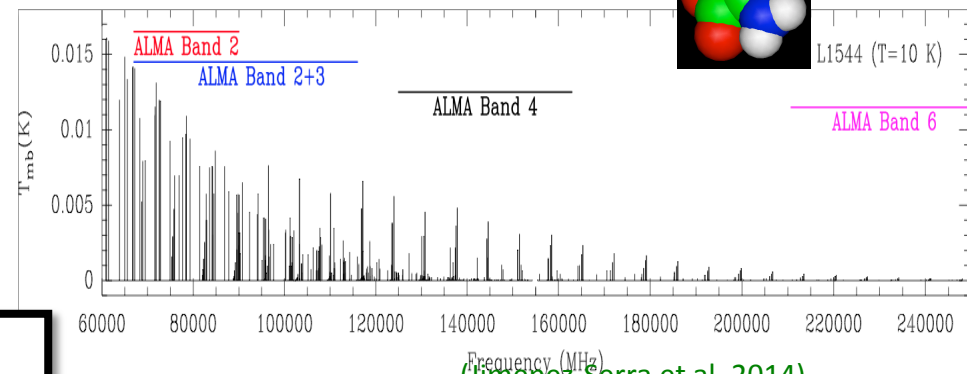
L. Testi^{1,2,3}, L. Perez⁴, I. Jimenez-Serra², M. Hoare⁵, A. Boley⁶, T. Bourke⁷, J.R. Brucato¹, P. Caselli⁸, C. Chandler⁴, C. Codella¹, A. Isella⁹, J. Lazio¹⁰, M.E. Palumbo¹¹, L. Podio¹, A. Remijan⁴, J. Tarter¹², D.J. Wilner¹³

¹INAF-Osservatorio Astrofisico di Arcetri, Firenze, Italy; ²European Southern Observatory,

Complex organic molecules in protostellar environments in the SKA era

C. Codella¹, L. Podio¹, F. Fontani¹, I. Jiménez-Serra², P. Caselli³, C. Ceccarelli⁴, M.E. Palumbo⁵, A. López-Sepulcre^{6,4}, M.T. Beltrán¹, B. Lefloch⁴, J.R. Brucato¹, S. Viti⁷, L. Testi^{2,1}

¹INAF, Osservatorio Astrofisico di Arcetri, Largo E. Fermi 5, 50125 Firenze (Italy); ²ESO, Karl



The Science Case for ALMA Band 2

G. A. Fuller ¹	C. De Breuck ²	S. Longmore ³	J. Wagg ⁴	L. Hunt ⁵	C. Cicone ⁶
P. Caselli ⁷	S. Viti ⁸	I. Jimenez-Serra ²	D. Vergani ⁹	S. Ramstedt ¹⁰	F. Costagliola ¹²
A. Richards ¹	A. Avison ¹	V. Casasola ¹¹	M. Massardi ⁸		
	L. Testi ²	M. Beltran ¹³			



ALMA Regional Centre node (Massardi - IRA)

1. ALMA Polarization/VLBI modes CSV
2. Italian mm workshop Jan 20-21, 2015
3. mm-VLBI workshop Jan 22-23, 2015
4. User support, training, etc.

Terzo Workshop sull'Astronomia Millimetrica in Italia

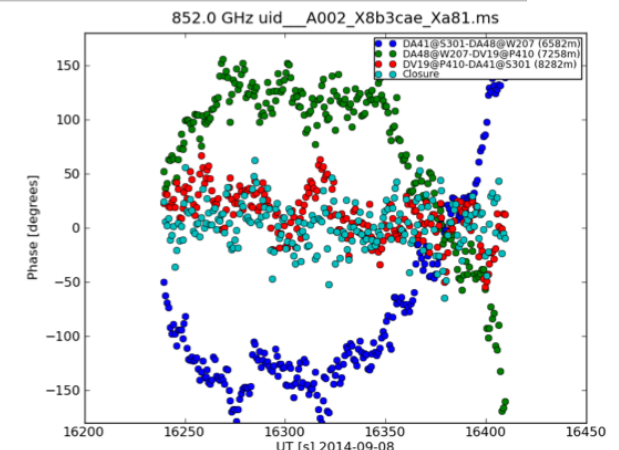
20 - 21 Gennaio 2015 - Istituto di Radioastronomia Bologna, Italy

http://www.alma.inaf.it/index.php/Terzo_Workshop_sull%27Astronomia_Millimetrica_in_Italia

Workshop on mm-VLBI with ALMA

22nd January 2015 - Istituto di Radioastronomia Bologna, Italy

http://www.alma.inaf.it/index.php/Workshop_on_mm-VLBI_with_ALMA

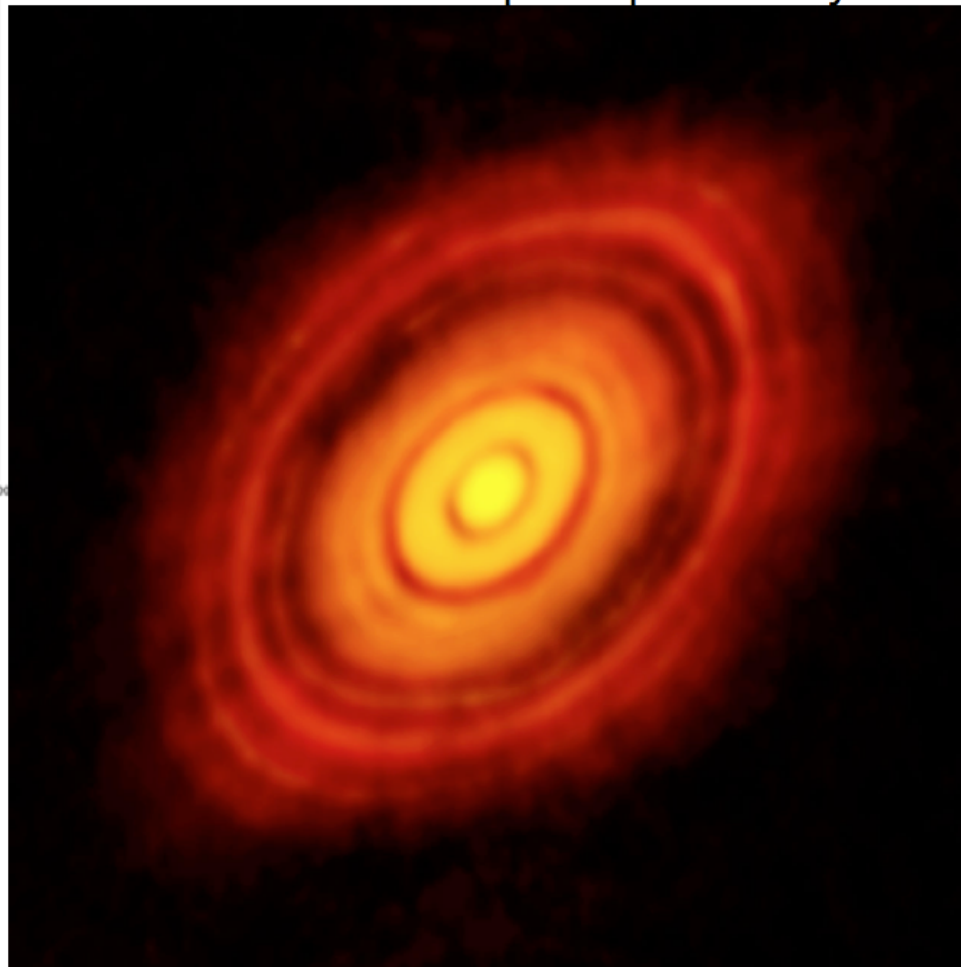
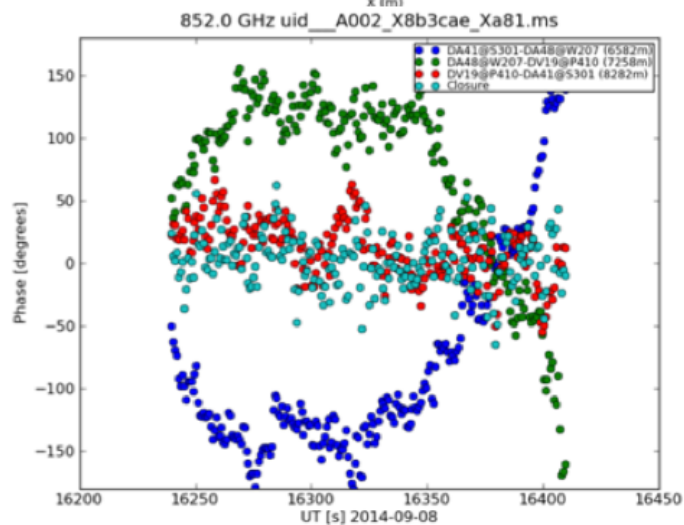
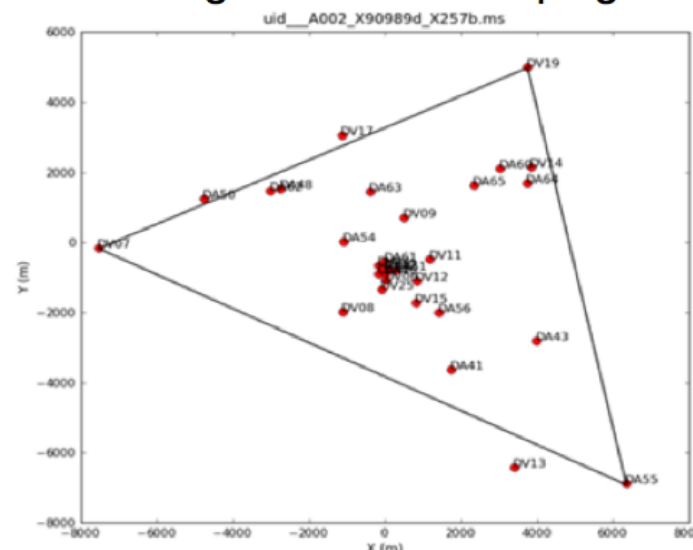




Contribution to ALMA EOC

■ Long Baselines Campaign - Sep-Nov 2014

HL Tau protoplanetary disk





What next

- Italian science case and science requirements for Band 2+3
- Final designs and components for prototype receiver – built as part of international consortium
- Final Set-up for Lab experiments
- Training of next generation It ALMA users (students/postdocs) and It community
- Foster scientific collaborations in Italy for submm astronomy



Goals for year 1

- Acquire the new lab instrumentation in Catania **In progress**
- Set up the Cryo-facility in Bologna **Very advanced**
- Start producing prototype components **Very advanced**
- Expand activities of the ARC node **Done**
- Develop science and hire students **Done**
- Produce the a new set of outreach material **In progress**
- Start investigating the Green Energy options **Delayed**



Long term evolution

- The original iALMA project covers 4 years
- Years 2-4 are essential for
 - Complete production of receiver prototype
 - Complete the setup and use the Lab in Catania
 - Support the full training cycle for PhDs
 - Consolidate ARC node development
 - Harvest the benefits of the investment/collaboration
- iALMA was front-loaded, but we are still keen to secure funding through competitive grants



Long term benefits for Italy

- Training + Laboratory + Receivers
 - Effective engagement in ALMA Science and Development
 - Benefits spreading to the Italian community at large
 - Fostering science driven collaboration
- Development of Italian ARC node in Bologna
 - Better support for the Italian community to use ALMA
 - Develop possible synergies with support of Italian radio telescopes
- Receiver/hw development
 - Involvement of Italian industry
 - Synergy with SRT receivers