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iram
Institut de Radioastronomie Millimétrique

The ALMA observatory and how to use it

Edwige Chapillon

On behalf of the IRAM ARC node

ALMA

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World wide collaboration

- **Atacama Large Millimeter/Submillimeter Array**
- Europe (**ESO**)
- North America (USA, Canada, Taiwan)
- Eastern Asia (Japan, Taiwan, South Korea)
- Chile

- Main array: 50 x 12 m antennas
- ALMA Compact Array (ACA): 4 x 12m + 12 x 7m
- Frequency range: 30—900 GHz (0.3—10 mm)
- 16 km max. baseline

Requirements

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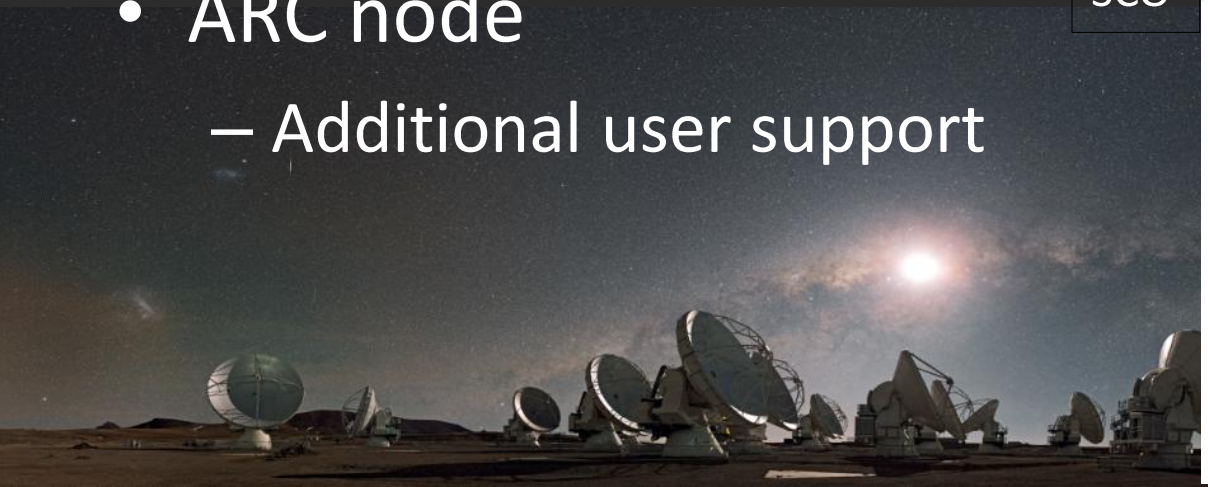
1. Detect spectral line emission of CO and CI in a normal galaxy like the Milky Way at a redshift of 3, in less than 24h observation.
2. Image the gas kinematics in protostars and protoplanetary disks around young Sun-like stars at a distance of 150 pc.
3. Provide precise images at 0.1 arcsec resolution

ALMA

- JAO
  - Main operations
    AOS, OSF, SCO
- ARC
  - Interface with user
- ARC node
  - Additional user support



OSF

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San Pedro de Atacama

ALMA antennas

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NA and EA antennas

EU antenna + transporter

AOS

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Morita array (ACA)

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Morita-array (compact array)

- 12 7-m antennas to observe the short spacing
- offered in stand-alone mode starting cycle 4

Single-dish antennas

- 4 12-m antennas used in single-dish mode to observe the zero-spacing

Main array

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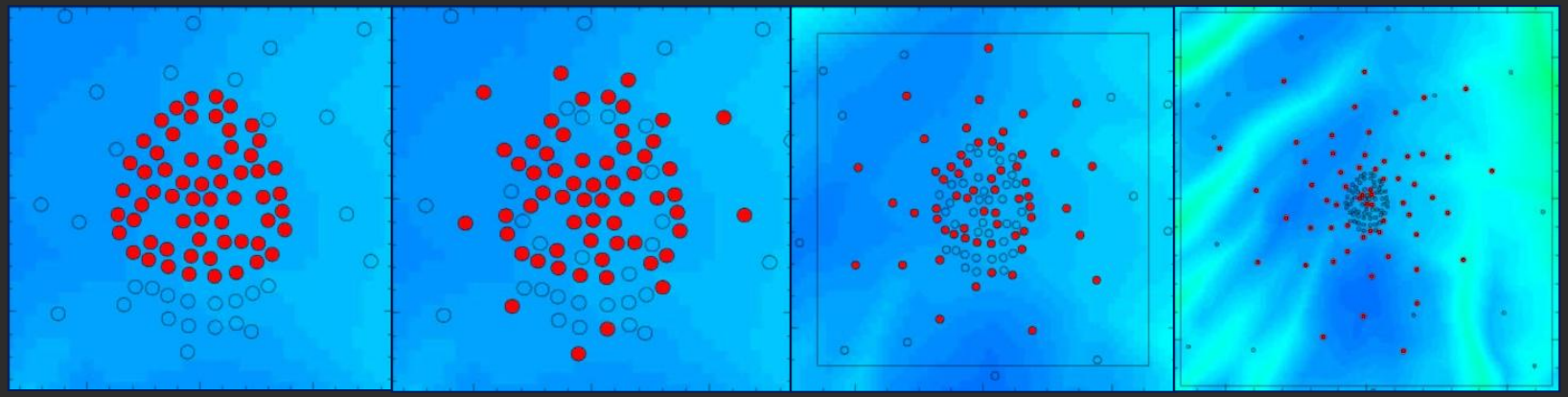
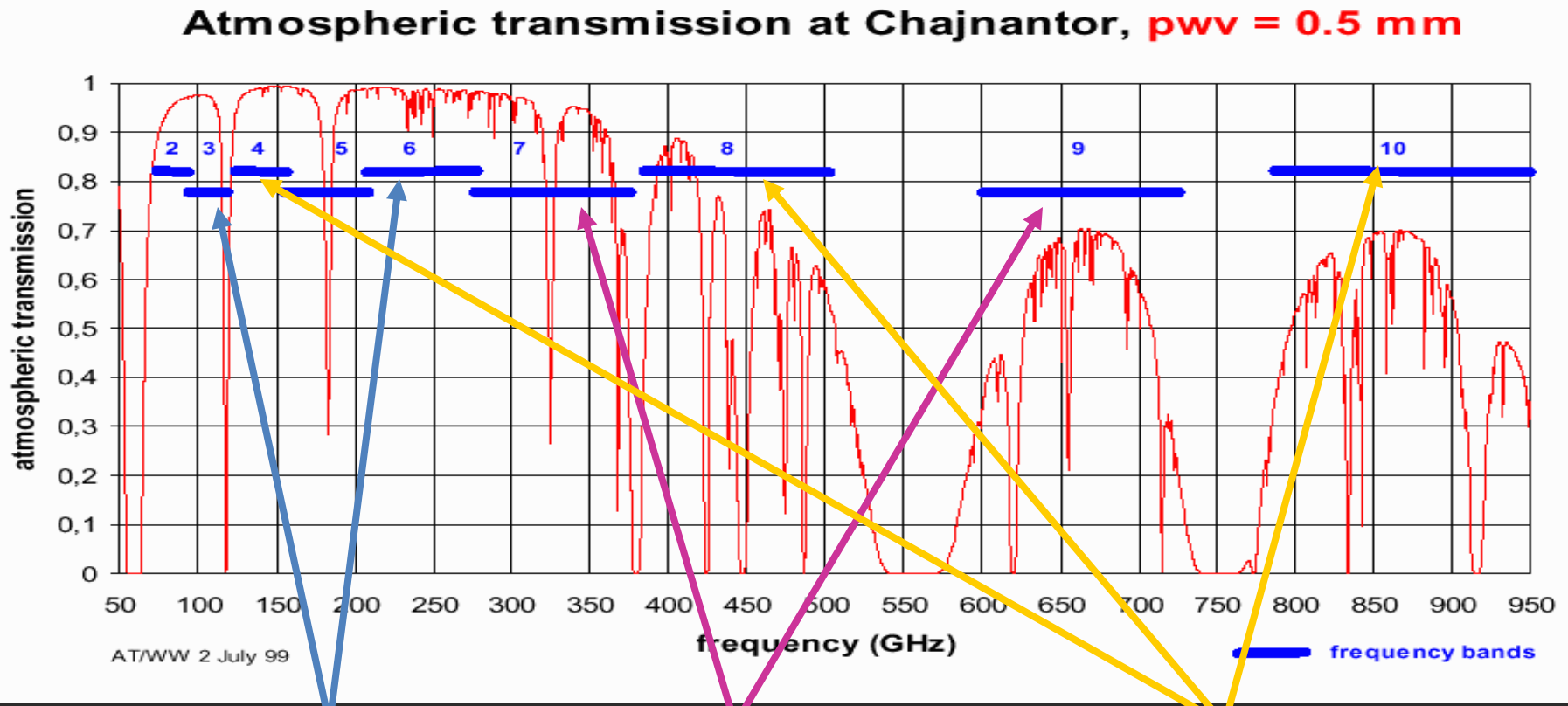
- 50 antennas, 1225 baselines (**Goal = 45 antennas used**)
- Angular resolution λ/B down to 40 mas (100 GHz), 5 mas (900 GHz)
- 28 (TBC) different antenna configurations, from compact to ~16 km



- **Short spacing ACA** observations + 4 single-dish antennas (TP)
- **Caution: not all projects can have ACA data**!
- ALMA imaging simulator in GILDAS and CASA



North America

Band 3 (84-116 GHz)
Band 6 (211-275 GHz)

Europe

Band 7 (275-373 GHz)
Band 9 (602-720 GHz)

Japan

Band 4 (125-163 GHz)
Band 8 (385-500 GHz)
Band 10 (787-950 GHz)

Freq. coverage: 30—900 GHz
Bandwidth: 8 GHz x 2 polarizations

Band 1 (35-50 GHz): Taiwan

Receivers

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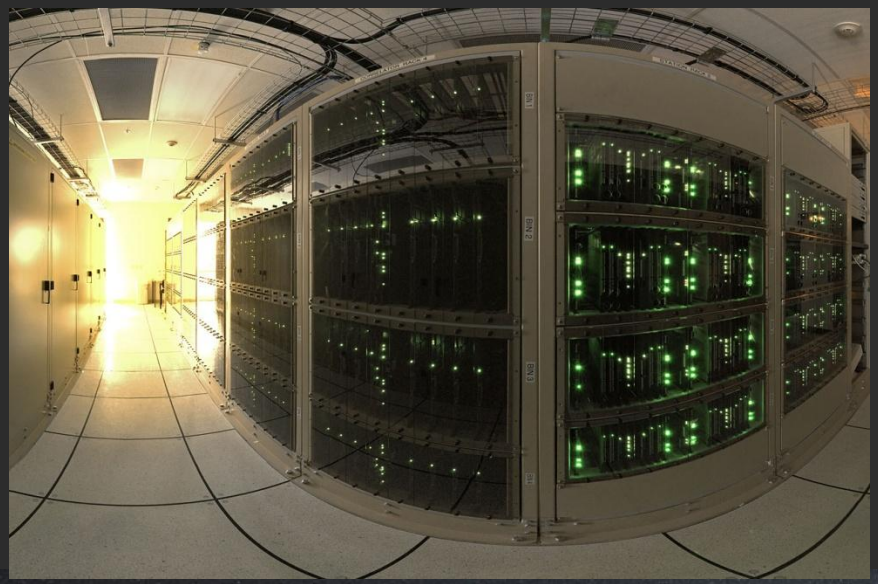
- Receiver Bands currently installed on all antennas:
  - Band 3: 3 mm (84-116 GHz)
  - Band 4: 2 mm (125-163 GHz)
  - Band 6: 1 mm (211-275 GHz)
  - Band 7: 850 µm (275-370 GHz)
  - Band 8: 650 µm (385-500 GHz)
  - Band 9: 450 µm (602-720 GHz)
  - Band 10: 350 µm band (787-950 GHz)

- Receiver Bands in development
  - Band 5 : EU 1.5mm (163-211 GHz) started
  - Band 1: TW 7mm (35-50 GHz) planned

- All receivers **8 GHz bandwidth x 2 polar**.

Correlators



- 4 units of 2 GHz = baseband
- 4 spectral windows per baseband with compromise bandwidth/resolution
- 1/2/4 polarization products (total number of channels = constant)

- Caution: data rate limitations!

Recent results

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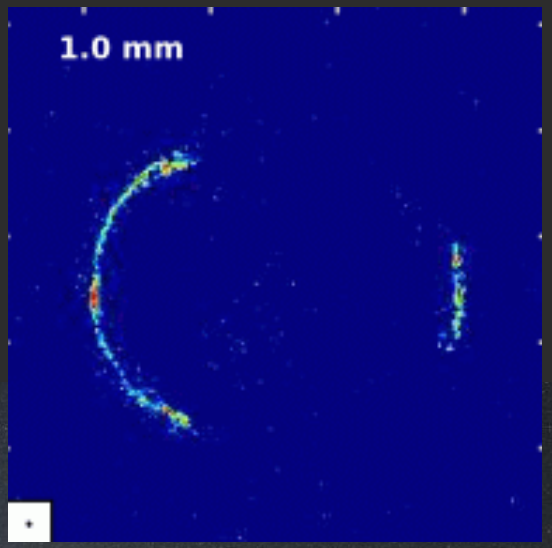
Long baseline campaign (cycle 3)

HL Tau

(Brogan et al. 2015)

SDP.81



(Vlahakis et al. 2015)

Recent results

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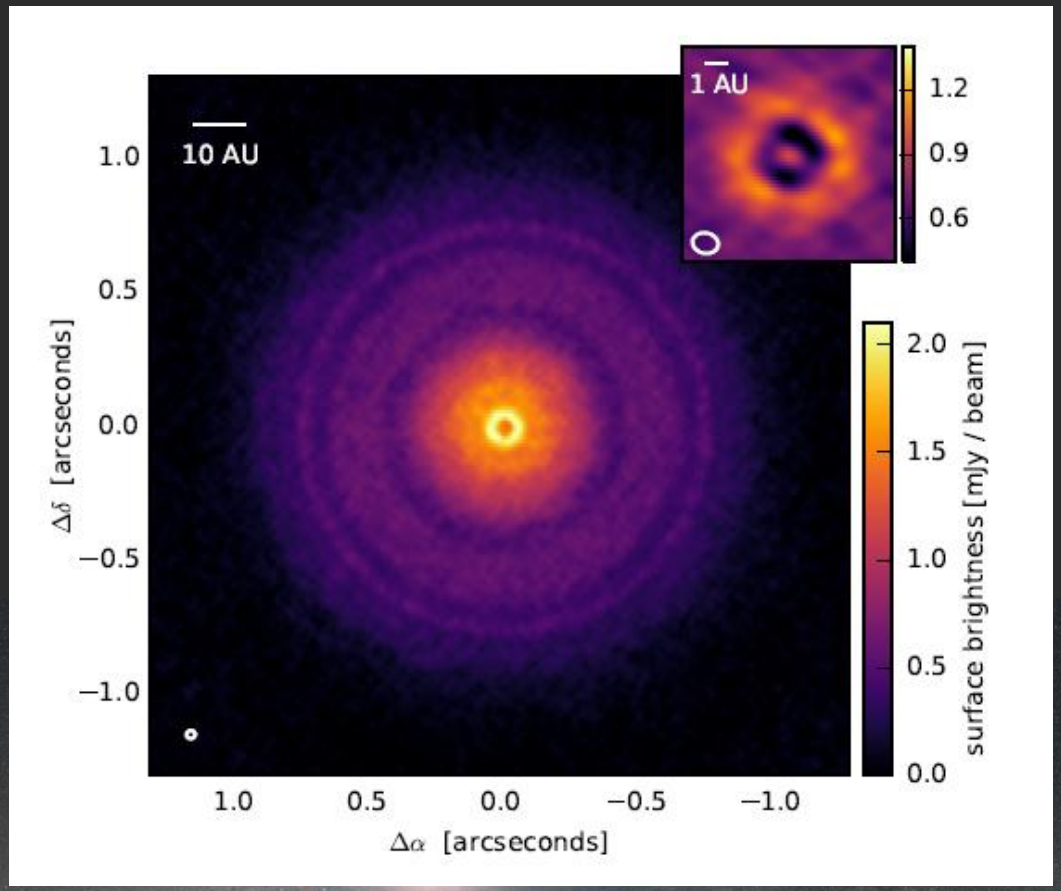
Protoplanetary disks

TW Hya



(Andrews et al. 2016)

Recent results

Protoplanetary disks

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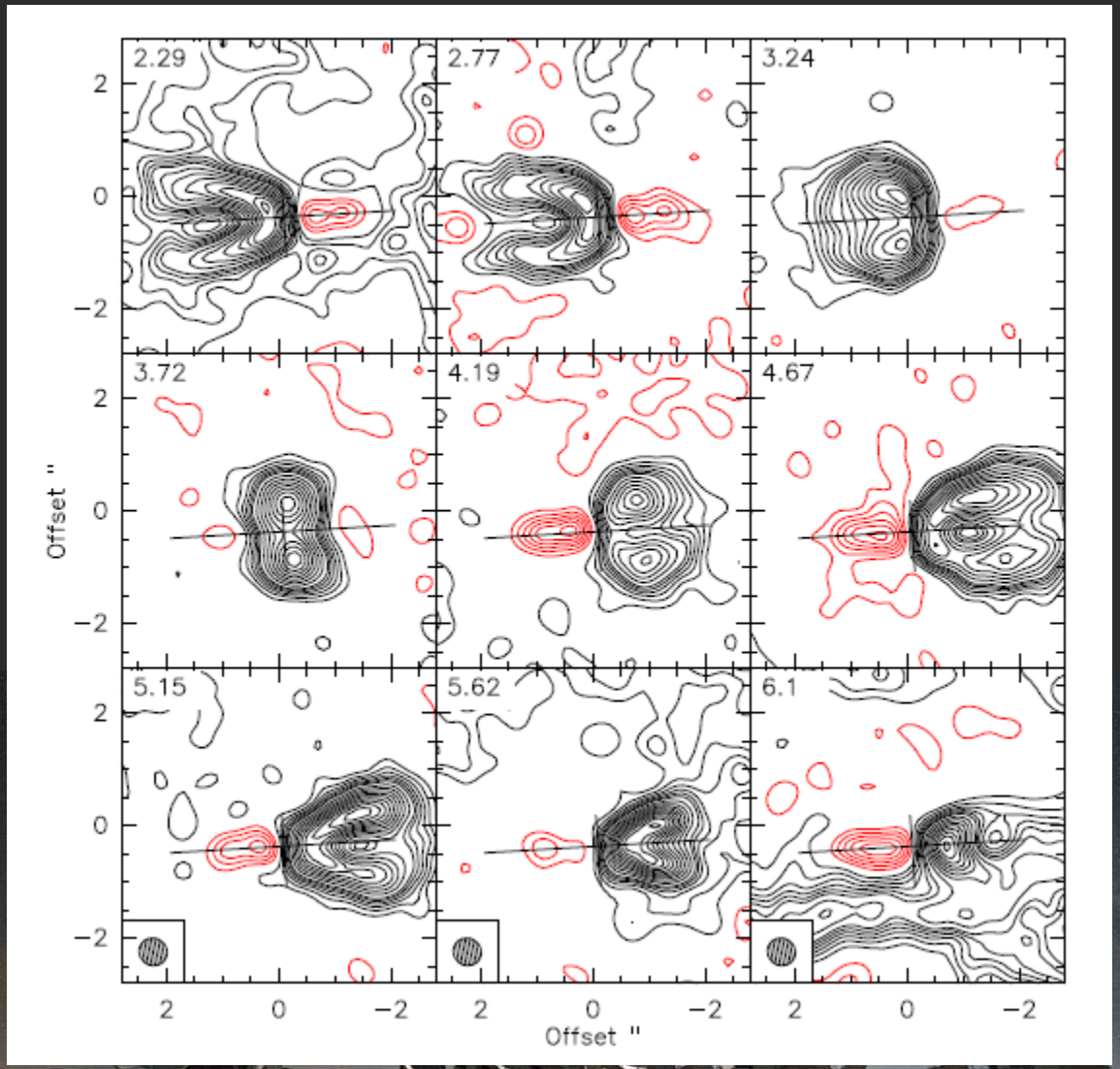
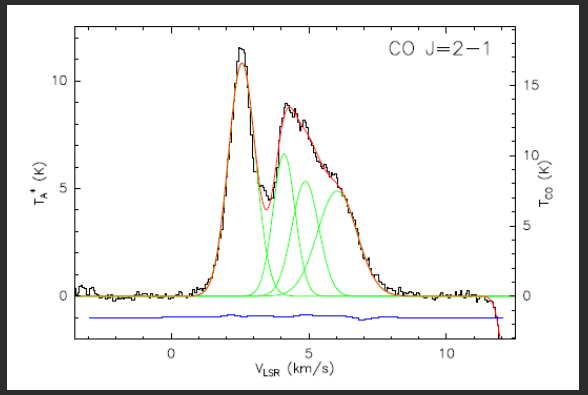


Flying Saucer



CO @ 230GHz

T_{dust} ~ 5 to 7K at 100 au

(Guilloteau et al. 2016)

Recent results

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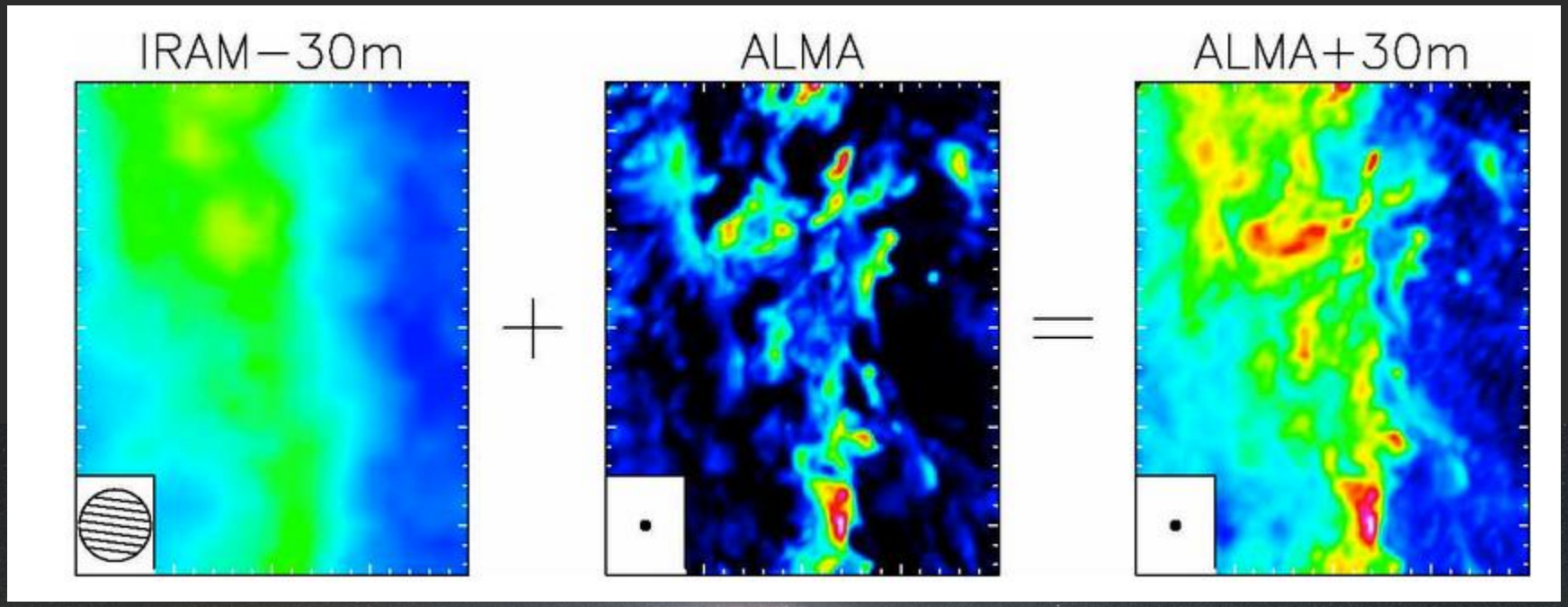
PDR region

Orion bar @ 345 GHz

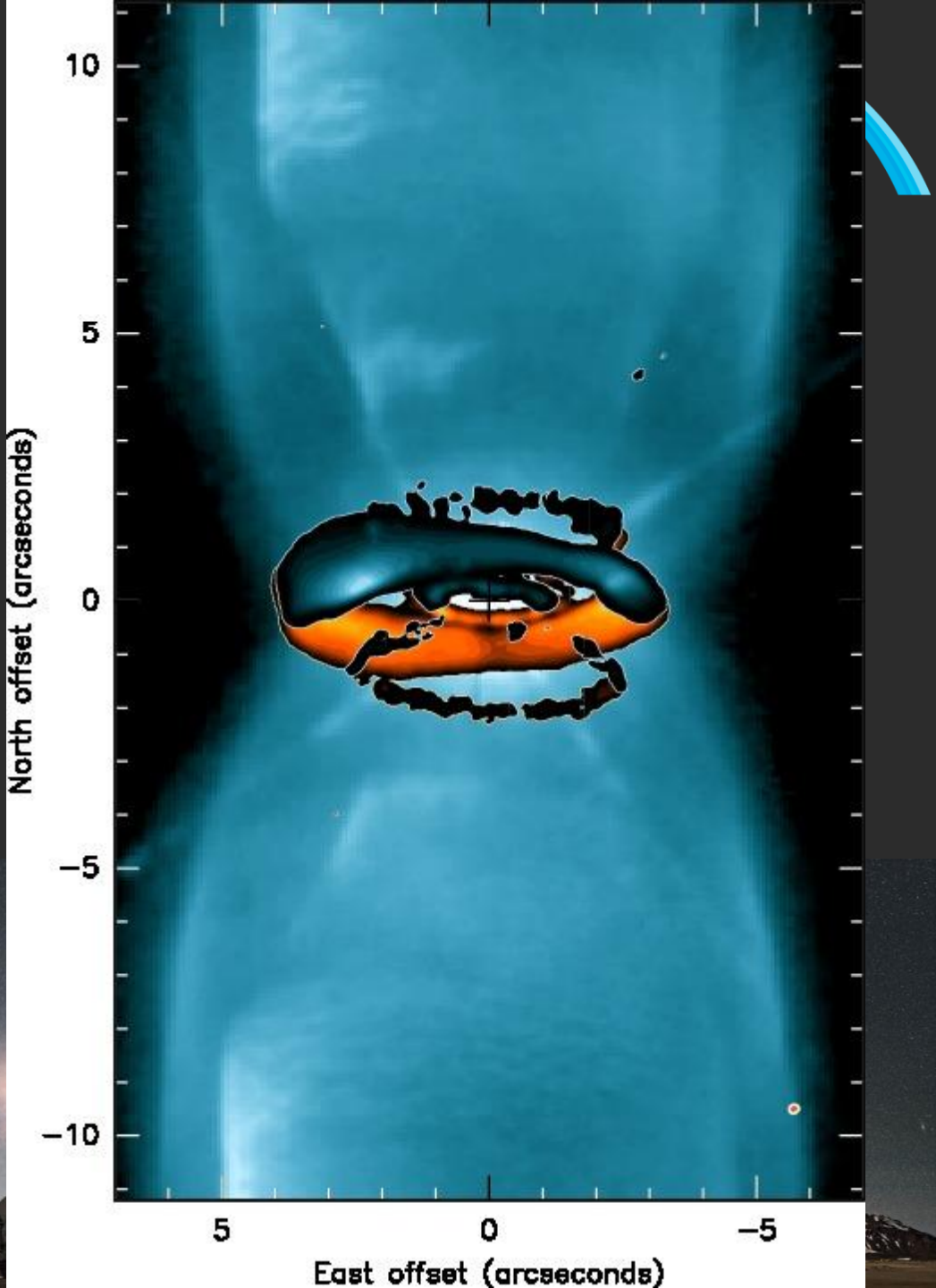


(Goicoechea et al. 2016)

Recent results

Evolved stars

(Castro Carrizo et al in prep.)



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ALMA Operation

ALMA Early Science

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Cycle 0: deadline mid 2011 ; observations in 2012
Cycle 1: deadline Jul 2012 ; observations in 2013-2014
Cycle 2: deadline Dec 2013: observations in 2014-2015
Cycle 3: deadline May 2015: observations in 2015-2016
Cycle 4: deadline May 2016: observation in 2016-2017
1571 proposals, 475 HP
Cycle 5: end of early science ?

Best effort basis

Pressure factor ~ **5—10**

ALMA capabilities deployment

Now distinguish between standard and non-standard modes
- ACA & SD, polarimetry, long baselines

ALMA Operations

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- Service observing operated by JAO with the help of the ARCs
- Proprietary period = **12 months**
- One single Time Allocation Committee for NA+EU+EA+CL
  - No guaranteed time
  - EU 33.75%, NA 33.75%, EA 22.5%, Chile 10% F ~ 5%

ALMA Operations

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In full operations:

- One call for proposals per year (deadline ~ April) started in Cycle 3
- Dynamic scheduling: best project determined every SB (hour scale) (status ?)
- Calibration & imaging pipeline (calibration for standard projects, imaging soon)
- Polarimetry (partially open)
- Large programs (open in Cycle 4)
- ACA stand alone (open in Cycle 4)
- Solar observation (open in Cycle 4)
- VLBI (open in Cycle 4)

ALMA Regional Centers

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Scientific operations & user support outside Chile

- Contact point between users and ALMA
- Call for proposals
- ALMA Helpdesk
- Data product support = delivering data and software
- ALMA archive operations

Three ARCs + JAO

ARCs:

- EU : ESO Garching (D)
- NA: NRAO Charlottesville (USA)
- EA: NAOJ Mitaka (J)

European ARC network

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Additional tasks : ARC nodes

- User formation & community development
- Phase II support (validation of SBs)
- **Face-to-face support** for data reduction
- New developments

- All nodes open to all European scientists but target own community
- IRAM = French, German, and Spanish communities

Seven ARC nodes in Europe

–INAF Bologna (I)
–Univ. Bonn (D)
–IRAM (F,D,E)
–Leiden Obs. (NL)
–Manchester Obs. (UK)
–Onsala Obs. (S,DK,SF)
–Prague (CZ)
+ Lisbone (P) Center of Expertise

IRAM ARC node

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- **Phase II and f2f support to ALMA**
  - Local contact assigned to each project
  - Use existing infrastructures and procedures
  - Travels to Grenoble funded by IRAM (same rules as NOEMA)
  - Limited staff (~1 FTE)
  - F2F and CS could be in different nodes

	High-Prio.	Fillers	Total	
Cycle 0	14/37	6/17	20/ 54	37%
Cycle 1	24/62	4/22	28/ 84	33%
Cycle 2	49/129	8/45	57/ 174	33%
Cycle 3	52/151	28/92	80/ 243	33%
Cycle 4	53/161	41/123	94/ 284	33%

IRAM ARC node

EUROPEAN ARC
ALMA Regional Centre || IRAM

- **Phase II and f2f support to ALMA**
  - Local contact assigned to each project
  - Use existing infrastructures and procedures
  - Travels to Grenoble funded by IRAM (same rules as NOEMA)
  - Limited staff (~1 FTE)
  - F2F and CS could be in different nodes

	High-Prio.	Fillers	Total	Actually supported
Cycle 0	14/37	6/17	20/ 54	20
Cycle 1	24/62	4/22	28/ 84	28
Cycle 2	49/129	8/45	57/ 174	57
Cycle 3	52/151	28/92	80/ 243	48
Cycle 4	53/161	41/123	94/ 284	64

User support

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- **Contact Scientists**
  - SB validation for all accepted + fillers projects (> observed projects)
  - Interface between PI and ESO & ALMA
  - Also: check projects status during Cycle
  - helpdesk
- **f2f support for data reduction**
  - Main task
  - Re-calibration
  - Re-imaging
  - Covers most bands & observing modes
  - Travel funding available (for PI affiliated to IRAM funding agencies) + MARCUS (radionet, restarting 2017)
  - No funding for specific computing equipment.
- Schools, workshops

How to use ALMA

Getting data

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- Phase I : proposal preparation and submission
- Phase II : Science Block preparation
- Observation
- Quality assessment (QA0, QA2)
- Data delivery
- Check the data (QA3)
- Analysis and publication

Phase I : PI

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- Call for proposal issued by JAO and the ARC
- **Science portal** (almascience.eso.org)
  - Call
  - Documentation
  - Observing tool
  - Duplication check list

Phase I : PI

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Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins

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User Services at ARCs

- Helpdesk
- ALMA Calendars
- EU ARC

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Sep 24, 2016

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Sep 05, 2016

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Aug 23, 2016

Cycle 4: Phase 2 kick-off
Aug 08, 2016

More...

Phase I : PI

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  - Cycle 4 Capabilities
  - Observing Tool
  - Sensitivity Calculator
  - Proposal Template
  - Duplications
  - ALMA Primer

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Proposing

The ALMA Director solicits proposals for observing time with the Atacama Large Millimeter/submm Array. The solicitation is done through a Call for Proposals, announced in this Section of the ALMA Science Portal. Supporting documents and associated software is made available to the community at the time of the call.

Proposals for use of Director's Discretionary Time (DDT) must currently be submitted using the Cycle 3 version of the ALMA Observing Tool available through the DDT proposal page.

Phase I : PI

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Summary of documents and tools available for ALMA

Call for Proposals

Documentation supporting the current ALMA Call for Proposals – **Cycle 4**. Documents from previous Cycles are provided here.

- ALMA Proposer's Guide (Contains all pertinent information regarding the ALMA Call for Proposals)
- ALMA Technical Handbook (A comprehensive description of the ALMA observatory and its components)
- ALMA Users' Policies (The long-term core policies for use of the ALMA and ALMA data by the science community.)
- Observing With ALMA - A Primer (Introduction to interferometry and how to use ALMA)
- ALMA Proposal Template (LaTeX format. Recommended but not mandatory)
- ALMA Proposal Review Process (An updated ALMA Principles of the ALMA Proposal Review Process)

Observing Tool (OT)

Documents and tools supporting the current ALMA Call for Proposals – **Cycle 4**.

The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase 1 (observing proposal) and Phase 2 (telescope runfiles for accepted proposals) materials. The current release of the OT is configured for Cycle 4 Capabilities of ALMA. Note that in order to submit proposals you will have to register with the ALMA Science Portal beforehand.

- ALMA Observing Tool (takes you to the OT page on the Science Portal)
- OT Quickstart (A Quick Start Guide for using the Observing Tool)
- OT User Manual (Describes how to use the Observing Tool for preparing ALMA proposals)
- OT Reference Manual (An in-depth description of the Observing Tool)
- Video Tutorials on how to use the Observing Tool
- Known OT issues (for those instances when OT problems are encountered)
- A User's Guide to ALMA Scheduling Blocks is a guide to understanding the structure and content of ALMA Scheduling Blocks (SBs) using the Observing Tool (OT). In particular this guide may be used by PIs when asked to verify and approve their SBs before they are placed in the queue, ready for observing.

Guides to the ALMA Regional Centers

The ALMA Regional Centers provide user support and host special activities related to their respective regions. Their functions are described in the 'Guide to'.

- Guide to the East Asian ARC
- Guide to the European ARC
- Guide to the North American ARC

ALMA Sensitivity Calculator (ASC)

The ALMA Sensitivity Calculator (ASC) will calculate the necessary integration times for a given sensitivity, or vice versa, for your ALMA observing project.

Phase I : PI

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Call for Proposals

The ALMA Director, on behalf of the Joint ALMA Observatory (JAO) and the partner organizations in East Asia, Europe, and North America, is pleased to announce the ALMA Cycle 4 Call for Proposals (CfP) for scientific observations to be scheduled from October 2016 to September 2017. It is anticipated that up to 3000 hours of the 12-m Array and up to 1800 hours of the Atacama Compact Array (ACA), also known as the Morita Array, will be available for successful proposals from Principal Investigators (PIs) in Cycle 4. Proposals must be prepared and submitted using the ALMA Observing Tool (OT), which is available for download from the ALMA Science Portal (www.almascience.org). Proposals will be assessed by competitive peer review by a single international review committee.

ALMA Cycle 4 proposal submission will open at:

15:00 UT on Tuesday 22 March 2016.

The ALMA Cycle 4 proposal submission deadline is:

15:00 UT on Thursday 21 April 2016.

Table 1 summarizes these and other important milestones for Cycle 4.

ALMA provides continuum and spectral line capabilities for wavelengths from 0.32 mm to 3.6 mm, and for angular resolutions from 0.024" to 3.7" on the 12-m Array. Cycle 4 offers several new technical capabilities, including Solar, millimeter-wavelength Very Long Baseline Interferometry (mm VLBI), spectral-line linear polarization, and ACA stand-alone observations. In addition, for the first time ALMA will accept Large Proposals, which are programs that request more than 50 hours of time on the 12-m Array or the ACA in stand-alone mode to address key scientific questions. Up to 15% of the available time will be allocated to Large Proposals.

The Proposer's Guide provides all the necessary information needed for submitting proposals including an overview of the types of proposals offered in Cycle 4 (Section. 4), information on planning (Section. 5) and submitting (Section. 6) proposals, and an overview of technical capabilities (Appendix A). Investigators are also strongly encouraged to review the ALMA User's Policies which describe the long term core policies used by ALMA and describes the policies for proposal change requests and the requirements for the use of ALMA data. Questions about proposal preparation and submission, data use or general ALMA policies should be submitted through the ALMA Helpdesk).

Table 1: The ALMA Cycle 4 Timeline

Date	Milestone

Phase I : Observing tool

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- Java tool mandatory to prepare and submit the proposal
- Need the updated version
- Complex: do not start at the latest moment

Phase I : Observing tool

EUROPEAN ARC
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ALMA Observing Tool (Cycle4) - Project

File Edit View Tool Search Help Perspective 1

Project Structure

Proposal | Program

Unsubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Science Goal)
        - General
        - Field Setup
        - Spectral Setup
        - Calibration Setup
        - Control and Performance
        - Technical Justification

Editors

Spectral | Spatial | Spectral Setup

Spectral Type

Spectral Type: ◉ Spectral Line ○ Single Continuum ○ Spectral Scan

Polarization products desired: ○ XX ◉ DUAL ○ FULL

Spectral Setup Errors

Spectral Line

Baseband-1

Fractio	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec Avg.	Representati Window
1/2	230.53800 G...	230.53822 G...	CO v=0 2-1	117.188 MHz(152 km/s), 122.070 kHz(0.159 km/s)	1	◉
1/4	231.22069 G...	231.22091 G...	13CS v=0 5-4	58.594 MHz(76 km/s), 122.070 kHz(0.158 km/s)	1	○
1/4	231.32183 G...	231.32205 G...	N2D+ J=3-2	58.594 MHz(76 km/s), 122.070 kHz(0.158 km/s)	1	○

Select Lines to Observe in Baseband-1... | Add | Delete

Baseband-2

1(Full)	230.00000 G...	230.00022 G...	...Enter Name...	1875.000 MHz(2444 km/s), 31.250 MHz(40.733 km/s)	1	○

Select Lines to Observe in Baseband-2... | Add | Delete

Baseband-3

Feedback

Validation | Validation History | Log

Phase I : Observing tool

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- Java tool mandatory to prepare and submit the proposal
- Need the updated version
- Complex: do not start at the latest moment
- Documentation:
  - OT quick start
  - Video tutorial

Phase I : Observing tool

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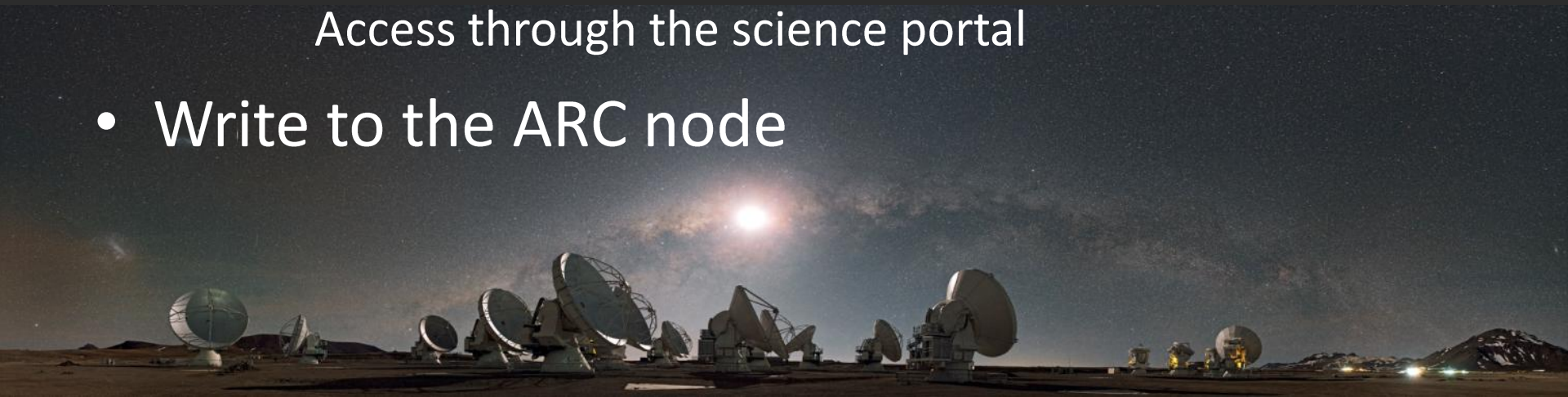
In case of any problem, do not hesitate to

- Consult
  - Troubleshooting page
  - Known OT issues
- Write to the helpdesk (recommended)

Access through the science portal

- Write to the ARC node



Helpdesk

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Helpdesk

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Please type your search query here SEARCH

Search in: Tickets KB articles Science Portal Help

View Tickets

Hide Closed and Resolved Tickets

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Ticket ID	Last Update	Last Replier	Department	Status
How to add several "previous proposals" in the OT?				
8500	21 April 2016 06:40 PM	Andy Biggs	Observing Tool (...	Closed
A PI cannot login to the helpdesk				
	08 April 2016 08:16	Evanthia		

You get time! Phase II

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Preparation of the "Scheduling Block" SB

Until cycle 3:

- Each project has a contact scientist "CS" and a "P2G" assigned
- Science Block "SB" prepared by "batch" along the year, according to the antenna configuration schedule
- SB prepared by the P2G (Phase 2 Generator) at ESO
- Send to the CS (contact scientist) in an ARC node
- The CS check the file, ask question give comments to the P2G, then send the file to the PI
- PI check the file, comments, ask questions to the CS
- The CS reply to the PI, or transmit the question to ESO, or ask the PI to do a "change request" via the helpdesk
- When the PI is happy, CS ask P2G to submit the file to the archive i.e. the project is in the observing queue!

Phase II Cycle 3

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PI @ home

CS @ node

P2G @ ESO

JAO @ Chile

Phase II Cycle 3

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PI @ home

CS @ node

1 :P2G prepared the SB (aot file)

P2G @ ESO

constraints

JAO @ Chile

Phase II Cycle 3

EUROPEAN ARC
ALMA Regional Centre || IRAM

PI @ home

CS @ node

2 : CS check

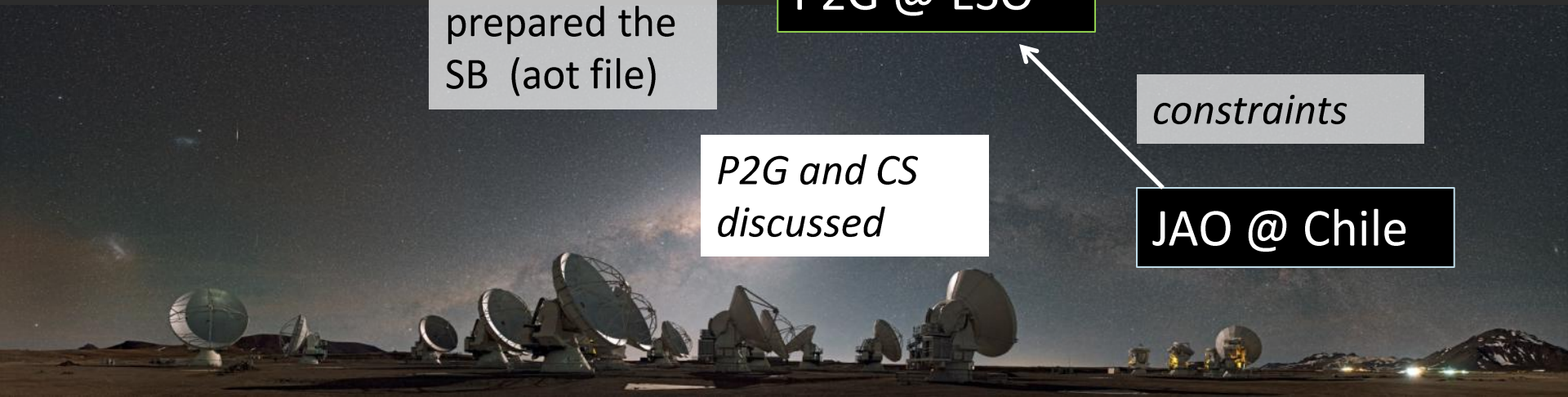
1 :P2G prepared the SB (aot file)

P2G @ ESO

constraints

P2G and CS discussed

JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
ALMA Regional Centre || IRAM

3 : PI check

PI @ home

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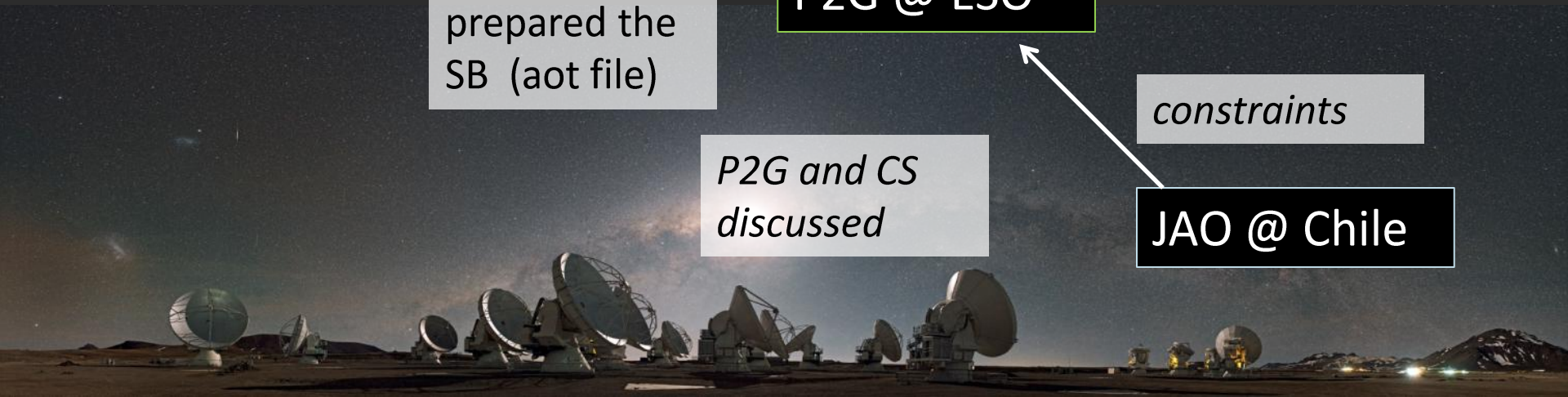
JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
ALMA Regional Centre || IRAM

3 : PI check

PI @ home

4 : PI and CS discussed

CS @ node

2 : CS check

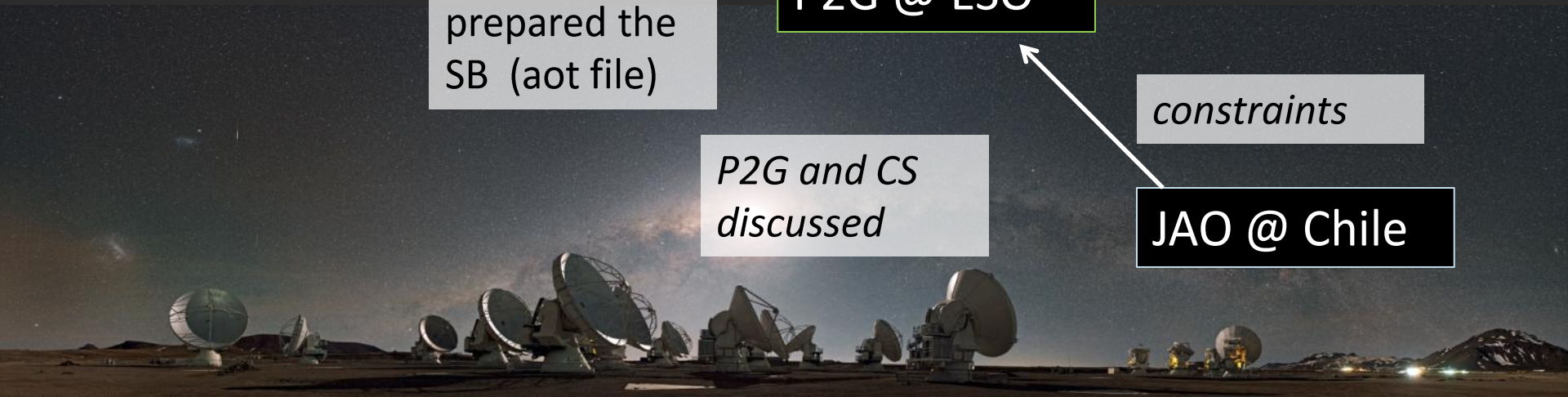
1 :P2G prepared the SB (aot file)

P2G @ ESO

constraints

P2G and CS discussed

JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
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3 : PI check

PI @ home

4 : PI and CS discussed

5 : PI happy Validate

CS @ node

2 : CS check

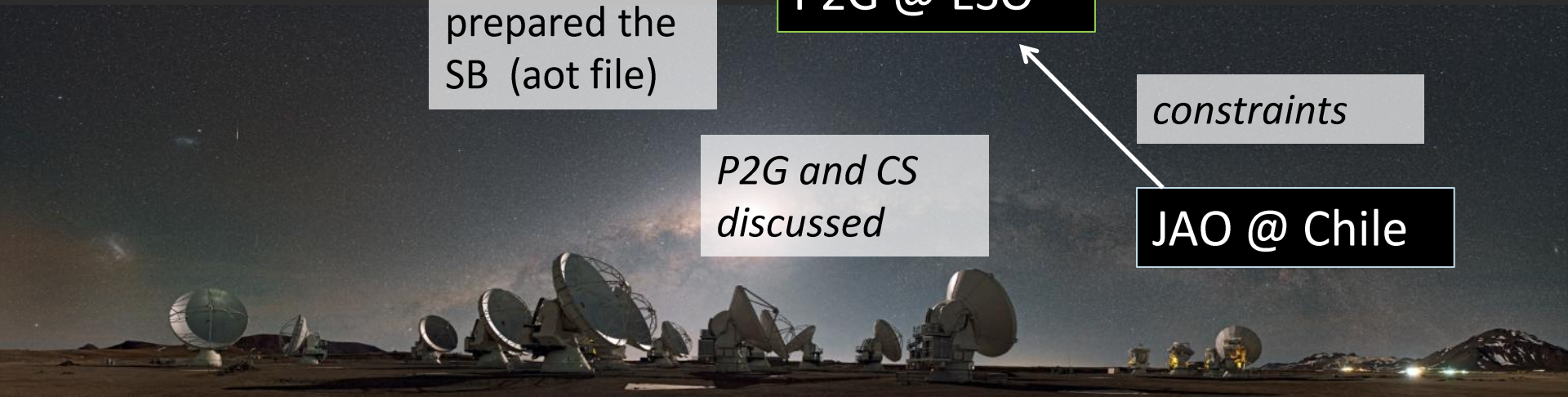
1 :P2G prepared the SB (aot file)

P2G @ ESO

constraints

P2G and CS discussed

JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
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3 : PI check

PI @ home

4 : PI and CS discussed

5 : PI happy Validate

CS @ node

2 : CS check

6 : validation

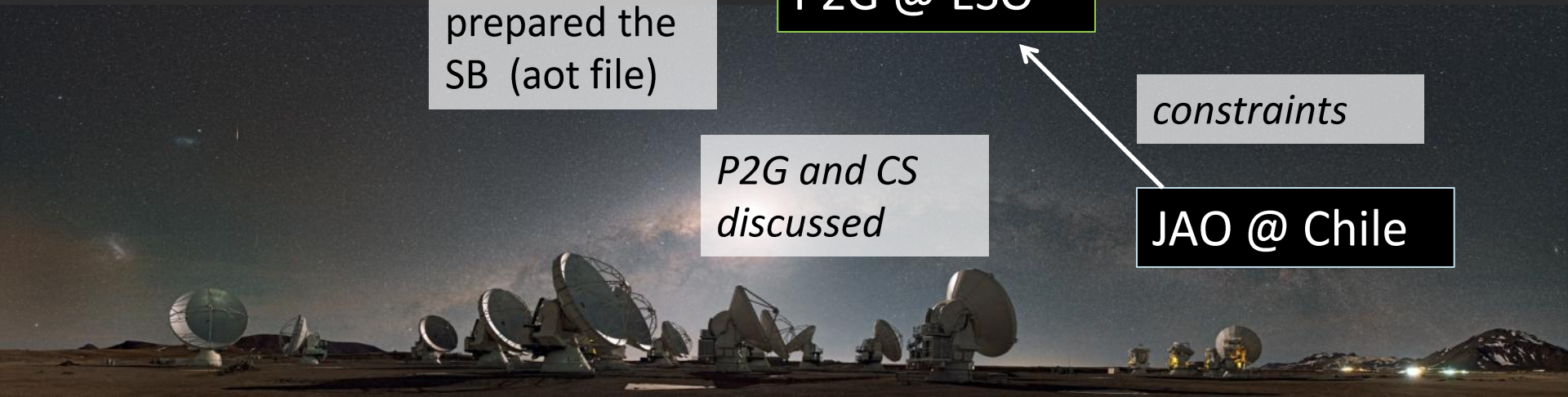
1 :P2G prepared the SB (aot file)

P2G @ ESO

constraints

P2G and CS discussed

JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
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3 : PI check

PI @ home

4 : PI and CS discussed

5 : PI happy Validate

CS @ node

2 : CS check

6 : validation

1 :P2G prepared the SB (aot file)

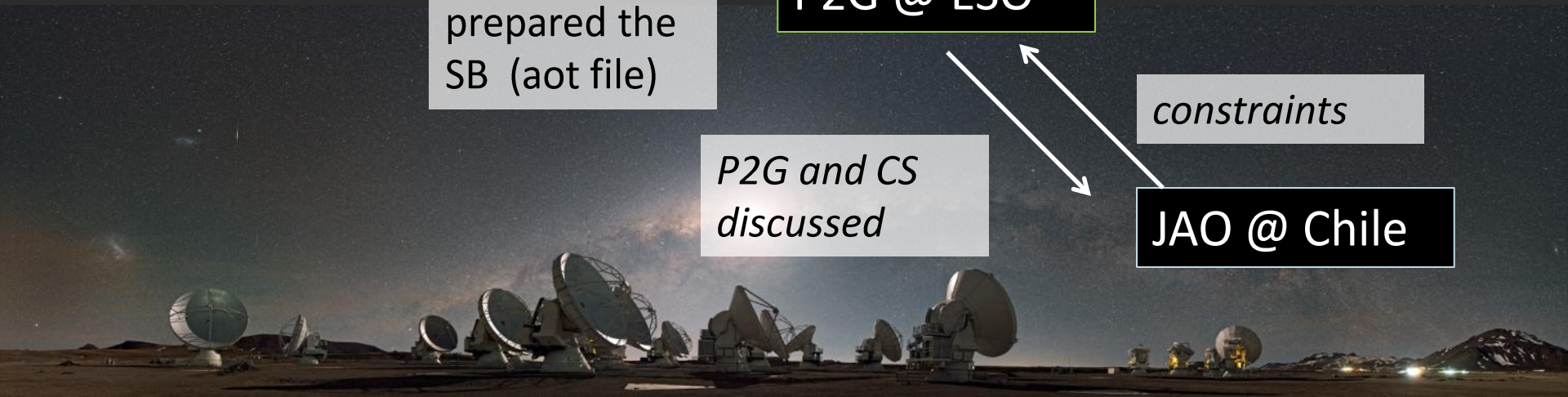
P2G @ ESO

7 : submission

constraints

P2G and CS discussed

JAO @ Chile



Phase II Cycle 3

EUROPEAN ARC
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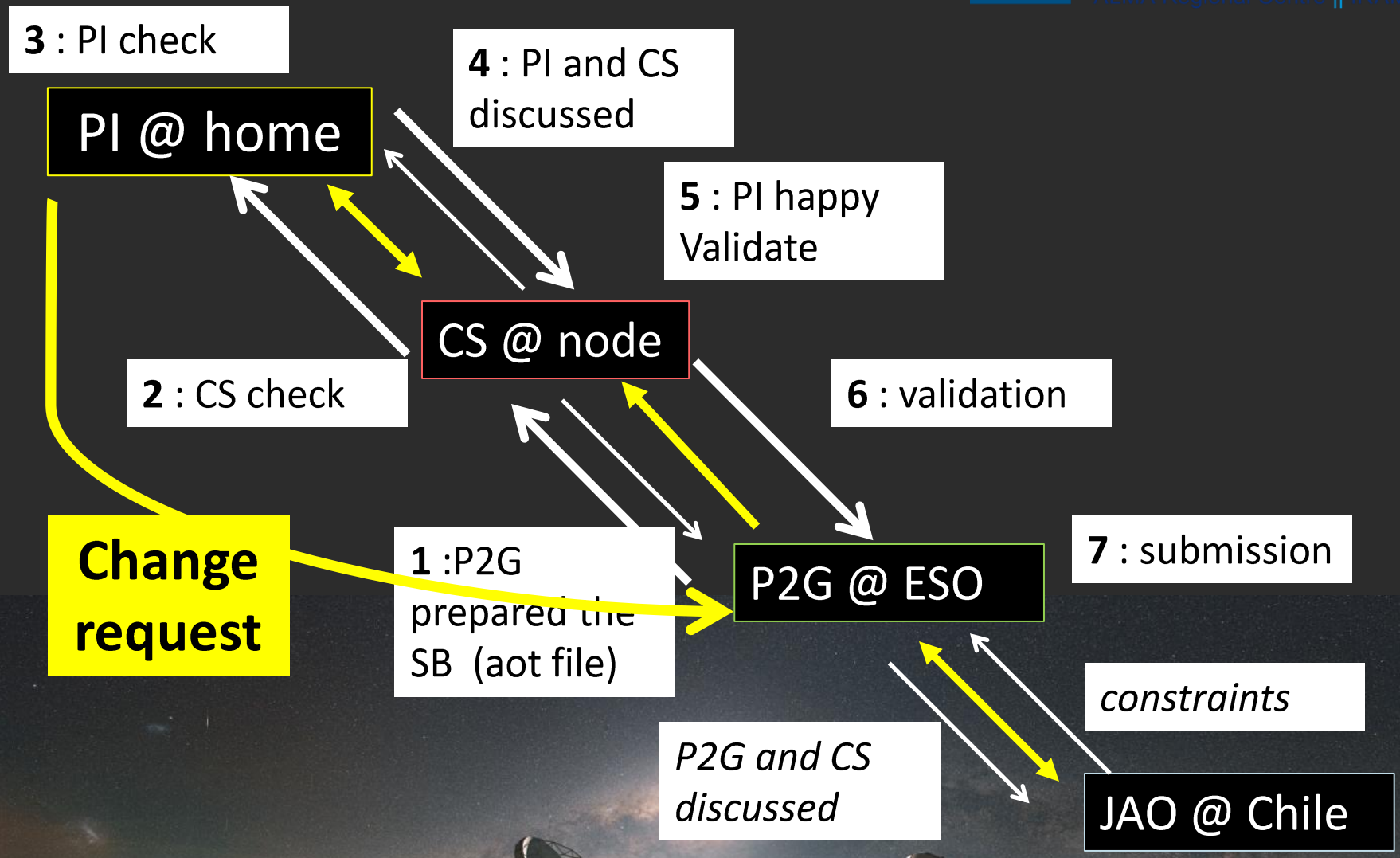
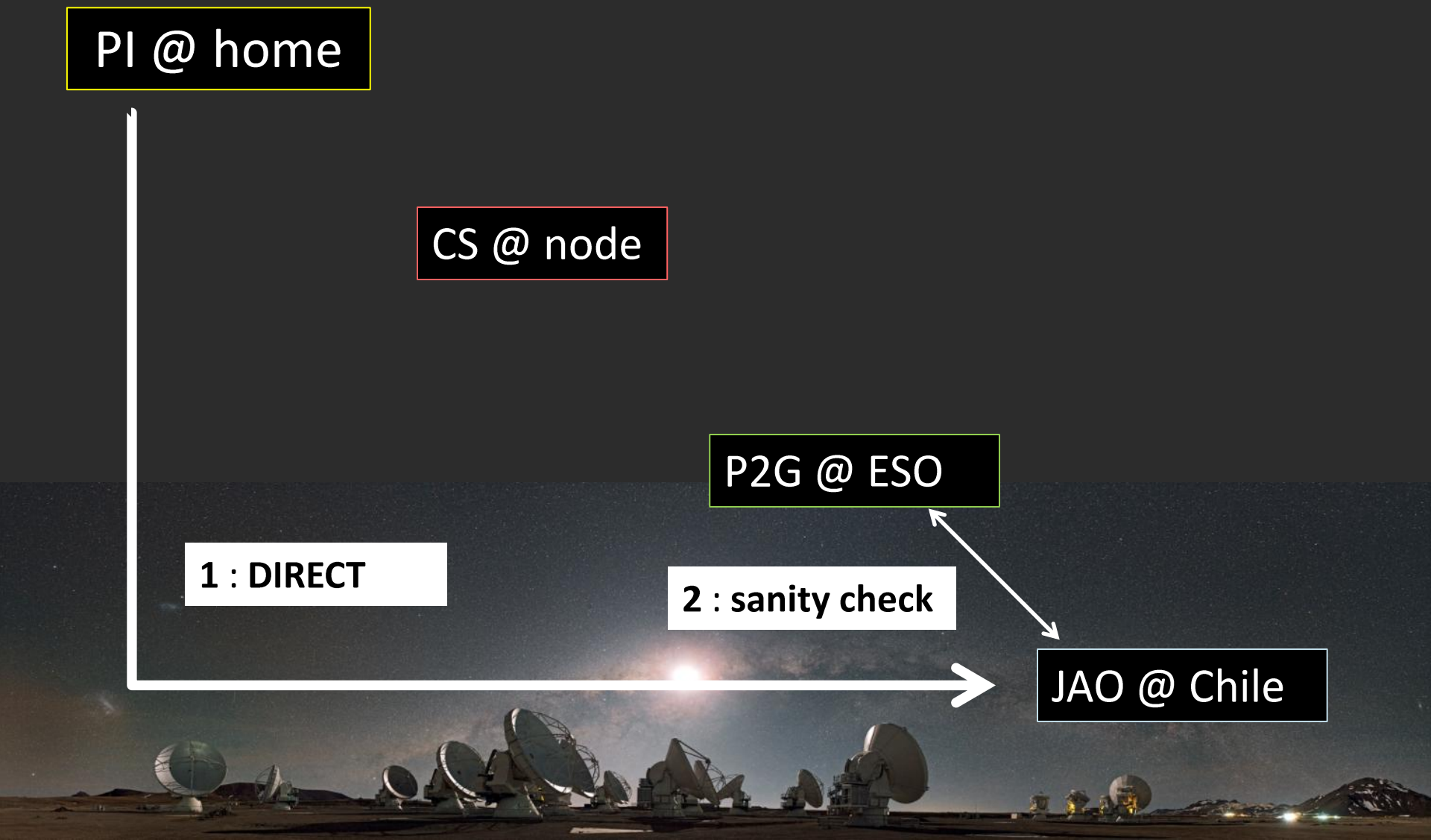


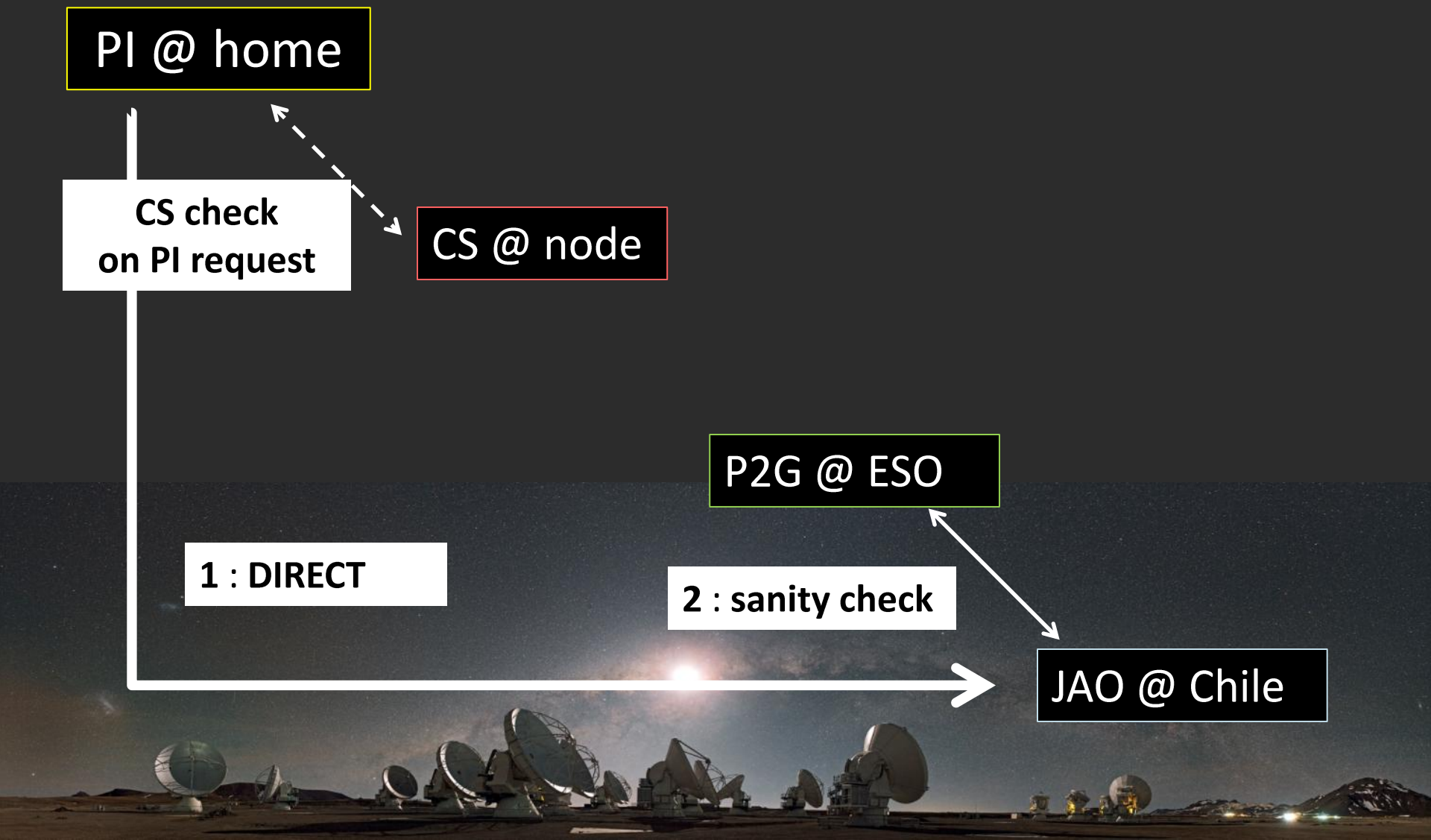
Phase II Cycle 4

EUROPEAN ARC
ALMA Regional Centre || IRAM



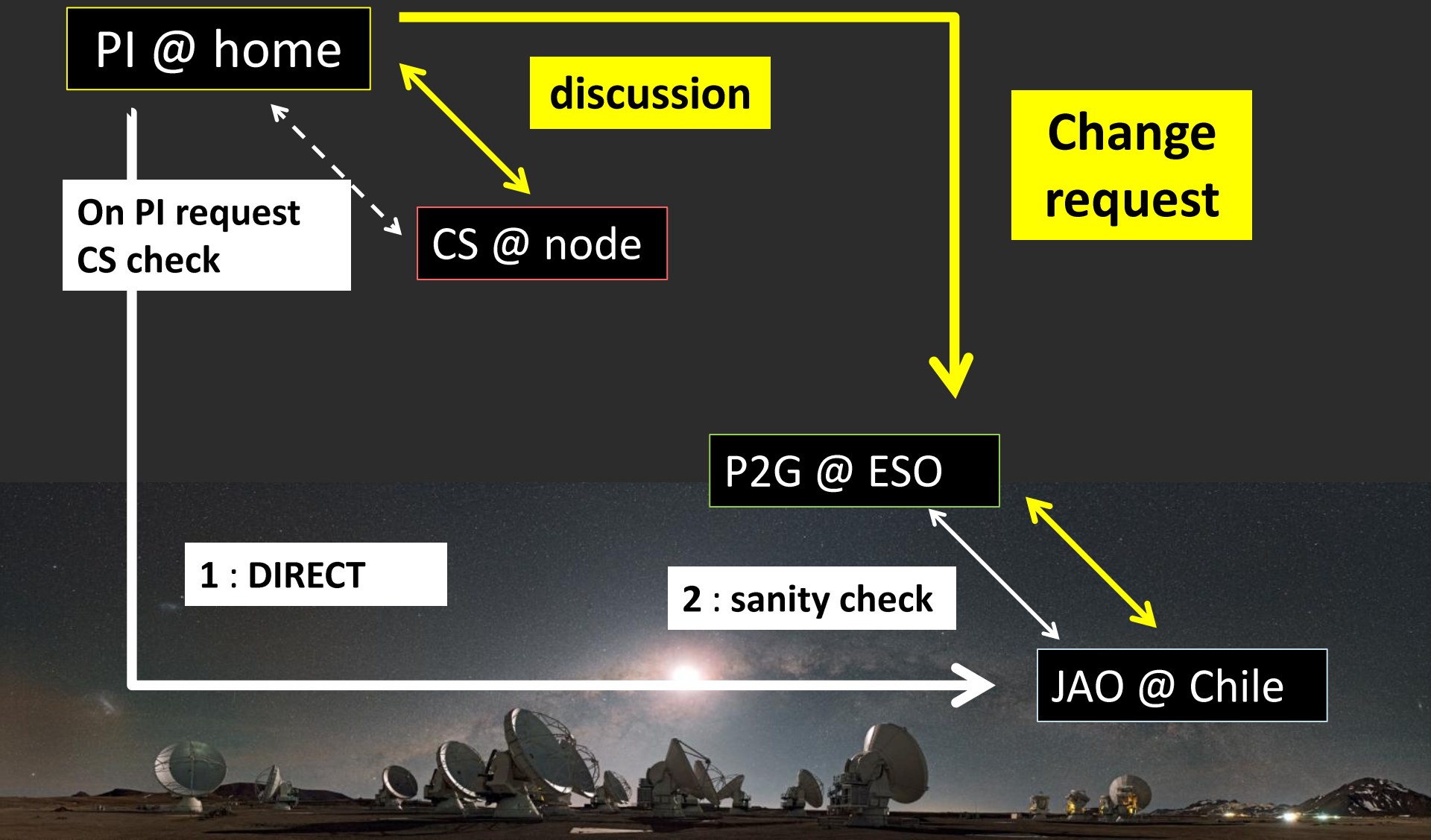
Phase II Cycle 4

EUROPEAN ARC
ALMA Regional Centre || IRAM



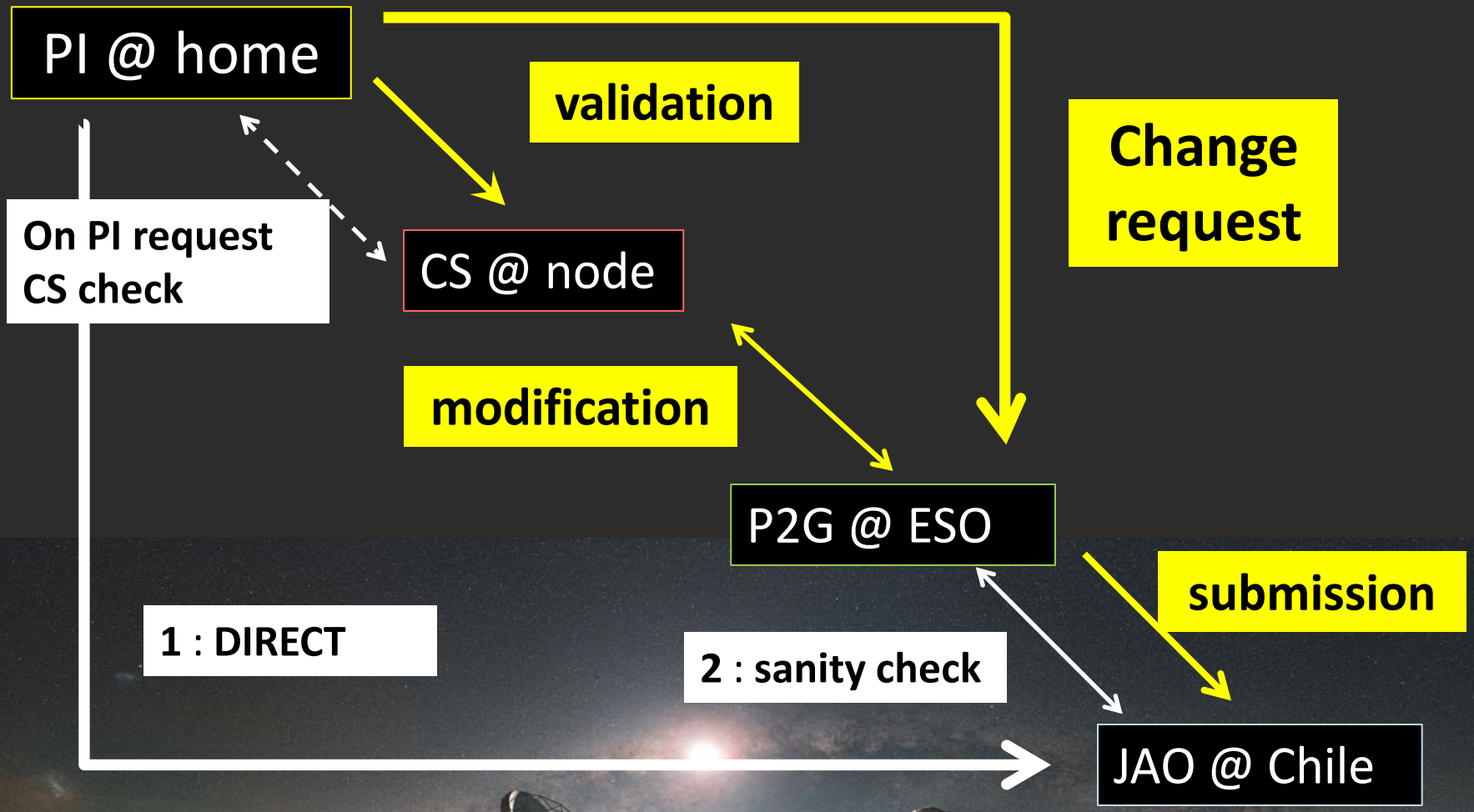
Phase II Cycle 4

EUROPEAN ARC
ALMA Regional Centre || IRAM



Phase II Cycle 4

EUROPEAN ARC
ALMA Regional Centre || IRAM



Phase II Cycle 4

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Preparation of the "Scheduling Block" SB

From cycle 4:

- All project prepared in 1 batch
- **PI** of "standard" project generate the **SB** thanks to the **OT**
  - Minor change by the PI
  - Major change by P2G, after "change request" (HD)
- CS assigned to each project,
  cannot access the files, check only on PI request
- **Hard deadline mid of September (project downgraded)**

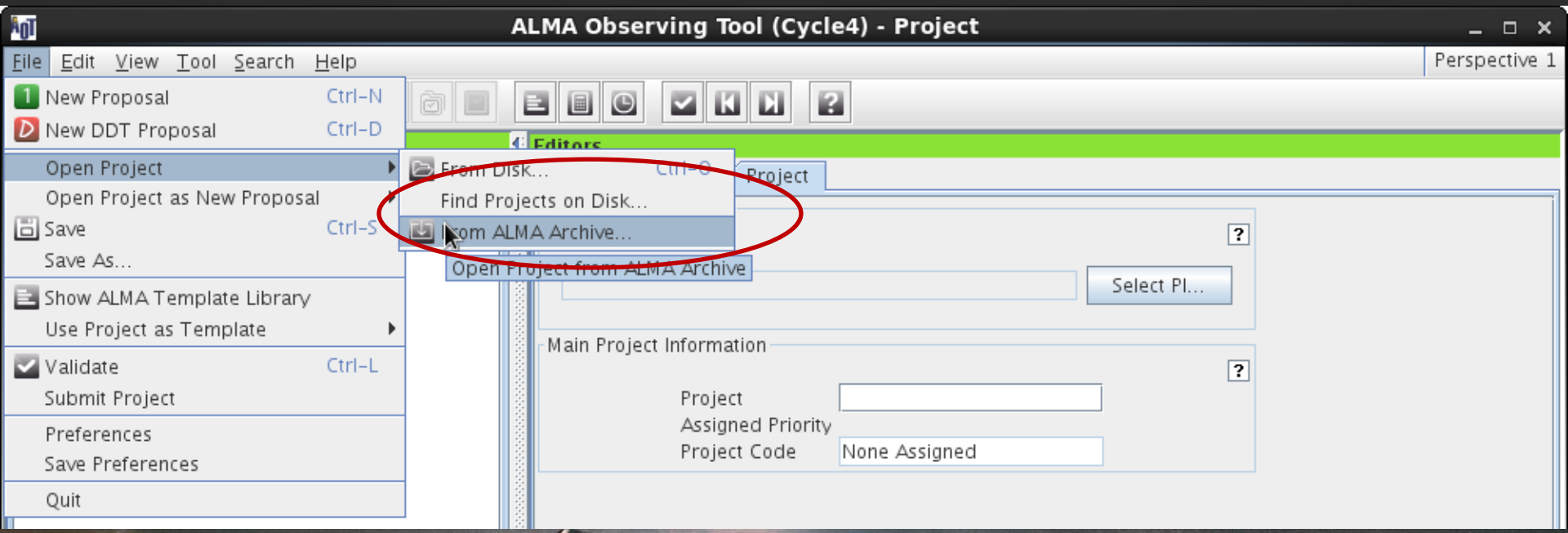
Phase II : OT

EUROPEAN ARC
ALMA Regional Centre || IRAM

With the OT

Get the *.aot file

- from your CS (via Helpdesk) up to cycle 3
- From the archive (via OT, file > open project > From ALMA archive)



Phase II : OT

EUROPEAN ARC
ALMA Regional Centre || IRAM

With the OT

Get the *.aot file

- from your CS (via Helpdesk) up to cycle 3
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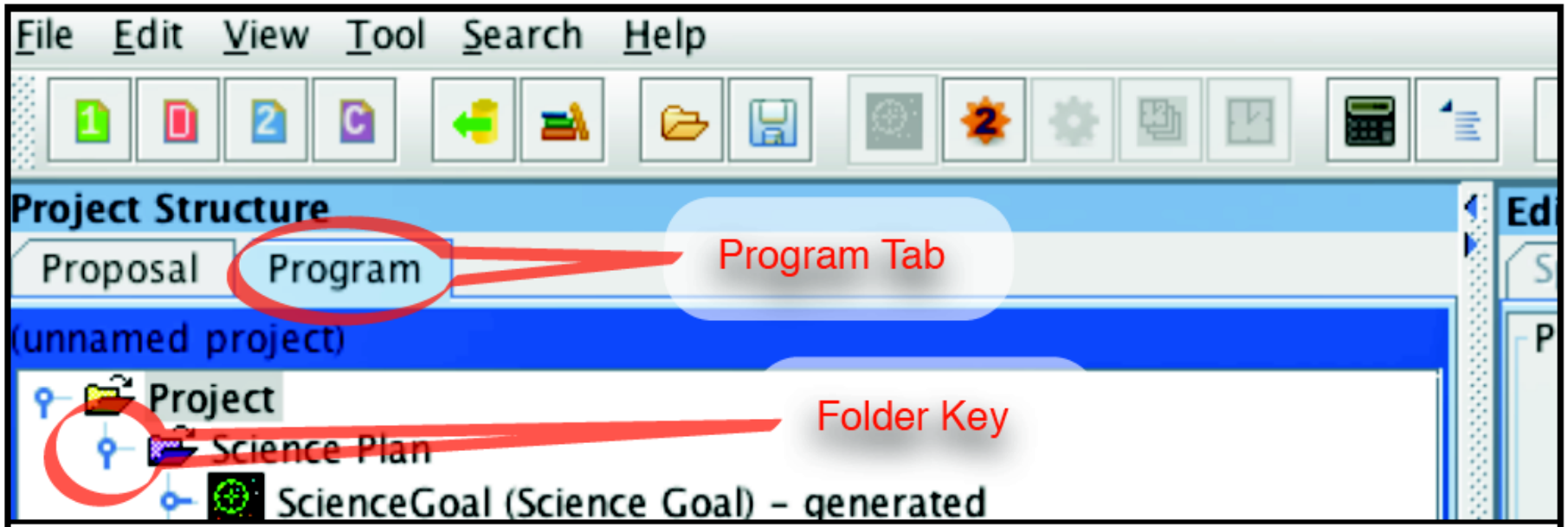

Figure 3: The "Program" tab (circled) contains the files generated at Phase 2, including the SBs. Clicking the folder key symbol exposes or hides the contents of the file. Right-clicking the key symbol and selecting "Expand all" allows you to see all the files under that key.

Phase II : OT

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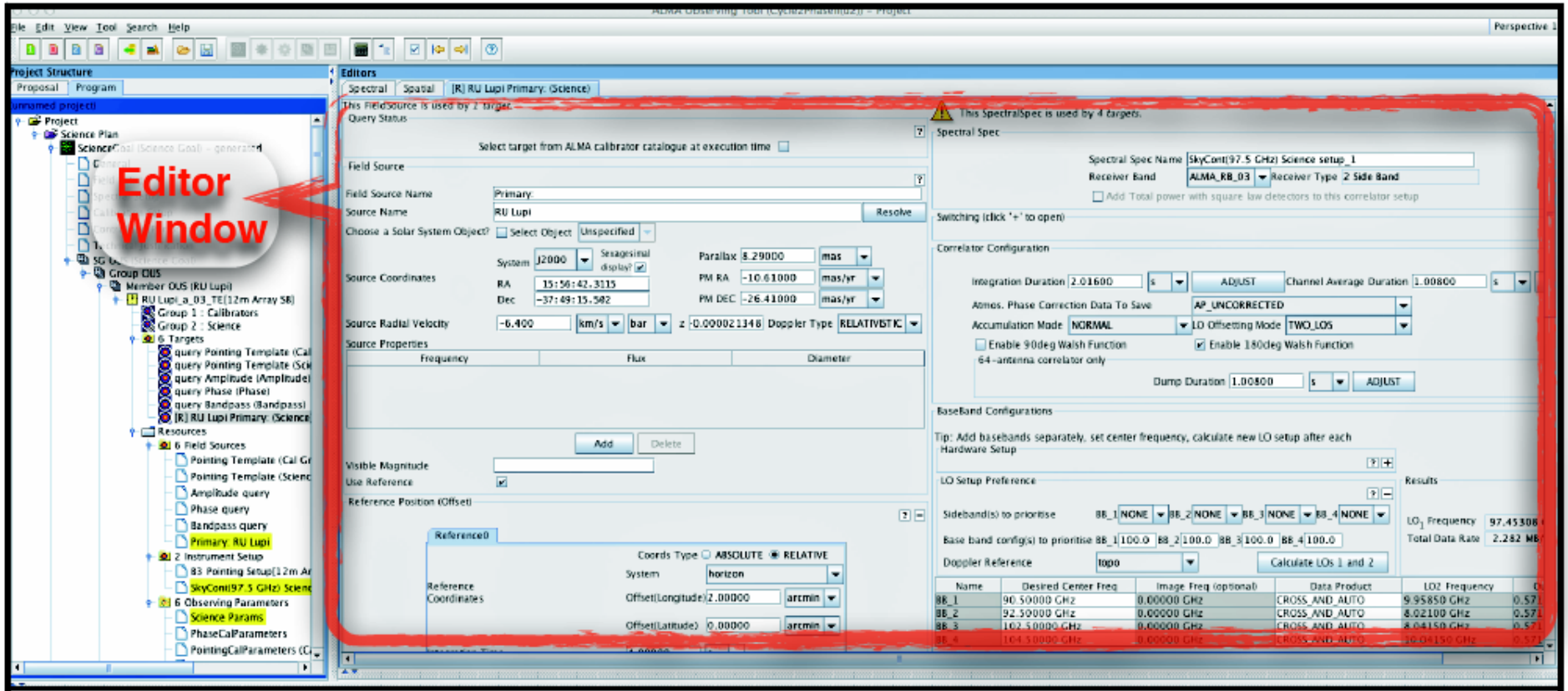

Figure 6: All observing parameters for the SB are viewable in the Editor Window.

Several configuration and/ot ACA :

→multiple “science Block” for 1 “Science Goal”

Phase II : documentation

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Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins

Search Site

ESO NRAO NAOJ

Log in | Register | Reset Password | Forgot Accou

- About
- Science
- Proposing
- Observing
  - Phase 2
  - ToO activation
  - ALMA Status Page
  - SnooPI
  - High Priority Projects
- Data
- Documents & Tools
- Knowledgebase/FAQ

You are here: Home / Observing / Phase 2

Phase 2

Phase 2 generation for Cycle 4

All Projects approved for observations with ALMA need to go through the Phase 2 generation. ***In Cycle 4, PIs of approved ALMA Projects are responsible for generating and submitting Phase 2 Scheduling Blocks (SBs). The Phase 2 submission deadline is September 15, 2016 at 1500 UT.*** Shortly after receiving the notification letters, PIs of approved projects are contacted by ALMA via a Helpdesk ticket. Any necessary communication between the PI and ALMA concerning the approved project should proceed by replying to this Helpdesk ticket. The only exception is for official change requests, which require an official change request ticket to be opened. The Project Helpdesk ticket is assigned to a Contact Scientist who will be happy to assist with any queries that may arise. However, it is in no way mandatory to reply to the Helpdesk ticket if the PI is able to generate and submit the Phase 2 products to their satisfaction.

PIs of approved Projects should consult the following references:

- Phase 2 QuickStart Guide provides instructions on generating and submitting Phase 2 SBs.
- User's Guide to ALMA Scheduling Blocks describes how to understand the structure and content of ALMA Scheduling Blocks (SBs) using the Observing Tool (OT).

Users may also reference the ALMA Proposer's Guide and the ALMA Technical Handbook for the present Cycle.

Phase II : documentation

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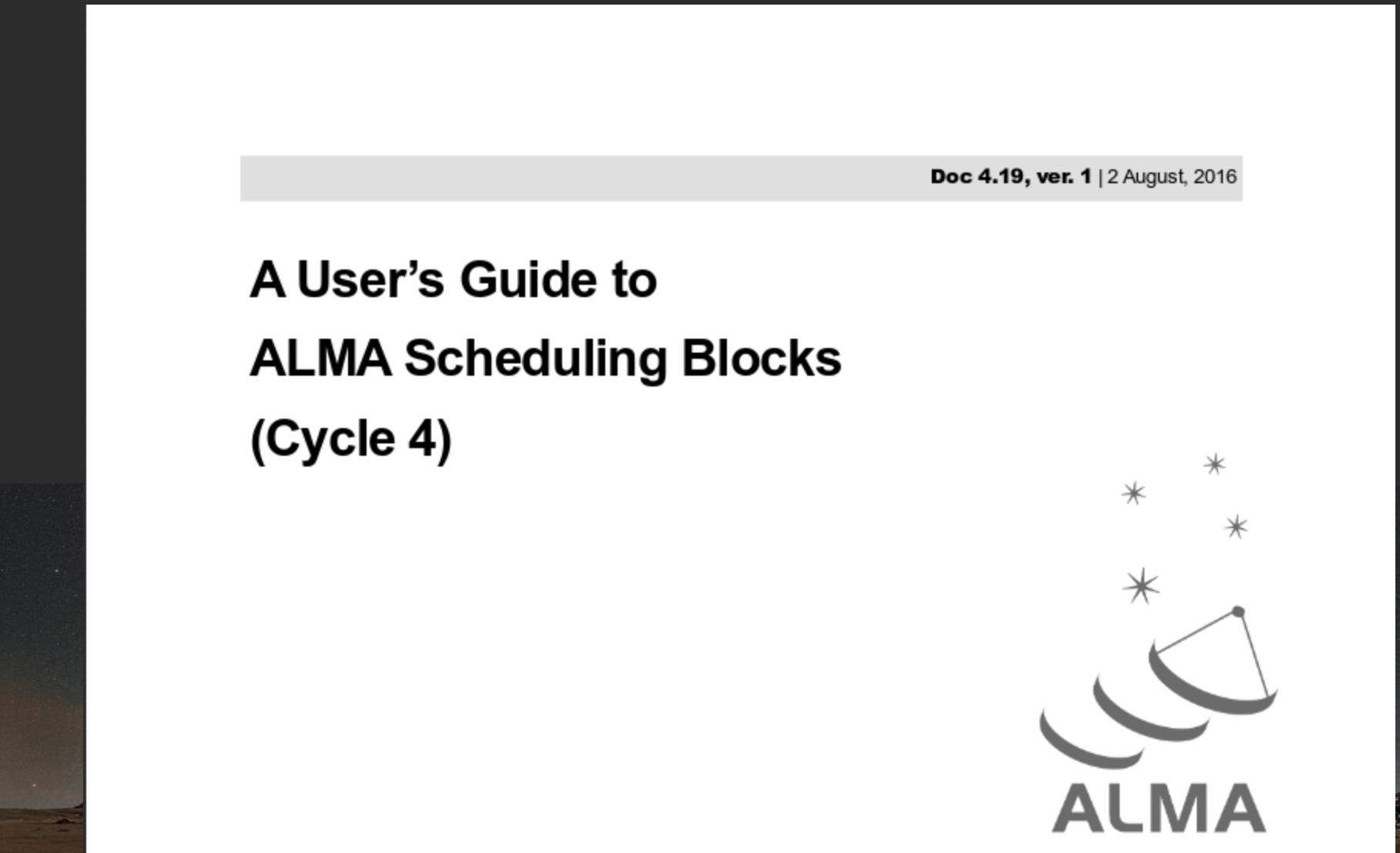


During observation

EUROPEAN ARC
ALMA Regional Centre || IRAM

For each SB (i.e. 1 freq /source/ant.conf), first status = "READY"

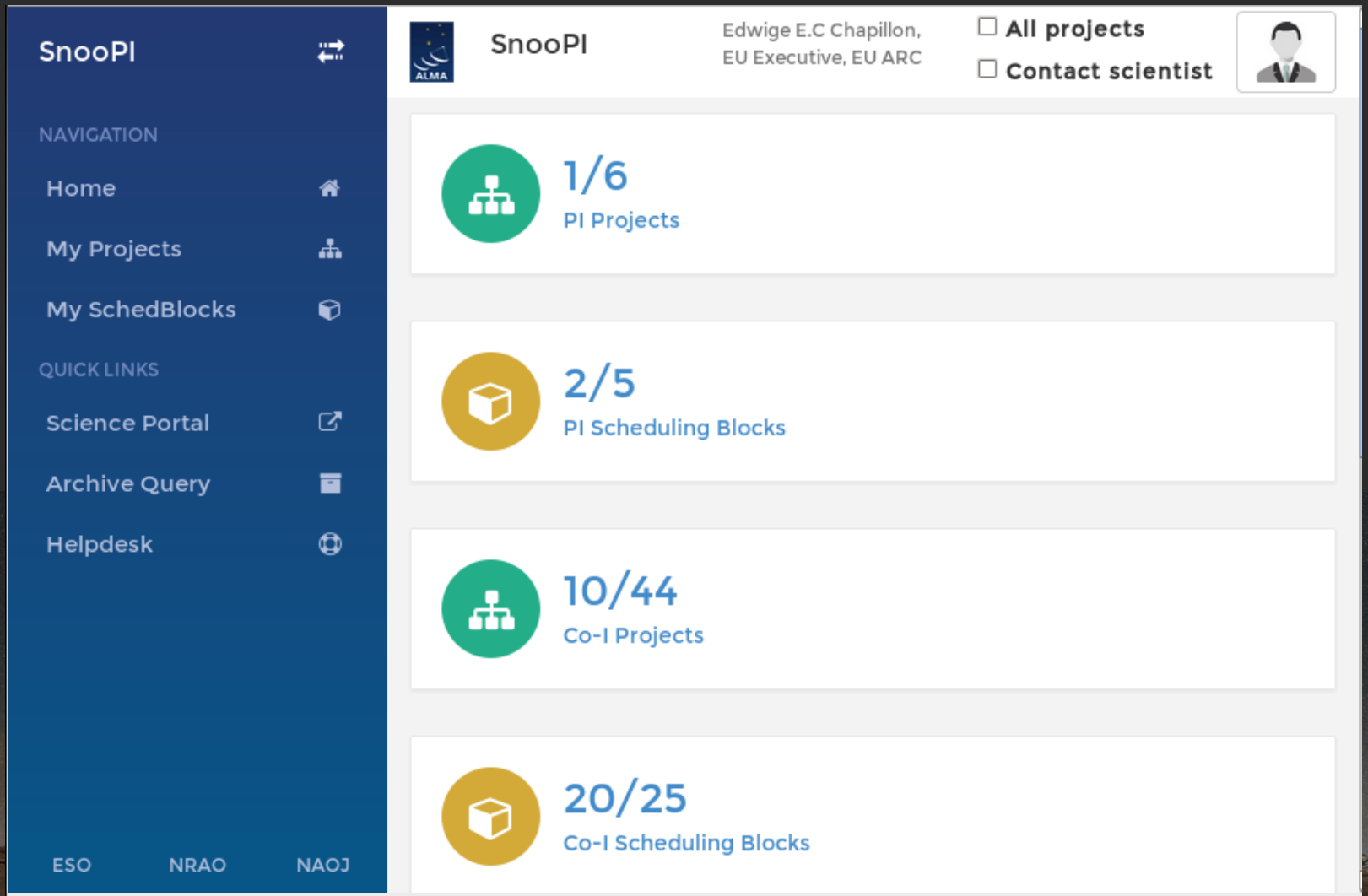
- 1 observation = 1 EB,
- After each EB : QA0 (sanity check)
- When the requested # of QA0 PASS EB is reached
  → "fullyObserved"
- Then go to QA2
  - Standard projects calibration with the **pipeline** at JAO
  - Others calibrated **"by hand"** at the ARC (nodes)
  - **Images still by hand** at the ARC (nodes)
  - DRM (Data Reduction Manager) at ARC decide if it is PASS of FAIL

  Pipeline should do more and more
- If FAIL go back to the observation queue
- If PASS delivered to PI status "delivered"

SnooPI

EUROPEAN ARC
ALMA Regional Centre || IRAM

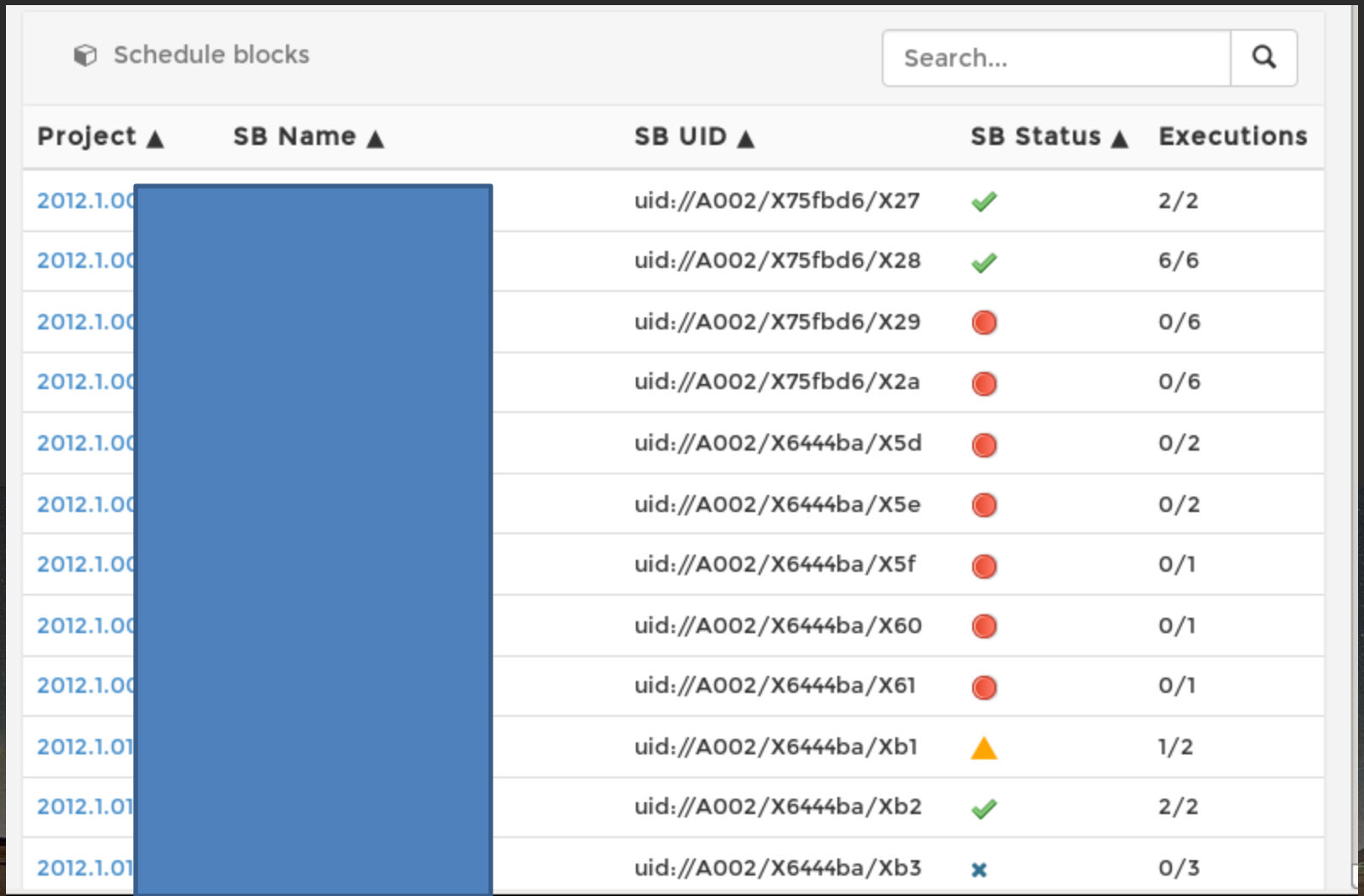
Follow your project status on the **“SnooPI”**



SnooPI

EUROPEAN ARC
ALMA Regional Centre || IRAM

Follow your project status on the **“SnooPI”**



After observation

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ALMA Regional Centre || IRAM

One of your SB is observed (i.e. not necessary all your project!)

- **Proprietary period** start the day of delivery, i.e. is different for each SB

- **Delivered data** consist of a tree of directories:

For each SB :

  - Raw data (asdm format) "raw" [optional]
  - Calibration and imaging scripts used for the QA2 "script"
  - Plots made during the QA2 "qa"
  - Images "product"
  - Calibration table "calibration"

After observation

EUROPEAN ARC
ALMA Regional Centre || IRAM

One of your SB is observed (i.e. not necessary all your project!)

- **Proprietary period** start the day of delivery, i.e. is different for each SB

- **Delivered data** consist of a tree of directories:

When the reduction is done by the pipeline:

  - The scripts are non human readable
  - The plots are stored in an html “weblog”
  - The tree and the plots change from a version of the pipeline to an other

After observation

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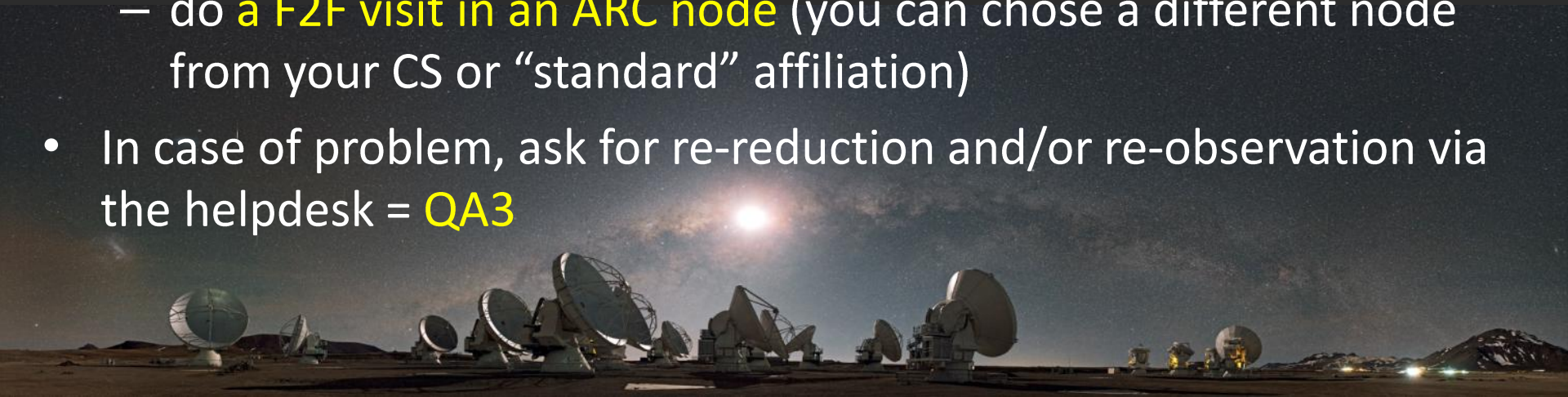
- You may want to check the calibration, and/or redo imaging
- You need to rerun the calibration scripts to have the calibrated visibilities, using the SAME CASA version used by the QA2 (not always the same for all SB)
- To got some help :
  - CASA guides casaguides.nrao.edu
  - Question to the helpdesk
  - do a F2F visit in an ARC node (you can chose a different node from your CS or “standard” affiliation)
- In case of problem, ask for re-reduction and/or re-observation via the helpdesk = QA3



After observation

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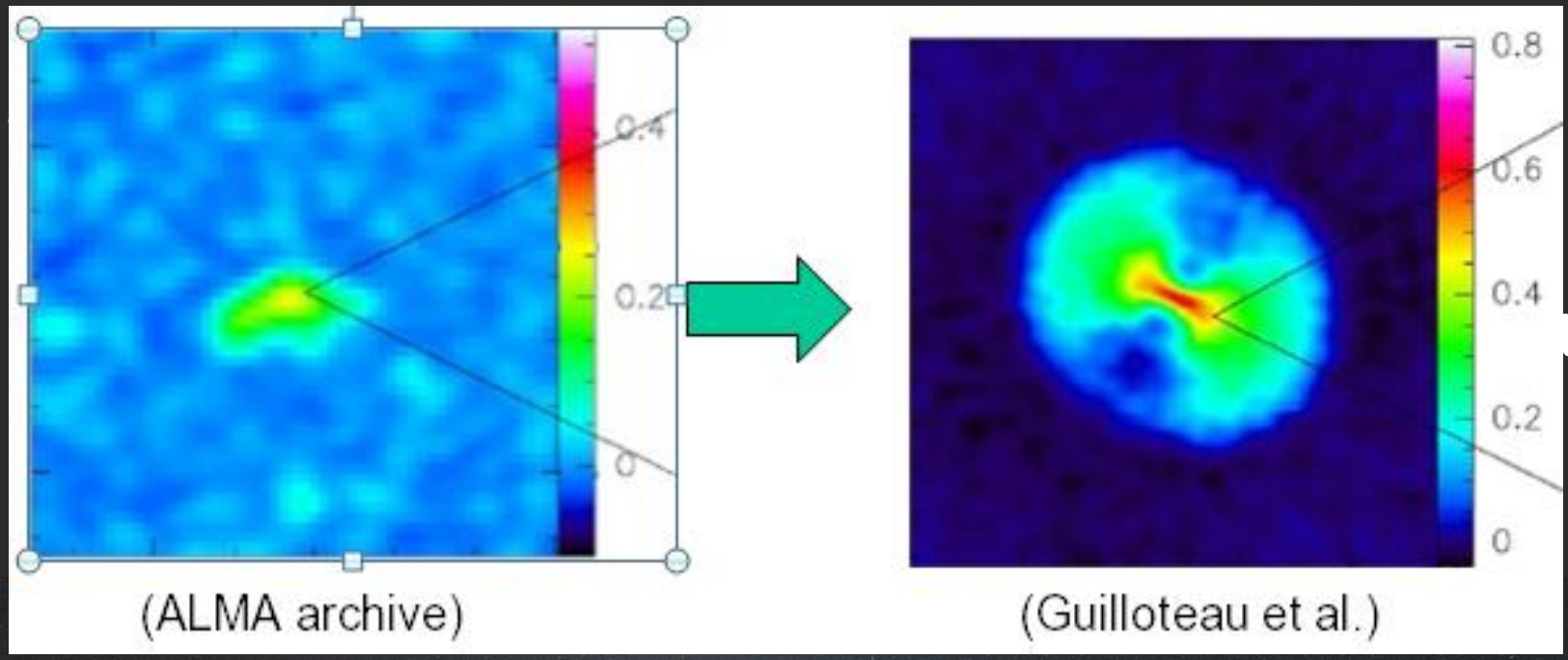
- Do not believe blindly the data delivery!
  - Calibration problems (less and less)
  - Too much flagging
    - Could flag your line of interest
  - "Quick and dirty" imaging (human pipeline best effort basis)
  - Only the main scientific target (source and line) are imaged, but data are often much more rich

After observation

EUROPEAN ARC
ALMA Regional Centre || IRAM

- Do not believe blindly the data delivery!
  - –
  - –
  - –
  - –



  - Do a careful imaging (e.g. self-calibration)

The ALMA observatory

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Data mining

Archive and data mining

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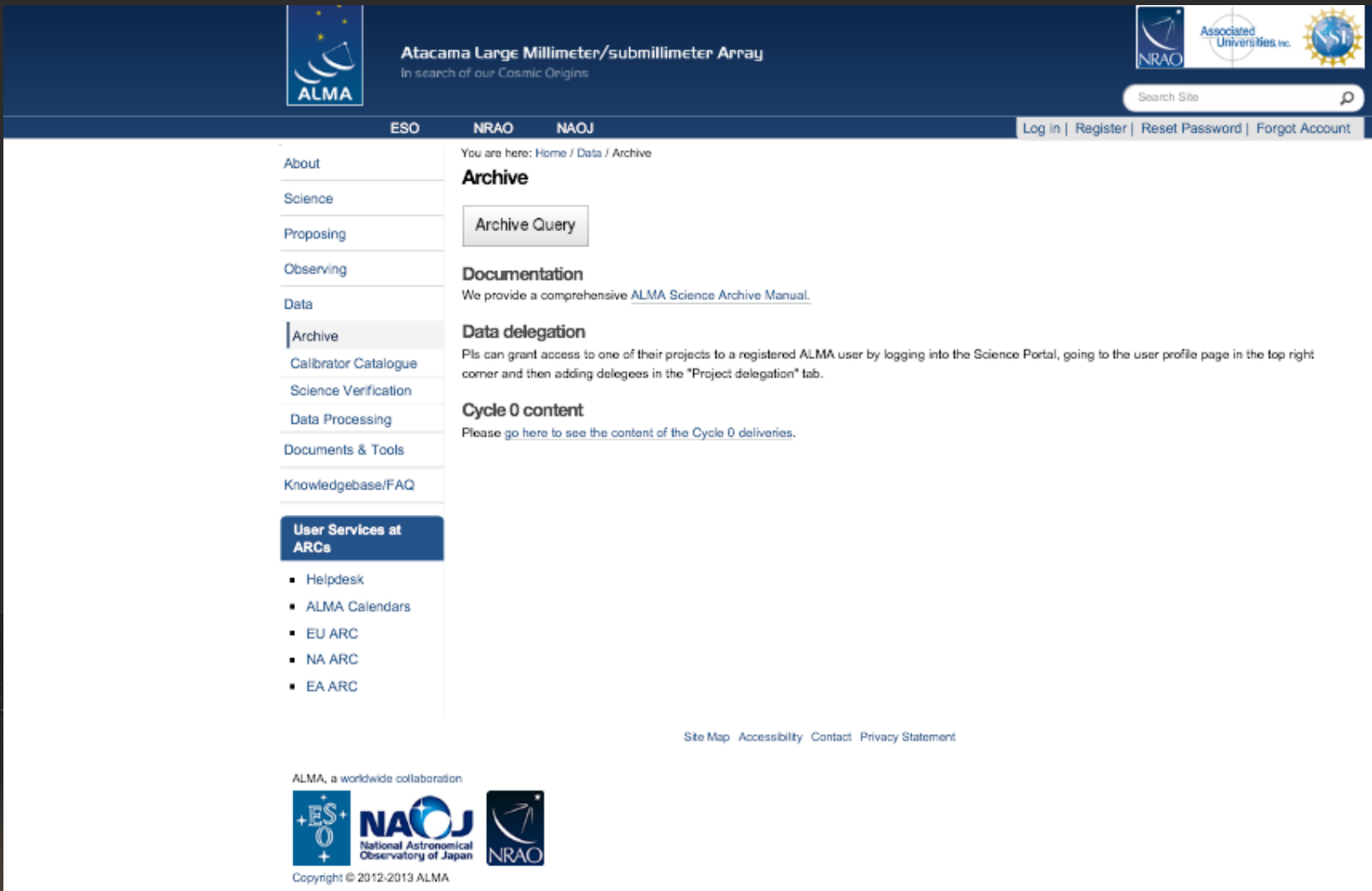
ALMA Regional Centre || IRAM



Archive and data mining

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ALMA Science Archive Query

Query Form | Results Table

Search | Reset

Query Help

Position
Source name (Resolver)
Source name (ALMA)
RA Dec
Spatial resolution
Largest angular scale

Energy
Frequency
Bandwidth
Spectral resolution
Band

Time
Observation date
Integration time

Polarisation
Polarisation type

Observation
Water vapour

Project
Project code
Project title
PI name
Project abstract
Publication count

Publication
Authors
Title
Abstract

Options
View:
- (•) raw data
- ( ) project
- ( ) publication

[ ] public data only
[x] science observations only

Archive and data mining

EUROPEAN ARC
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ALMA Science Archive Query

Query Form | Results Table

Submit download request

Results Bookmark | Export Table | Resu

Showing 94 of 94 rows.

Project code	Source name	Band	Integration	*Release date* ▲	Velocity resolution	Frequency support	Spatial resolution
Filter:					m/s		
2012.1.00681.S	hd_163296	7	2630.88	2015-08-01	171.02	278.68..290.67GHz	0.34
2013.1.01268.S	HD163296	6	2751.84	2015-09-12	167.52	216.07..233.99GHz	0.35
2013.1.01268.S	HD163296	6	2751.84	2015-09-12	167.52	216.07..233.99GHz	0.35
2013.1.01268.S	HD163296	6	2751.84	2015-09-12	167.52	216.07..233.99GHz	0.35
2013.1.01268.S	HD163296	6	756	2015-09-12	167.52	216.07..233.99GHz	0.35
2013.1.01268.S	HD163296	6	756	2015-09-12	167.51	216.08..233.99GHz	0.42
2013.1.00366.S	HD_163296	6	2993.76	2015-10-07	41.67	216.08..233.70GHz	0.44
2013.1.00366.S	HD_163296	6	2993.76	2015-10-07	41.67	216.09..233.71GHz	0.43
2013.1.00366.S	HD_163296	6	2993.76	2015-10-07	41.67	216.09..233.71GHz	0.42
2013.1.00366.S	HD_163296	6	2993.76	2015-10-07	41.67	216.09..233.71GHz	0.43
2013.1.00366.S	HD_163296	6	2993.76	2015-10-07	41.67	216.09..233.71GHz	0.42
2013.1.00527.S	HD_163296	8	786.24	2016-05-28	593.74	479.24..494.97GHz	0.37
2013.1.00226.S	hd_163296	6	1209.6	2016-06-29	145.81	241.53..260.56GHz	0.45
2013.1.00226.S	hd_163296	6	786.24	2016-06-29	145.83	241.50..260.53GHz	0.38

Archive and data mining

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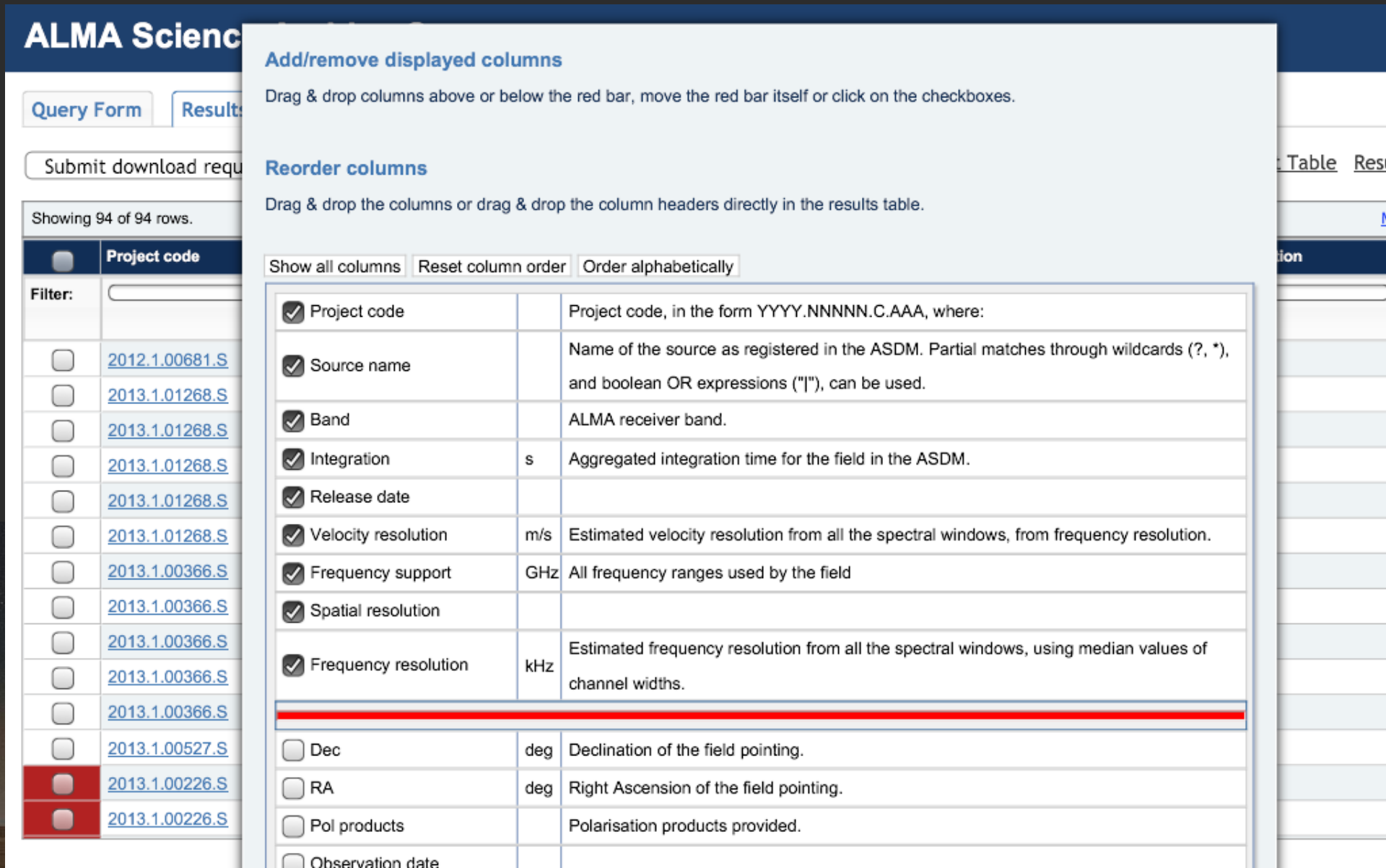

Archive and data mining

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ALMA Request Handler | Login

Anonymous User: Request #559648521 ✔

Request Title: Click to edit

Download Selected

Include Raw

Project / OUSet / Executionblock	File	Size	Accessible
Request 559648521			
Project 2012.1.00681.S			
Science Goal OUS uid://A002/X684eb5/X24d			
Group OUS uid://A002/X684eb5/X24e			
Member OUS uid://A002/X684eb5/X24f			
☑ product	2012.1.00681.S_uid___A002_X684eb5_X24f_001_of_001.tar	412.1MB	✔
☐ raw	2012.1.00681.S_uid___A002_X8254f0_Xeba.asdm.sdm.tar	43.7GB	✔
		Total: 44.1GB	

Exactly the same delivery as for PI

- Same structure,
- Same scripts …

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Filler CASA-GILDAS

Filler CASA- GILDAS

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To have a gateway to be able to :

- View and analyze images
  - from CASA into GILDAS
  - from GILDAS into CASA
- Make operations on visibilities
  - from CASA with GILDAS (not straightforward)
  - From GILDAS with CASA
- Thanks to (UV)FITS
- Calibration is done in the corresponding software (CASA for ALMA, GILDAS/CLIC for NOEMA)

Filler CASA- GILDAS

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Why?

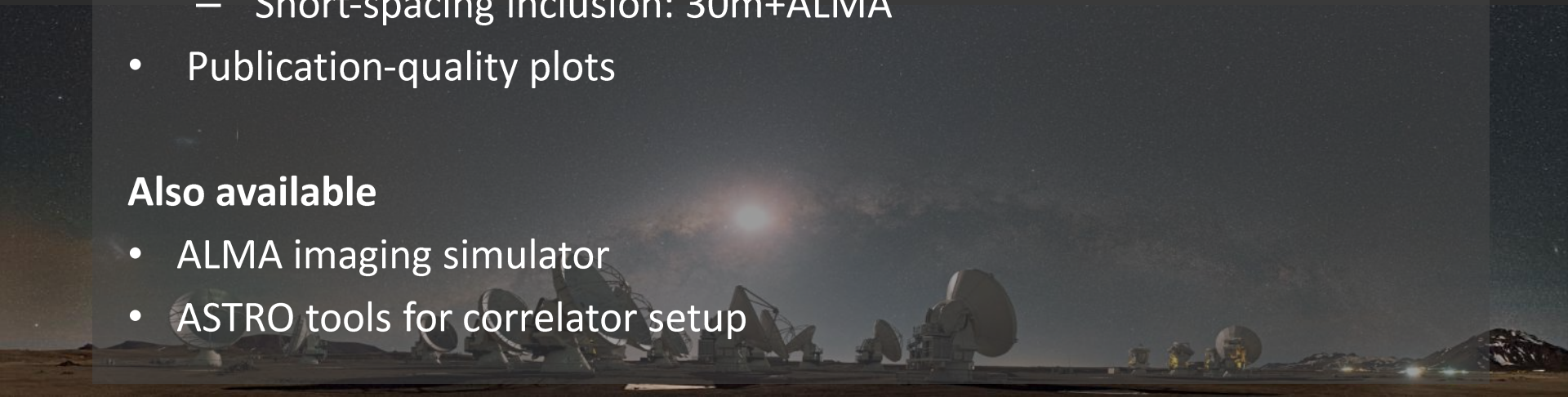
- Users are used to some software
- Users have developed dedicated tools in one software
- Analysis of data coming from different instruments

Why in GILDAS?

- Imaging faster (and better in some cases)
- Access to specific data reduction and analysis tools
  - Short-spacing inclusion: 30m+ALMA
- Publication-quality plots

Also available

- ALMA imaging simulator
- ASTRO tools for correlator setup



Filler CASA- GILDAS

EUROPEAN ARC
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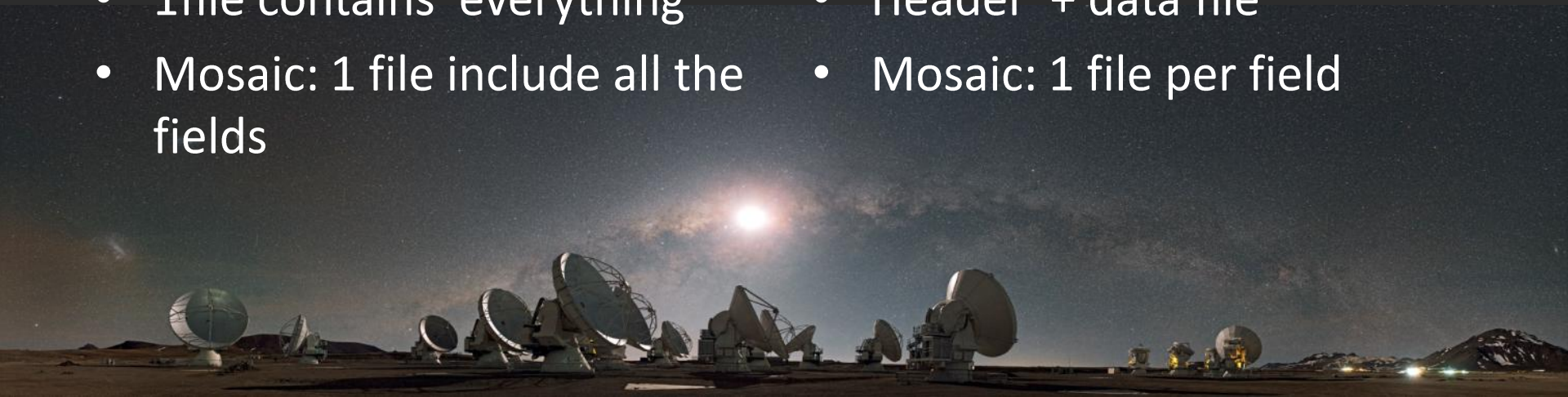
Difference of philosophy

CASA

- Topocentric frame
- No source systemic velocity
- 2 polarizations
- Everything done in one software, complex data
- 1file contains everything
- Mosaic: 1 file include all the fields

GILDAS

- LSR in source frame
- Source systemic velocity
- polarization
- Calibration/imaging independent steps
- Header + data file
- Mosaic: 1 file per field



Filler CASA- GILDAS

EUROPEAN ARC
ALMA Regional Centre || IRAM

Images CASA → GILDAS

- "QA2" product (i.e. observatory delivery) images are in LSRK or BARYCENTRIC frame
- "QA2" product fits image are in "frequency" mode
- **casa> exportfits (image = 'my-image.image',**
  fitsimage = 'my-image.fits', velocity=T)
- **Mapping> let name my-image**
- **Mapping> let type fits**
- **Mapping> go bit / go map / go view**

Filler CASA- GILDAS

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ALMA Regional Centre || IRAM

Images GILDAS → CASA

- Frame : LSR from the source
- **Mapping > fits my-image.fits from my-image.gdf**
- **CASA> importfits(fitsimage= 'my-image.fits',**
  imagename= 'my-image.image')

Filler CASA- GILDAS

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Visibilities CASA → GILDAS

- split 1 file per field and per spw, without the flags

CASA> split(vis='calibrated.ms', outputvis='field1-spw0.ms',
field = '1', spw='0', keepflags=F)

Option **datacolumn** CORRECTED or DATA

- Correct for TOPO to LSR or BARY

CASA> cvel(vis='field1-spw0.ms', outputvis='field1-spw0-cvel.ms',
outframe='LSRK', restfreq='245.8GHz')

- Export

CASA> exportuvfits(vis='field1-spw0-cvel.ms',
fitsfile='field1-sp0.uvfits', multisource=F)

Filler CASA- GILDAS

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ALMA Regional Centre || IRAM

Visibilities CASA → GILDAS

MAPPING> @fits_to_uvt field1-spw0 field1-spw0
[FREQUENCY 238500 VELOCITY 6 LINE CO]

1. uvfits name without extension (should be uvfits)
2. uvt name without extension (will be uvt)
3. Rest frequency in MHz (optional)
4. Source systemic velocity in km/s (optional)
5. Line name (optional)

Filler CASA- GILDAS

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Visibilities CASA → GILDAS

In details, **fits_to_uvt** do:

- Convert uvfits to uvt (fits /style casa)
- Extracting/collapsing the polarization (uv_splitpolar)
- Re-calculate the weights (uv_noise)
- Exclude points with “unusual” weight (uv_trim)
- Recalculate the velocity axis according to the source systemic velocity (modify)
- Other “details” (source coordinates …)

Filler CASA- GILDAS

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Visibilities CASA → GILDAS

MAPPING> @fits_to_uvt field1-spw0 field1-spw0
[FREQUENCY 238500 VELOCITY 6 LINE CO]

IF you have this problem:

DOUBLE time discontinuity, I cannot treat

F-SYSTEM, Exit code 44 from call to SYSEXI

Decrease the value of “space_gildas” in ~/.gag.dico

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Visibilities GILDAS → CASA

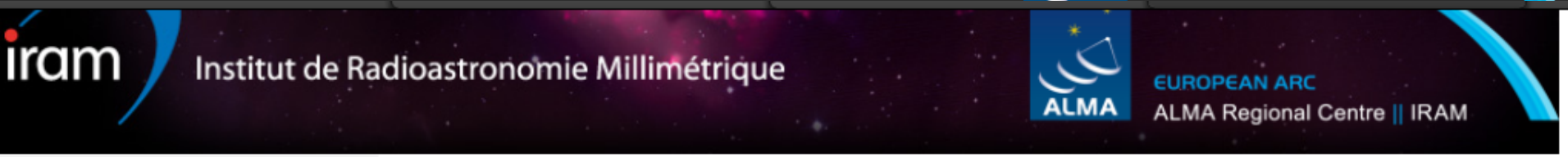
1 procedure

MAPPING> fits source.uvfits from source.uvt /style CASA

Then

CASA> importuvfits(fitsfile='source.uvfits', vis='source.ms')

Getting some help



IRAM ARC node

- About the IRAM ARC node
- IRAM involvement in the ALMA construction
- Visiting program
- Contact

Schools & Workshops

Users support

Docs & Tools

Useful links:
ALMA Science Portal
ALMA Helpdesk

For ARC staff:
Wiki IRAM
Wiki ESO

Contact us:
arc@iram.fr

IRAM ARC Node

IRAM has established an ALMA user support center, which forms a node of the European ALMA Regional Center (ARC). The ARC nodes are providing support to the community in the preparation of ALMA observations and in data processing and analysis. More about the IRAM ARC node.

What you can find on this site:

- School & Workshops organized by IRAM
- Users support at IRAM (including face-to-face)
- Docs & Tools available at IRAM (including GILDAS tools for ALMA)

ALMA Observations & Data

Useful links

- ALMA science portal
- Current status of the array
- List of high-priority projects (with status and links to public data)
- Science Verification projects: status & plans | data already released
- ALMA data archive query
- ALMA articles and publications

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IRAM Memo 2014-?

From CASA to GILDAS
I - GILDAS Data Format Version 2

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1. LAB (Bordeaux) 2. IRAM (Grenoble)

October 20, 2014– version 2.0

Abstract

With the advent of ALMA, IRAM users may prefer at some point to handle their ALMA data in GILDAS rather than in CASA[1], vice versa to handle IRAM data into CASA. This document describes the different ways to do so, and what are the benefits and limitations of the process. This document only covers **calibrated** data, either UV data or images. There is (currently) no plan to handle uncalibrated

Filler CASA- GILDAS

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- Documentation:

IRAM ARC node website :

www.iram.fr/IRAMFR/ARC

www.iram.fr/IRAMFR/ARC/documents/filler/casa-gildas.pdf

- Contact : arc@iram.fr, gildas@iram.fr

Getting some help

EUROPEAN ARC
ALMA Regional Centre || IRAM

- **ALMA Science portal** (EU, NA or EA), documentation
  almascience.eso.org
- **ALMA Helpdesk** for question related to the instrument or project
- **CASA** helpdesk at NRAO
- **IRAM ARC node**
  - website : www.iram.fr/IRAMFR/ARC
  - www.iram.fr/IRAMFR/ARC/documents/filler/casa-gildas.pdf
  - Contact : arc@iram.fr

Do not hesitate to contact us

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Institut de
Radioastronomie
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Thank you !