

SKA-France : What's new ?

Chiara Ferrari

Astronome à l'OCA

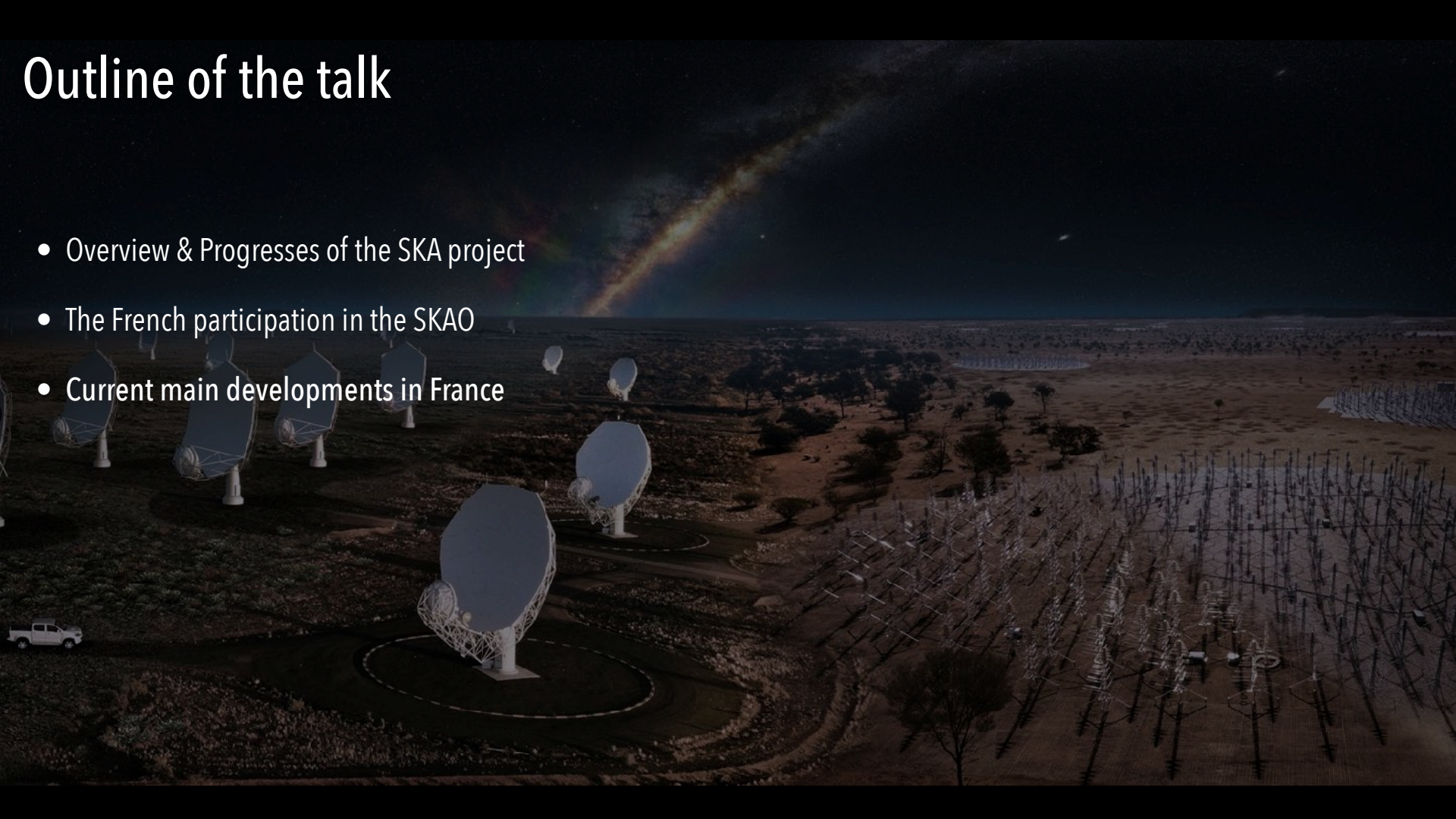
Déléguée Scientifique CNRS/INSU-AA, SKA-France Director

French representative @ SKAO Council



Outline of the talk

- Overview & Progresses of the SKA project
- The French participation in the SKAO
- **Current main developments in France**



SKA Phase 1 Baseline

- SKA-LOW (50-350 MHz) : 131072 log periodic antennas, spread across 512 stations
Maximum distance between stations: 74 km
- SKA-MID (350 MHz – 15.4 GHz) : 197 fully steerable dishes, including the existing 64 MeerKAT dishes
Maximum distance between dishes: 150 km
- SKA-HQ : SKAO headquarters located on the UNESCO World Heritage Site of Jodrell Bank
- SRC-Net (SKA Regional Center Network) : a world wide network of data/computing centres

50 MHz ————— 350 MHz ————— ... ————— 15 GHz →



Image/Video courtesy:
SKAO, H2020 AENEAS project

Construction strategy

- Construction split into stages (Array Assemblies):
AA0.5, AA1, AA2, AA*, AA4
- Target: build the SKA Baseline Design (AA4)
- Not all funding yet secured, therefore following
Staged Delivery Plan
- AA2 will be an important milestone for the scientific
community: SKA telescopes will be scientifically
competitive → beginning of Science Verification



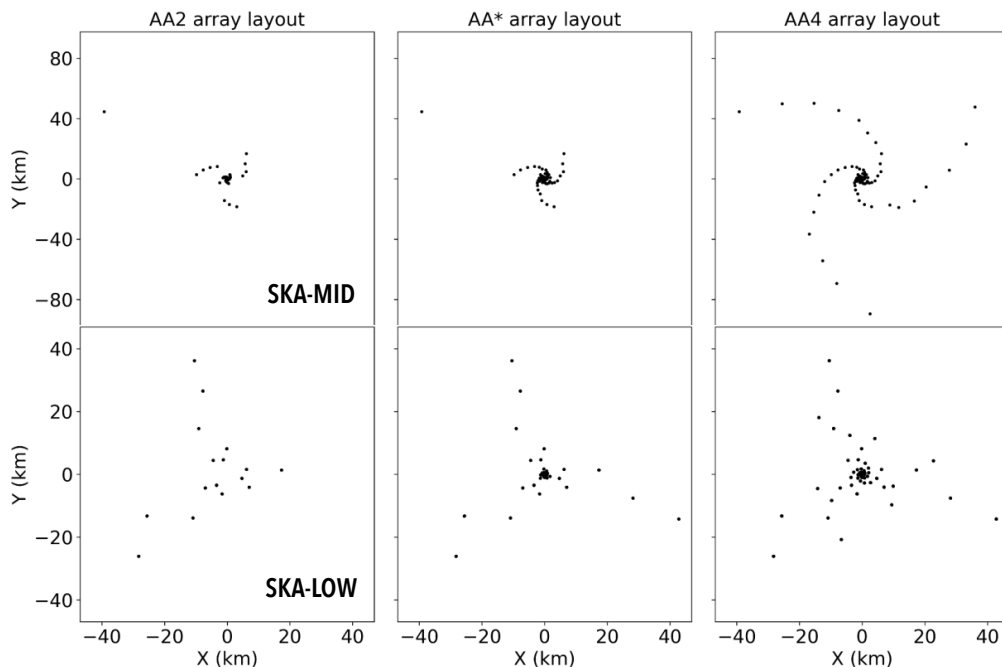
SKAO Staged Delivery, Array Assemblies and Layouts

SKAO-TEL-0002299
 Classification: UNRESTRICTED
 Document type: REP
 Date: 2025-06-10
 Status: RELEASED

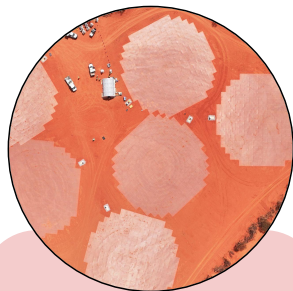
Available [on-line](#)

Role	Name	Description	Affiliation	Signature	Date
Author	Sarvesh Sridhar and Science Operations	Operations Scientist	SKAO	<i>Sarvesh Sridhar</i>	2025-06-10
Owner	Shari Breen	Head of Science Operations	SKAO	<i>Shari Breen</i>	2025-06-10
Approver	Stuart Whitley	Director of Programmes	SKAO	<i>Stuart Whitley</i>	2025-06-10
Released by	Lewis Ball	Director of Operations	SKAO	<i>Lewis Ball</i>	2025-06-10

Telescope	Maximum baseline length and number of stations/dishes		
	AA2	AA*	AA4
Low	64.8 km with 68 stations	73.4 km with 307 stations	73.4 km with 512 stations
Mid	108.0 km with 66 dishes (36.0 km, excluding dish SKA008)	108.0 km with 144 dishes (36.0 km, excluding dish SKA008)	159.6 km with 197 dishes



SKAO milestones

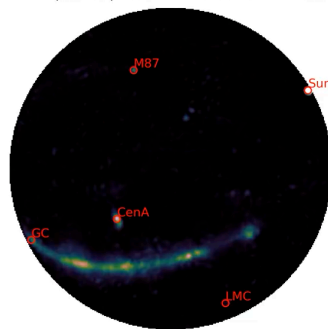


Construction

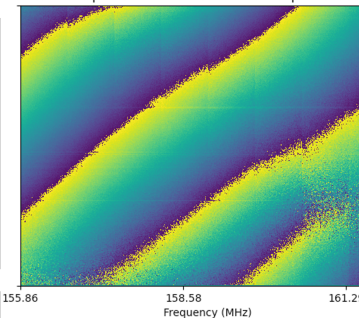
- Building antennas, dishes, roads etc!
- Followed by Assembly, Integration and Verification



S8-6 (XX+YY) 2024-07-05 08:54:55.0 UTC



Waterfall plot from Station 1 to Station 2 polarisation



SKA001

Band #2 installed



Now



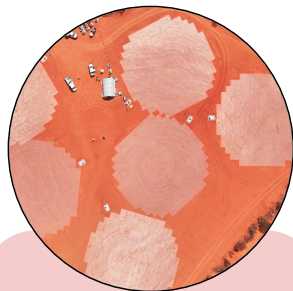
Now



SKAO milestones

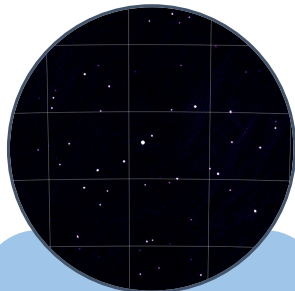
Community involvement starts

Credit: I. Heywood, SARAO



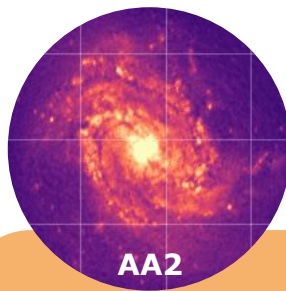
Construction

- Building antennas, dishes, roads etc!
- Followed by Assembly, Integration and Verification



Commissioning

- SKAO activity
- Collaborative across system verification and science commissioning



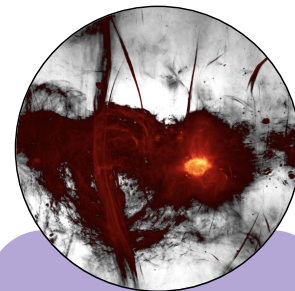
AA2



AA*

Science Verification

- A full dress rehearsal of the end-to-end system for every mode of operation
- Once modes and pipelines are working, the community can submit target ideas
- Data will be publicly available for scrutiny
- Build trust and fostering an early science return



Cycle 0

- Shared-risk PI projects
- SRCNet resources ready for user
- Proprietary periods



Now

Now

First half 2027

First half 2029

2030



Now

Soon

First half 2029

First half 2031

2032

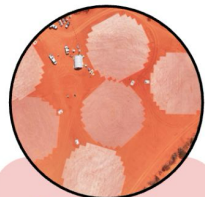


SKAO milestones

SKAO milestones

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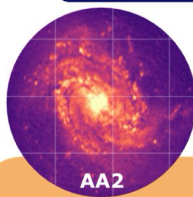
Construction

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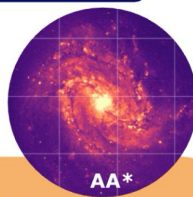


Commissioning

- SKAO activity
- Collaborative across system verification and science commissioning



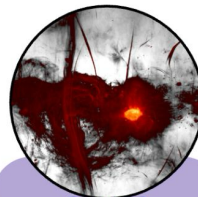
AA2



AA*

Science Verification

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Cycle 0

- Shared-risk PI projects
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Cycle ~4
Steady state
operations
(all capabilities
available)



Now



Now

Now

Soon

First half 2027

First half 2029

First half 2029

First half 2031

2030

2032

2034

2036



SKA-Low



307

Stations

Up to **48**
station beams

Up to **1440**
substations

74 km

Max Baseline

AA*

Up to **16** subarrays, **commensal** Observations
• **Two telescopes**, frequency coverage of 50
MHz and 15.4 GHz

Continuum

Spectral Line

Pulsar Timing

Pulsar Search

Transient Buffer

VLBI

Observing modes

SKA will be **highly flexible**, complicated and delivered on an
enormous scale. Plan to deliver **highly processed** Observatory
Data Products adds to this complexity → we expect to
build up to **the full set of capabilities** over time

Delivery of capabilities



SKA-Mid

144

Antennas

36 km

Max Baseline

*108 km including SKA008

307
Stations

Up to **48**
station beams

Up to **1440**
substations

Up to **16** subarrays, **commensal** Observing
Two **telescopes**, frequency coverage of
MHz and 15.4 GHz

Continuum

Spectral Line

Pulsar T

Pulsar Search

Transient Buffer

V

Observing modes

SKA will be **highly flexible**, complicated and deliver
enormous scale. Plan to deliver **highly processed** C
Data Products adds to this complexity → we expect
build up to **the full set of capabilities** over

74 km
Max Baseline

Delivery of capabilities



A year in the life of the SKA telescopes: overview and main outcomes

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Document type:

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Revision 01

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REP

2025-06-13

RELEASED

Role	Name	Designation	Affiliation	Signature	Date
Author	Sarvesh Sridhar	Operations Scientist	SKAO	<i>Sarvesh Sridhar</i>	2025-06-13
Owner	Shari Breen	Head of Science Operations	SKAO	<i>Shari Breen</i>	2025-06-13
Approver	Antonio Chrysostomou	Deputy Director of Operations	SKAO	<i>Antonio Chrysostomou</i>	2025-06-13
Released by	Lewis Ball	Director of Operations	SKAO	<i>Lewis T Ball</i>	2025-06-13

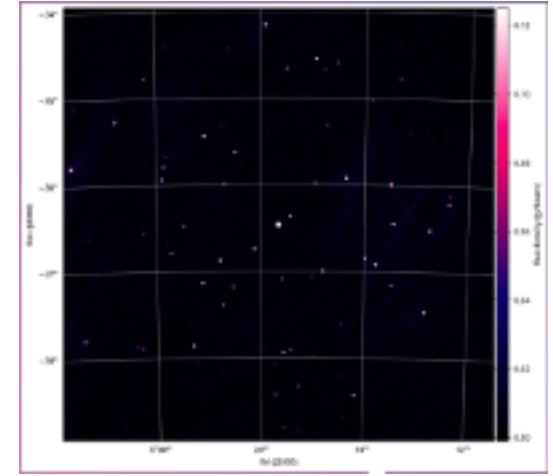
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SKAO construction progresses

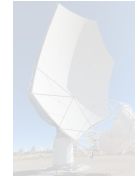
- End of September 2025: 49.4% of project realised
 - SKA-MIID: 7 antennas being built on site + finalisation of AA0.5 with 4 dishes fully operational in 2026
 - SKA-LOW: 15762 antennas assembled + AA0.5 verification phase with 4 stations successfully finalised in July 2025 → first interferometric image!
 - Programme Schedule Review: construction of 50 station of SKA-LOW (over 307 of AA*) deferred to post-2030



SKAO construction progresses

- End of September 2025: 49.4% of project realised
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 - Programme Schedule Review: construction of 50 stations of SKA-LOW (over 30 deferred to post-2030)

[Register](#) to SKAO Newsletters and Webinars



SKA001



SKA063



SKA031



SKA077



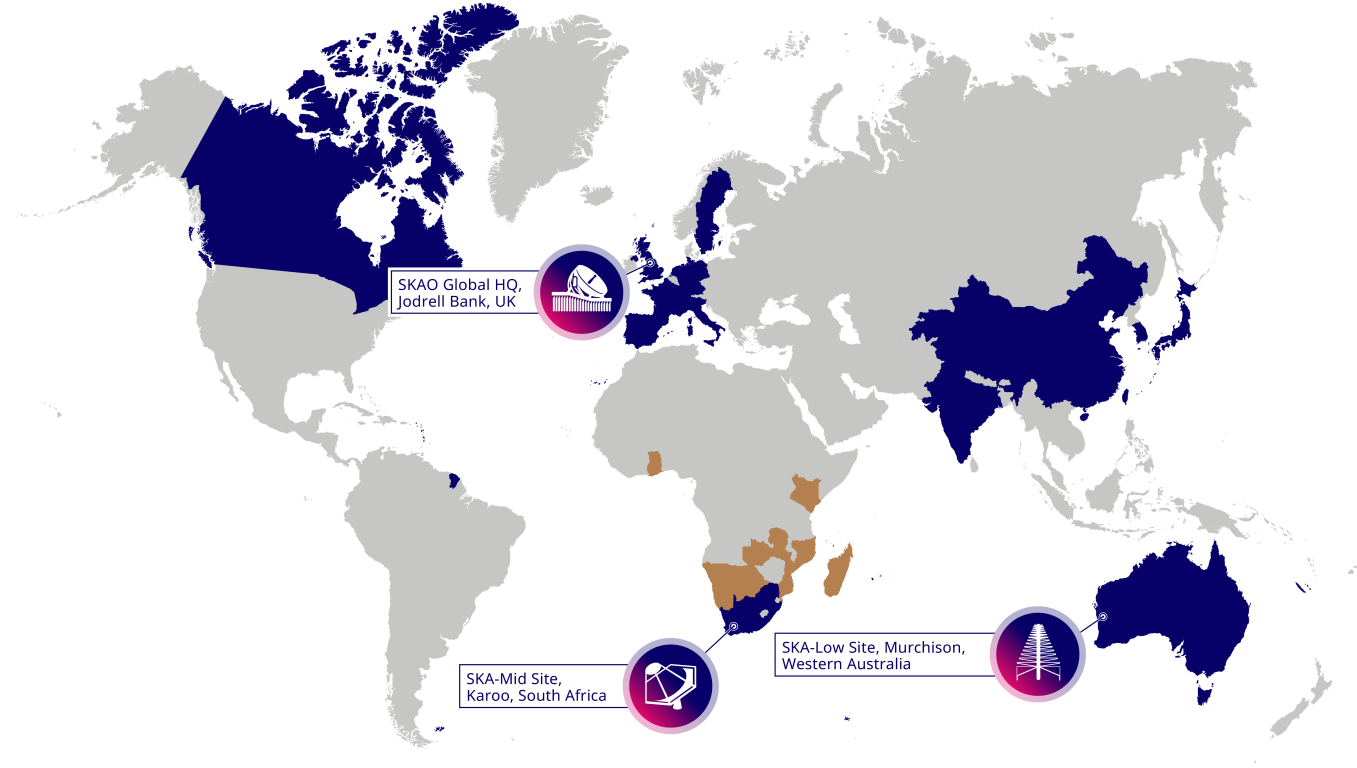
AA1



AA2 (FAT) - China

SKAO Science Community Webinars

SKAO Membership



SKAO Partnership - includes SKAO Member States* and SKAO Observers (as of August 2025)



African Partner Countries



French membership: where we are



2021

Travaux parlementaires

Vos sénateurs

Connaitre le Sénat



Le Sénat et vous

Europe et international

Presse



Accueil / Travaux parlementaires / Projets et propositions de loi

DOSSIER LÉGISLATIF

Adhésion de la France à l'Observatoire du réseau d'antennes d'un kilomètre carré

Projet de loi autorisant l'approbation de l'accord entre le Gouvernement de la République française et l'Observatoire du réseau d'antennes d'un kilomètre carré (SKAO) relatif à l'adhésion de la France à l'Observatoire

Procédure accélérée engagée par le Gouvernement le 31 octobre 2024

[Link](#)



Dépôt au Sénat

- [Texte](#) n° 104 (2024-2025) de M. Jean-Noël BARROT, ministre de l'Europe et des affaires étrangères, déposé au Sénat le 31 octobre 2024 - [exposé des motifs](#) - [étude d'impact](#)



Première lecture au Sénat



Travaux de commission

COMMISSION DES AFFAIRES ÉTRANGÈRES, DE LA DÉFENSE ET DES FORCES ARMÉES, SAISIE AU FOND

- [Comptes rendus des réunions](#)
- [Rapport](#) n° 407 (2024-2025) de M. Jean-Pierre GRAND, déposé le 5 mars 2025
- [Texte de la commission](#) n° 408 (2024-2025) déposé le 5 mars 2025



Séance publique

- [Compte rendu intégral des débats](#) en séance publique (12 mars 2025)
- [Résumé des débats](#) en séance publique
- [Texte](#) n° 75 (2024-2025) adopté par le Sénat le 12 mars 2025



Première lecture à l'Assemblée nationale

→ Dossier législatif sur le site de l'Assemblée nationale

- [Texte](#) n° 1109 transmis à l'Assemblée nationale le 12 mars 2025

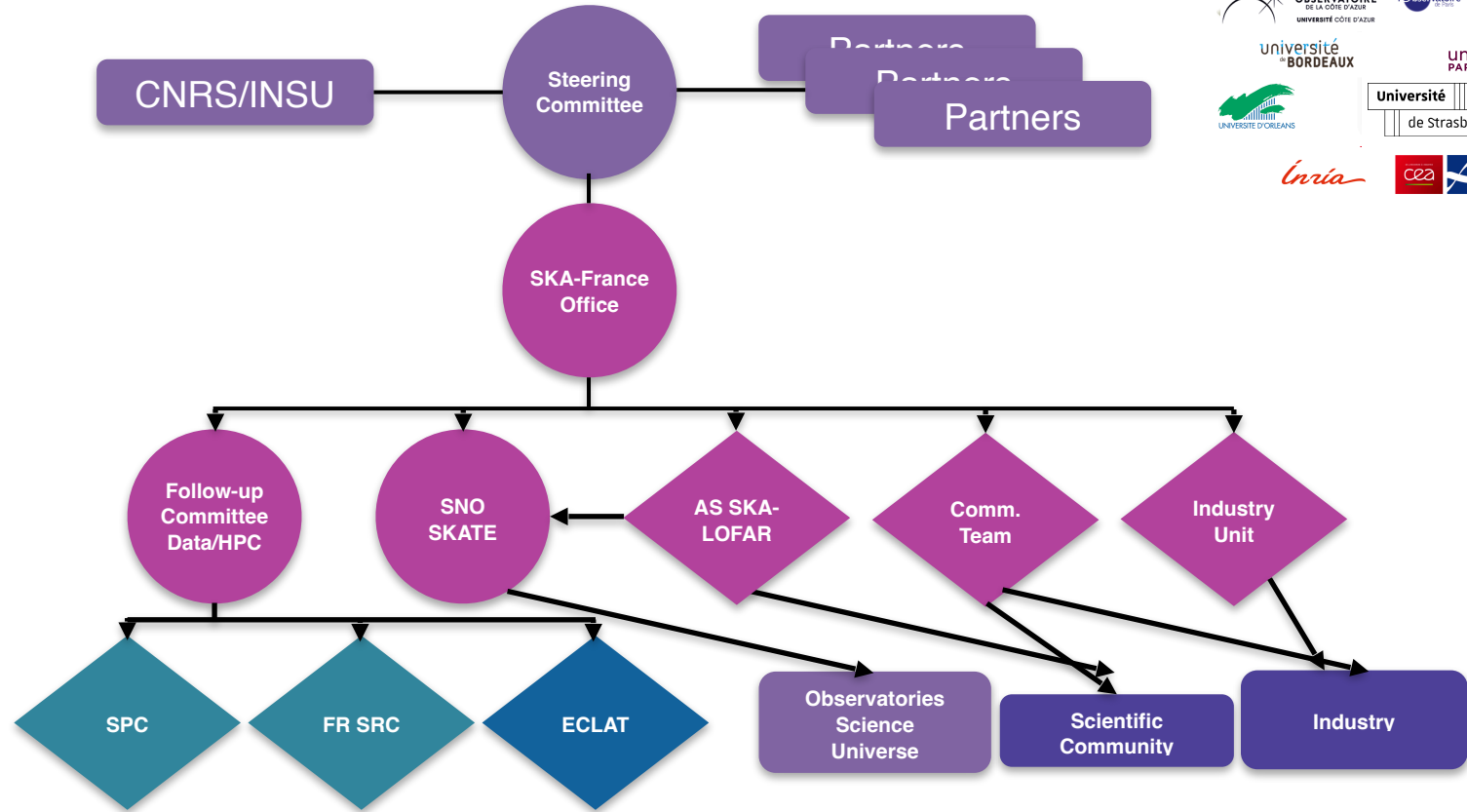
Les étapes de la discussion

- [Première lecture - Sénat](#)
31 octobre 2024
- [Première lecture - Assemblée nationale](#)
12 mars 2025

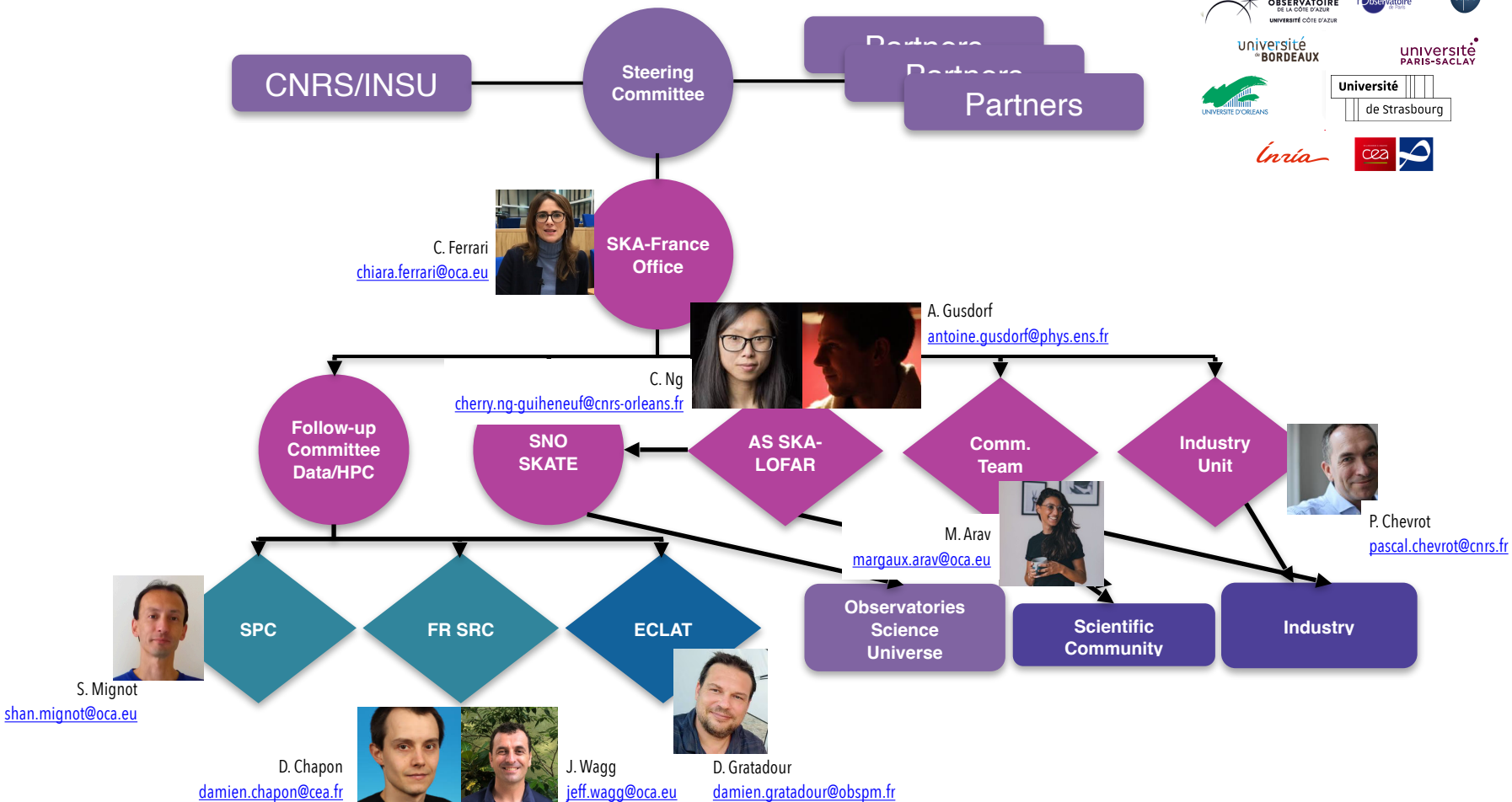
→ [Comprendre la procédure](#)

2025

SKA-France: a national coordination



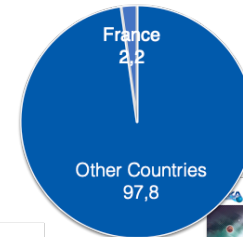
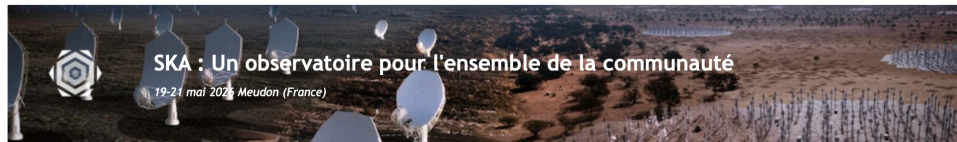
SKA-France: a national coordination



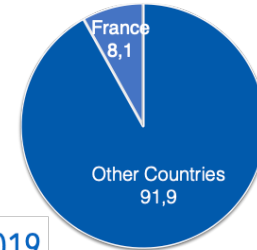
French participation in the SKAO

Science

- A continuously growing scientific community preparing for the start of SKAO observations
 - Active exploitation of SKA pathfinders and precursors (NenuFAR, LOFAR, MeerKAT, ASKAP, FAST, ...)
 - Participation to all SKA Science Working Groups
 - Wide and recognised methodological expertise in data processing and analysis
 - The SKAO challenges interests a wider community of researchers, not only astronomers
- [Register](#) to the May 2026 SKA meeting organised by CSSA



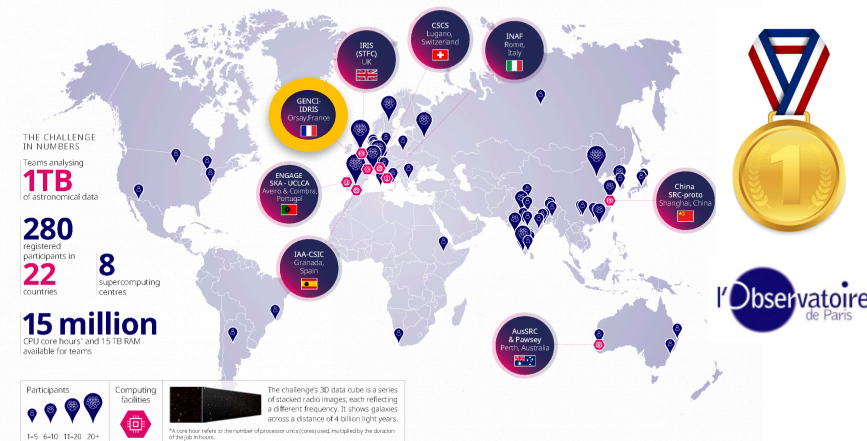
2014



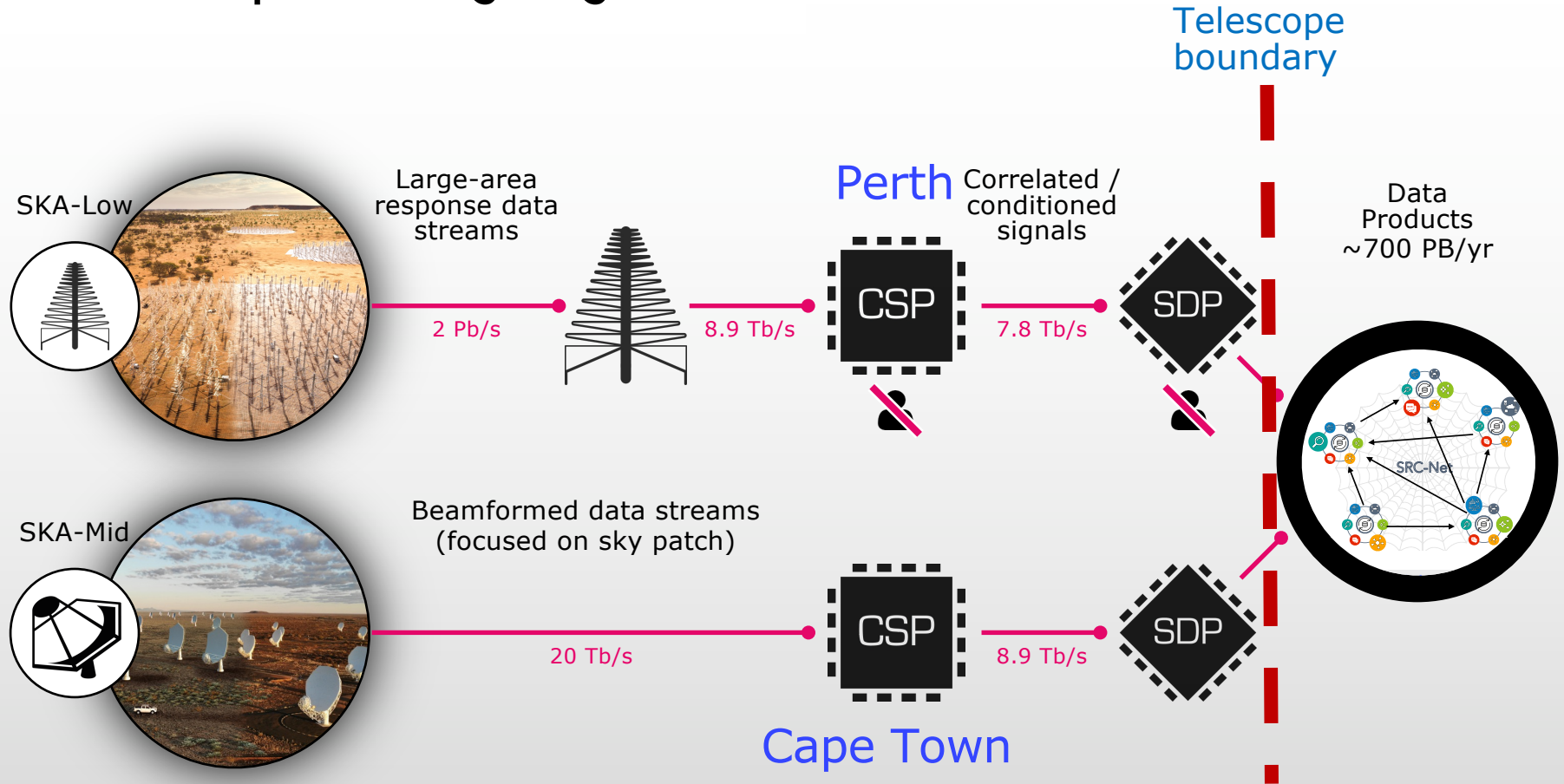
2019

SKAO Science Data Challenge 2

MAP OF WORLDWIDE PARTICIPATION



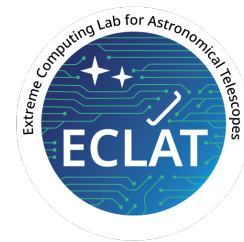
SKAO data processing stages



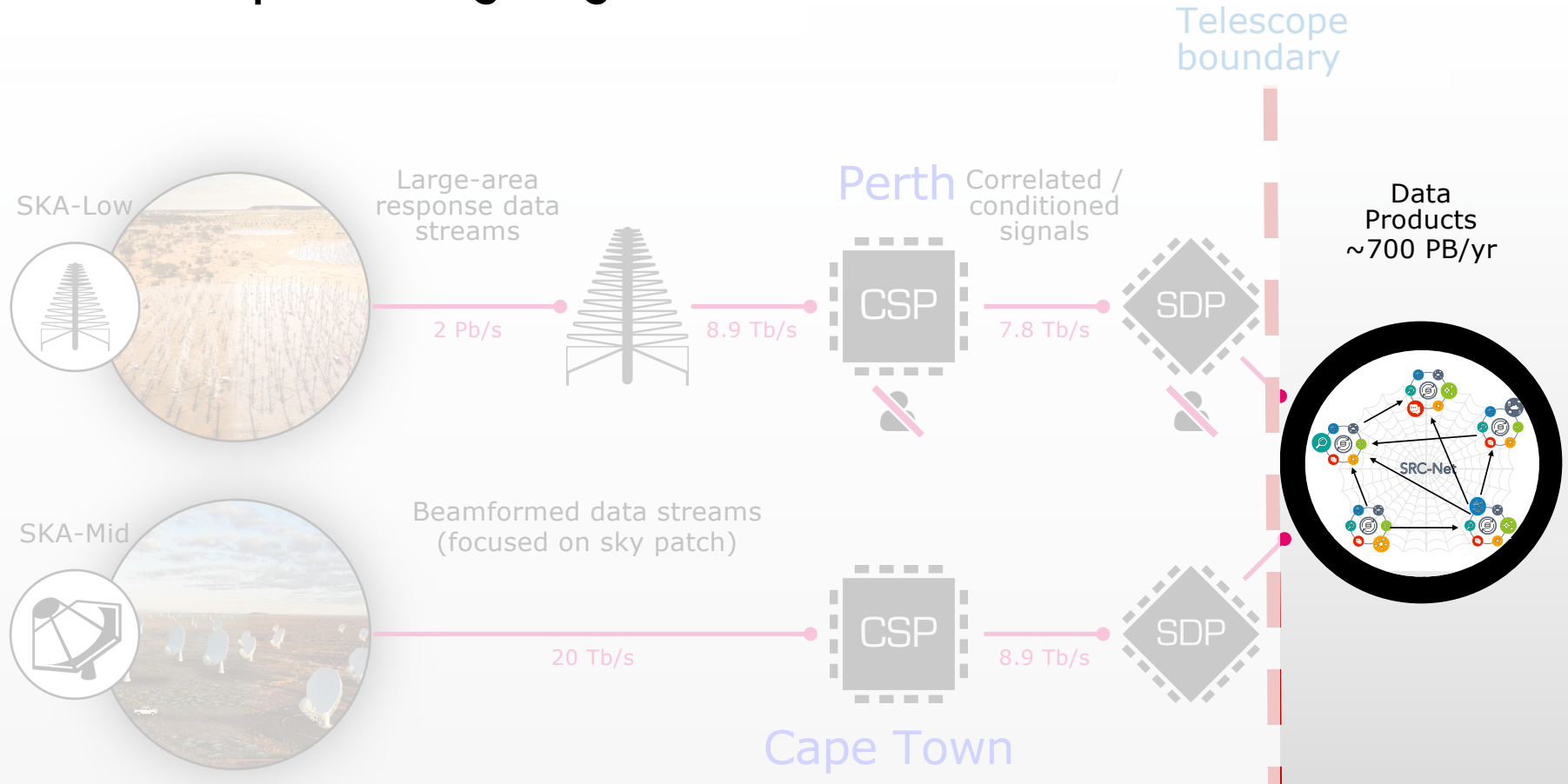
French participation in the SKAO

Construction & Operations

- Construction
 - Co-design & Equipment of the two sub-exascale computing centres of the Observatory
- Strategic objectives for SKA-France
 - Environmental sustainability of the project
 - Efforts made by France in the design of future SKAO computing centres with low environmental impact
 - Study of energy solutions for SKA-MID funded in 2019
 - SKA: fundamental research as a driver for strategic innovation and collaboration between academia and industry
 - SKA Regional Centre Network (SRC-Net): a new model of Data & Computing Centres for A&A



SKAO data processing stages

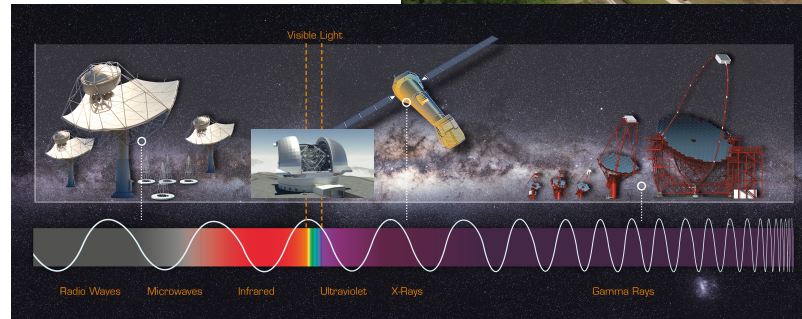


Objectives of the FR-SRC

- Contribute to the SRC Net at an appropriate level within the SKAO IGO
- Enable French scientists to lead/ contribute to future SKA projects (KSP and PI)
- Provide to the French community the necessary access and support to SKA and pathfinders/precursors data
- Perspective: meet the needs of the French astronomical community

French SKA White Book

The French community towards the Square Kilometre Array



Mission du Groupe de Réflexion

- **Pourquoi ce Groupe de Réflexion:** recommandations formulées lors de la dernière prospective INSU/AA visant à mettre en place une nouvelle infrastructure de recherche répondant aux besoins en données et en calculs spécifiques à notre communauté
- **Mission:** produire un rapport destiné aux instances pour l'été 2026
 - ✓ recenser les besoins de la communauté astronomie-astrophysique
 - ✓ proposer des pistes de solutions concrètes pour y répondre
 - ✓ étude de benchmarking au niveau national (d'autres disciplines) et international

Recommandations :

- Finir l'instrumentation ELT jusqu'à MOSAIC (sécuriser les moyens)
- Finir l'engagement dans VLT 2030
- Finir l'engagement dans CTA
- Concrétiser le SKA-RC et le faire évoluer vers un moyen national d'exploitation de données massives en AA.

Recommandations :

- L'INSU-AA doit développer une stratégie ambitieuse et coordonnée sur le traitement, la curation et l'archivage de nos données (SNO existant et à venir) et préparer le franchissement des murs de données qui s'annoncent.

Recommandations :

- Il faut élaborer une stratégie nationale coordonnée de développement de moyens pérennes dédiés à la gestion des données AA ainsi qu'au calcul Exascale en accord avec les partenaires. L'IR CDS et la dynamique autour du SKA-SRC française doivent être des points forts de la communauté AA sur lesquels il faudra s'appuyer.

cnrs

INSU

Prospective
Astronomie
Astrophysique
2025-2030



Composition du groupe de reflexion

- **Jérôme BOBIN** (CEA / Co-Directeur PEPR NumPEX)
- **Caroline BOT** (ObAS / Directrice CDS)
- **Pierre CASENOVE** (CNES / Chef de projet contributions françaises Euclid)
- **Yohan DUBOIS** (IAP / Membre du CoPil de l'AS Numérique + Expertise simulations numériques)
- **Benoit FAMAIEY** (ObAS / Président de la CSAA)
- **Chiara FERRARI** (OCA / DS INSU-AA + Directrice SKA-France)
- **Nadège MEUNIER** (IPAG / Vice-Présidente CSAA PN Astro)
- **Ada NEBOT** (ObAS / Présidente ASOV)
- **Franck LE PETIT** (OP-PSL / Vice-Présidente CSAA Services & Observations)
- **Christian SURACE** (LAM / Expert Centres de Données)

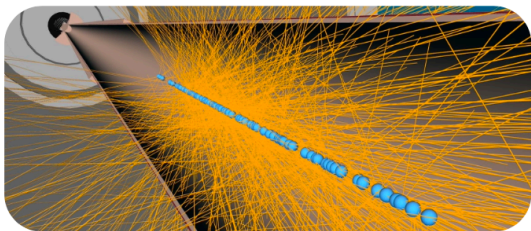
- Jean-Pierre VILOTTE (CNRS/INSU)
- Aude CHAMBODUT (CNRS/INSU)
- Guy PERRIN (MESRE)
- Michel JOUVIN (MesoNET)
- François BODIN (NumPEX)
- Baptiste CECCONI (NenuFAR)
- Héloïse MÉHEUT (AS Num)
- ...

- Laurent CROUZET (MESRE)
- Arnauld LESERVOT (MESRE)
- Isabelle BLANC (MESRE)
- ...



The Exascale Challenge: A New Era for Science

High-Energy Physics (HEP) and Radio Astronomy (RA) are entering the Exascale era, driven by next-generation instruments



High-Luminosity Large
Hadron Collider (HL-LHC)



Square Kilometre Array
(SKA)



LOW Frequency ARray
(LOFAR) 2.0

Volume

Exabytes of data requiring
storage and analysis

Velocity

Data generated at
terabytes/petabytes per
second, demanding
real-time processing

Variety

Complex, heterogeneous
data from millions of
sensors or thousands of
antennas

Agenda and Speakers

1. SPECTRUM Project overview



Sergio Andreozzi
(EGI Foundation)

2. Technical Blueprint for a compute and data continuum



Eric Wulff
(CERN)

3. Strategic Research, Innovation and Deployment Agenda (SRIDA)



Xavier Salazar
(EGI Foundation)

Moderator



Valentin Jay
Blanchard
(Neovia
Innovation)



Help shape the SRIDA and Technical Blueprint

Join the consultation process



By following this link, you can access a survey that enables you to share your feedback with us.

The survey includes direct access to the draft versions of both the SRIDA and the Technical Blueprint, and its length adapts to the time you have at your disposal.

Your input is essential to help shape the final documents.

The consultation will close on 31 January 2026.

spectrumproject.eu/spectrum-consultation



Next steps

