

# GdR CoPhy

## Groupement de Recherche Cosmological Physics

"*Research Network*"

GdR Ondes Gravitationnelles
Lyon, Oct 6, 2026

**Josquin Errard (APC, director)**
**Guilhem Lavaux (IAP, co-director)**
**Vincent Vennin (ENS, co-director)**

➔ created in 2022, I was appointed director of the GdR in 2025. Vincent Vennin (ENS) and Guilhem Lavaux (IAP) are co-directors

Scientifically, CoPhy is organized around three broad questions:

- **Initial conditions and the primordial Universe** — inflation and alternatives, primordial perturbations, quantum aspects of the early Universe, etc.
- **Fundamental laws of the Universe** — gravity on cosmological scales, tests/extensions of General Relativity, connections with fundamental physics.
- **Matter and energy content of the Universe** — dark energy, dark matter from the cosmological perspective, neutrinos, and the formation/evolution of large-scale structure.

# GdR CoPhy: Federating the French cosmology community

**Our Main objectives**

✓ Connect sub-communities

✓ Promote cross-fertilization between theory, observations, simulations and methods

✓ Support young researchers

✓ Increase visibility and coordination of French cosmology

**Primordial Universe**

**Fundamental laws**

**Matter and Energy**

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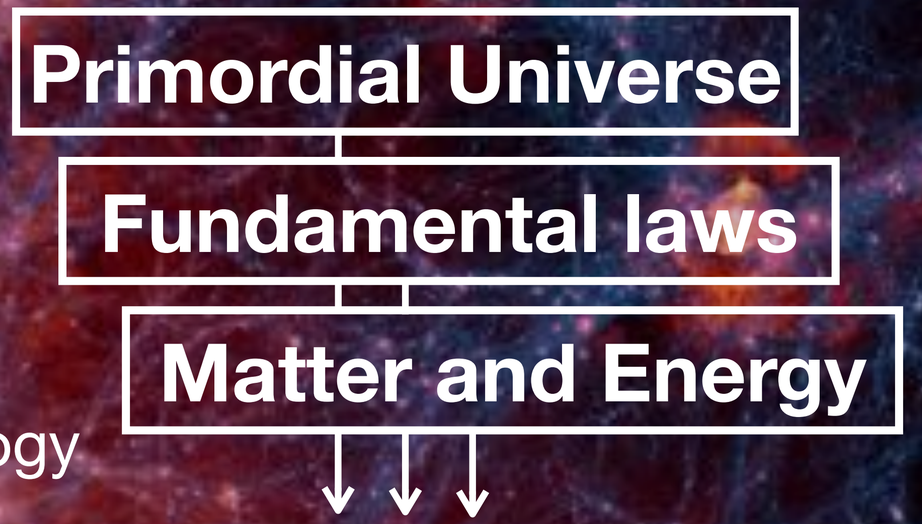
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**Theory, Simulations, Data, Observations**

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**WG Theory, Universe and Gravitation (TUG)**

**WG Dark Energy (ADE)**

**WG Tools & Methodology**

**WG Cosmic Microwave Background (CMB)**

**Theory, Simulations, Data, Observations**

**+ Task Forces: Anomalies · Cross-correlations · Gravitation · String Theory**

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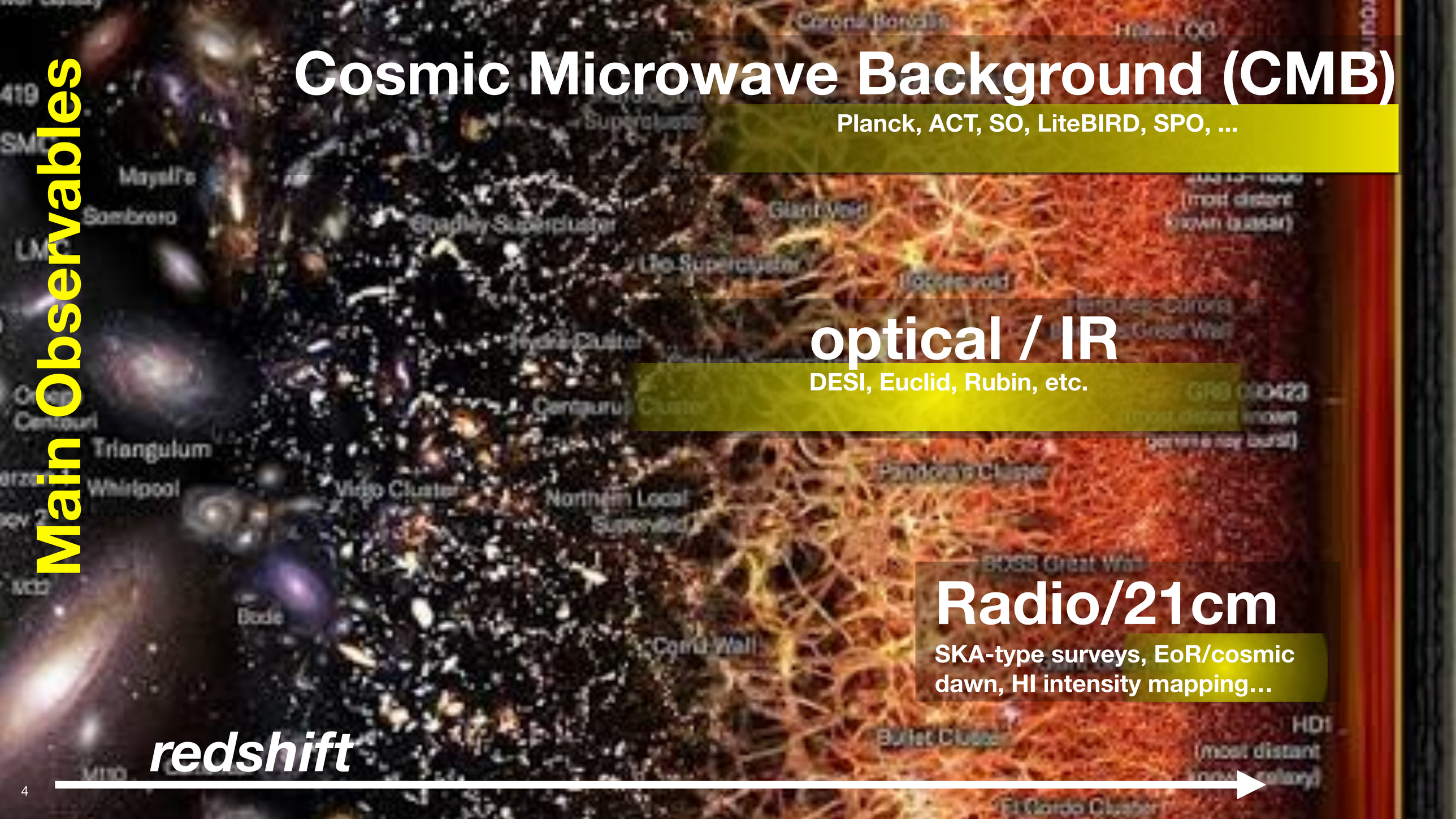
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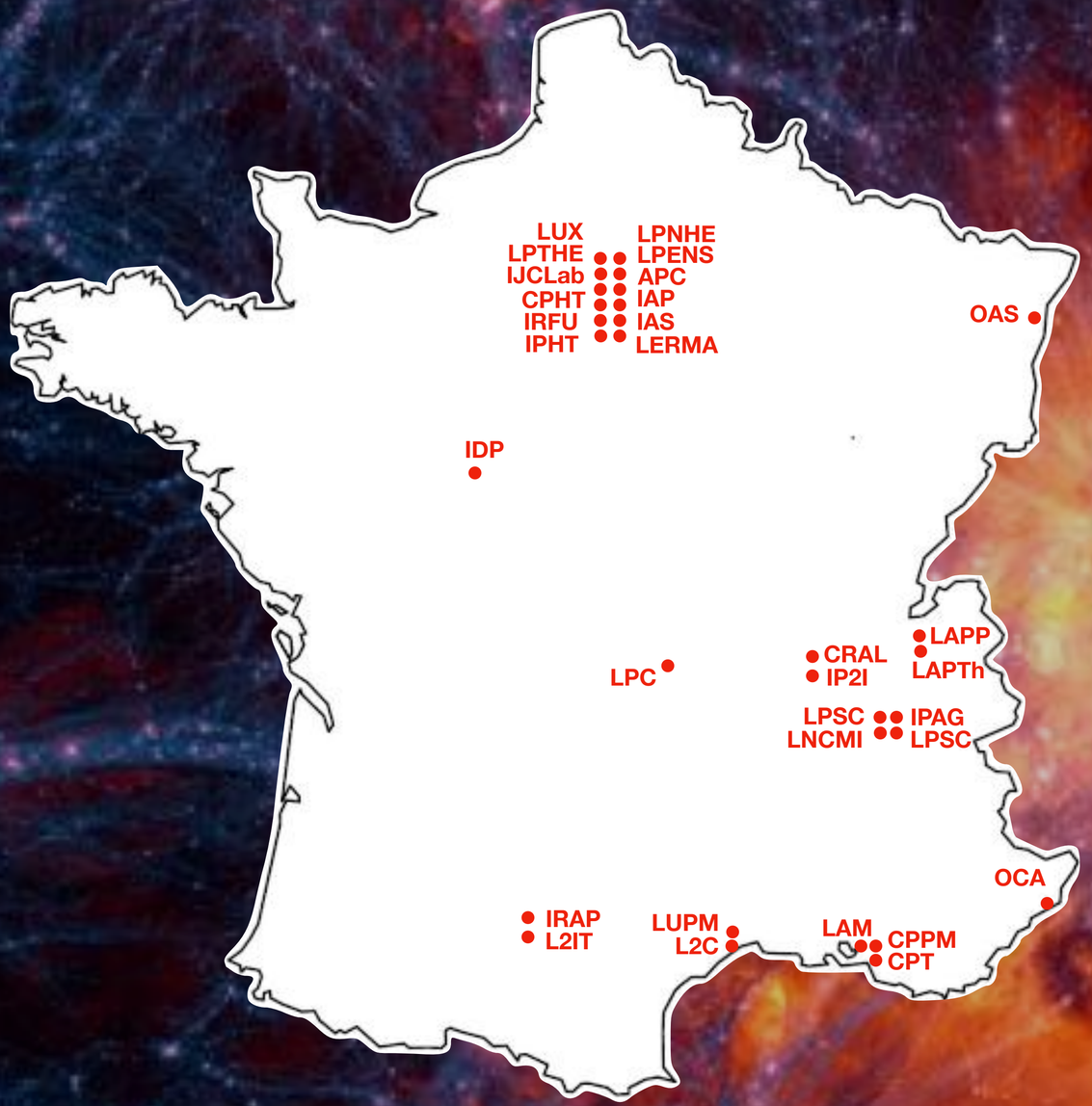
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Main Observables
Cosmic Microwave Background (CMB)
Planck, ACT, SO, LiteBIRD, SPO, ...
optical / IR
DESI, Euclid, Rubin, etc.
Radio/21cm
SKA-type surveys, EoR/cosmic dawn, HI intensity mapping…
redshift
Mayall's
Sombrero
Triangulum
Whirlpool
Virgo Cluster
Bode
Hydra Cluster
Centaurus
Northern Local Supervoid
Giant Void
Lite Supercluster
Bullet Cluster
Great Wall
Pandora Cluster
HD1
(most distant known galaxy)

# GdR CoPhy community




| | | |
|---|---|---|
| APC | AstroParticule et Cosmologie, CNRS/IN2P3 & Université de Paris, CEA, Observatoire de Paris | 24 |
| CPB | Centre Pierre Binetruy CNRS/Université de Berkeley-USA | 2 |
| CPHT | Centre de Physique Théorique CNRS/INP et École Polytechnique | 8 |
| CPPM | Centre de Physique des Particules de Marseille, CNRS/IN2P3 & AMU | 7 |
| CPT | Centre de Physique Théorique de Marseille, CNRS, Aix-Marseille-Université et Université de Toulon | 4 |
| CRAL | Centre de Recherche Astrophysique de Lyon Université Claude Bernard Lyon 1, ENS de Lyon et CNRS. | 4 |
| IRFU | Institut de Recherche sur les lois fondamentales de l'Univers, CEA | 20 |
| IAP | Institut d'Astrophysique de Paris, CNRS/INSU & Sorbonne Université | 26 |
| IAS | Institut d'Astrophysique Spatiale, UMR 8617, CNRS/INSU & Université Paris Saclay | 7 |
| IDP | Institut Denis Poisson, CNRS- Tours/Orléans | 1 |
| IJCLab | Laboratoire de Physique des 2 infinis Irène Joliot-Curie, CNRS/ IN2P3 & Université Paris Saclay & Université de Paris | 19 |
| ILANCE | International Laboratory for Astrophysics, Neutrino and Cosmology Experiments IN2P3/CNRS and University of Tokyo | 1 |
| IPAG | Institut de Planétologie et d'Astrophysique de Grenoble (IPAG) , CNRS/INSU et Université Grenoble Alpes. | 2 |
| IP2I | Institut de Physique des deux infinis de Lyon, CNRS/IN2P3 et Université Claude Bernard | 7 |
| IPHT | Institut de Physique Théorique, CNRS/INP & CEA | 7 |
| IRAP | Institut de Recherche en Astrophysique et Planétologie, CNRS/INSU & Université Paul Sabatier | 5 |
| LAM | Laboratoire d'Astrophysique de Marseille, CNRS/INSU & AMU | 10 |
| LAPP | Laboratoire d'Annecy de Physique des Particules, CNRS/IN2P3 & Université Savoie-Mont-Blanc | 3 |
| LAPTh | Laboratoire d'Annecy de Physique Théorique, CNRS/INP et USMB | 4 |
| LERMA | Laboratoire d'Étude du Rayonnement et de la Matière en Astrophysique et Atmosphères, CNES/INSU & Observatoire de Paris & UPMC | 8 |
| LNCMI | Laboratoire National des Champs Magnétiques Intenses CNRS, INSA Toulouse, Université Grenoble Alpes et Université Paul Sabatier | 2 |
| LPC | Laboratoire de Physique - Clermont, CNRS/IN2P3 et Université Clermont Auvergne | 6 |
| LPENS | Laboratoire de Physique de l'Ecole Normale Supérieure, ENS, CNRS, Sorbonne Université et l'Université Paris Cité | 2 |
| LPNHE | Laboratoire de physique nucléaire et de hautes énergies, CNRS/IN2P3 , Sorbonne Université et Université Paris Cité. | 12 |
| LPSC | Laboratoire de physique subatomique et de cosmologie de Grenoble, CNRS/IN2P3, Université Grenoble Alpes et école Grenoble INP | 11 |
| LPTHE | Laboratoire de Physique Théorique et des Hautes Énergies, CNRS, Sorbonne Université | 5 |
| LUPM | Laboratoire Univers et Particules de Montpellier, CNRS/IN2P3, CNRS/INSU, CNRS/INP | 8 |
| LUX | Laboratoire d'étude de l'Univers et des phénomènes eXtrêmes (LUX), CNRS, Observatoire de Paris, Sorbonne Université | 9 |
| L2C | Laboratoire Charles Coulomb, CNRS et Université Montpellier | 6 |
| L2IT | Laboratoire des 2 infinis, Toulouse, CNRS/IN2P3 | 3 |
| OAS | Observatoire astronomique de Strasbourg Université de Strasbourg, CNRS et Unistra. | 6 |
| OCA | Observatoire de la côte d'Azur | 5 |
| TOTAL | | 244 |



**Centre Pierre Binétruy (CPB, UC Berkeley)**



**Particle Physics & Cosmology International Research Laboratory (PPC, UChicago)**



**ILANCE (University of Tokyo)**

**~ 250 researchers**
**30+ labs**

# GdR CoPhy past events

direction:

- Sophie Henrot-Versillé (2022-2025)
- Josquin Errard (2025-today)

| Année | Intitulé | Lien | Détails |
|---|---|---|---|
| **2023** | Kick-off du GdR | https://indico.ijclab.in2p3.fr/event/8881/ | LPNHE, Paris<br>17-19 janvier 2023<br>157 participant.e.s (47% de jeunes) |
| **2024** | GdR Episode 2 | https://indico.ijclab.in2p3.fr/event/10428/ | IP2I, Lyon<br>21-23 mai 2024<br>60 participant.e.s (35% de jeunes) |
| **2025** | GdR Episode 3 | https://indico.ijclab.in2p3.fr/event/11301/ | LPENS, Paris<br>14-16 avril 2025<br>119 participant.e.s (44% de jeunes) |
| **2026** | GdR Episode 4 | https://indico.ijclab.in2p3.fr/event/13091/ | LPC Clermont<br>1-3 juin 2026<br>~ 60 participant.e.s (TBC) |

| Année | Evénements | Lieu | Référence |
|---|---|---|---|
| **2023** | Colloque national Action Dark Energy | LAPTh, Annecy | https://indico.in2p3.fr/event/29646/ |
| | Colloque National CMB-France #5 | IAP, Paris | https://indico.in2p3.fr/event/30833 |
| | Atelier TUG | LPENS, Paris | https://indico.in2p3.fr/event/29276/ |
| | Tools WG session | IAP, Paris | https://cophy-tools.iap.fr/index.php?p=meetings-2023 |
| | Anomalies in Cosmology | LAPTH, Annecy | https://indico.in2p3.fr/event/30622/ |
| | String - Cosmo Day | APC, Paris | https://indico.in2p3.fr/event/30602/ |
| **2024** | Colloque national du WG Dark Energy | IHP, Paris | https://indico.in2p3.fr/event/32522/ |
| | Colloque National CMB-France #6 | IHP, Paris | https://indico.in2p3.fr/event/34251/ |
| | Atelier TUG | LAPTH, Annecy | https://indico.in2p3.fr/event/32387/ |
| | Tools WG session | IAP, Paris | https://cophy-tools.iap.fr/index.php?p=meetings-2024 |
| **2025** | Tools WG session | LAM, Marseille | https://indico.iap.fr/event/48/ |
| | Colloque national du WG Dark Energy | Université de Montpellier | https://indico.in2p3.fr/event/36618/ |
| | Colloque National CMB-France #7 | IAP, Paris | https://indico.in2p3.fr/event/36914 |
| | Atelier TUG | IPhT, Saclay | https://indico.in2p3.fr/event/tug25 |
| | Strings & Cosmology | LAPTh, Annecy | https://indico.in2p3.fr/event/33661/overview |
| **2026** | Atelier TUG | LPENSL, Lyon | https://indico.in2p3.fr/e/tug26 |
| | Colloque national du WG Dark Energy | IHP, Paris | https://www.ihp.fr/fr/agenda/10ieme-colloque-national-action-dark-energy |

# Congratulations on the recent CNRS medals!



Image : Laurent Ardhuin pour le CNRS

Accueil › Actualités

## Sophie Henrot-Versillé, médaillée d'argent CNRS 2026, trait d'union entre cosmologie et physique des particules

**Sophie Henrot-Versillé est directrice de recherche à IJCLab (CNRS / Université Paris-Saclay), où elle a dirigé le pôle astroparticules, astrophysique et cosmologie pendant les 6 dernières années. Depuis près de trente ans, sa soif de connaissances la pousse à naviguer entre deux infinis : celui de l'infiniment petit des particules élémentaires et celui, vertigineux, du cosmos. Elle alterne successivement entre les expériences de physique des particules comme BaBar aux Etats-Unis et ATLAS au CERN, où elle part à la recherche de particules et d'interactions au-delà du Modèle Standard de la physique des particules, et les projets de cosmologie tels que les satellites Planck ou LiteBIRD, qui mesurent le fond diffus cosmologique, une relique de l'Univers primordial. Cette aventure entre les deux infinis lui a permis de porter un regard croisé sur les deux disciplines et de développer ses talents d'expérimentatrice comme de phénoménologiste. Une trajectoire singulière qui lui vaut aujourd'hui la médaille d'argent du CNRS.**



© CNRS Paris-Centre

Accueil › Actualités

## Clotilde Laigle : une médaille de bronze pour ses travaux sur l'observation de la toile cosmique

**Clotilde Laigle est astronome adjointe à l'IAP (CNRS/Sorbonne Université), où elle étudie la formation des galaxies dans la toile cosmique. Pour cela elle tire parti aussi bien des riches données des nouveaux relevés astronomiques que des simulations cosmologiques.**



Accueil › Actualités

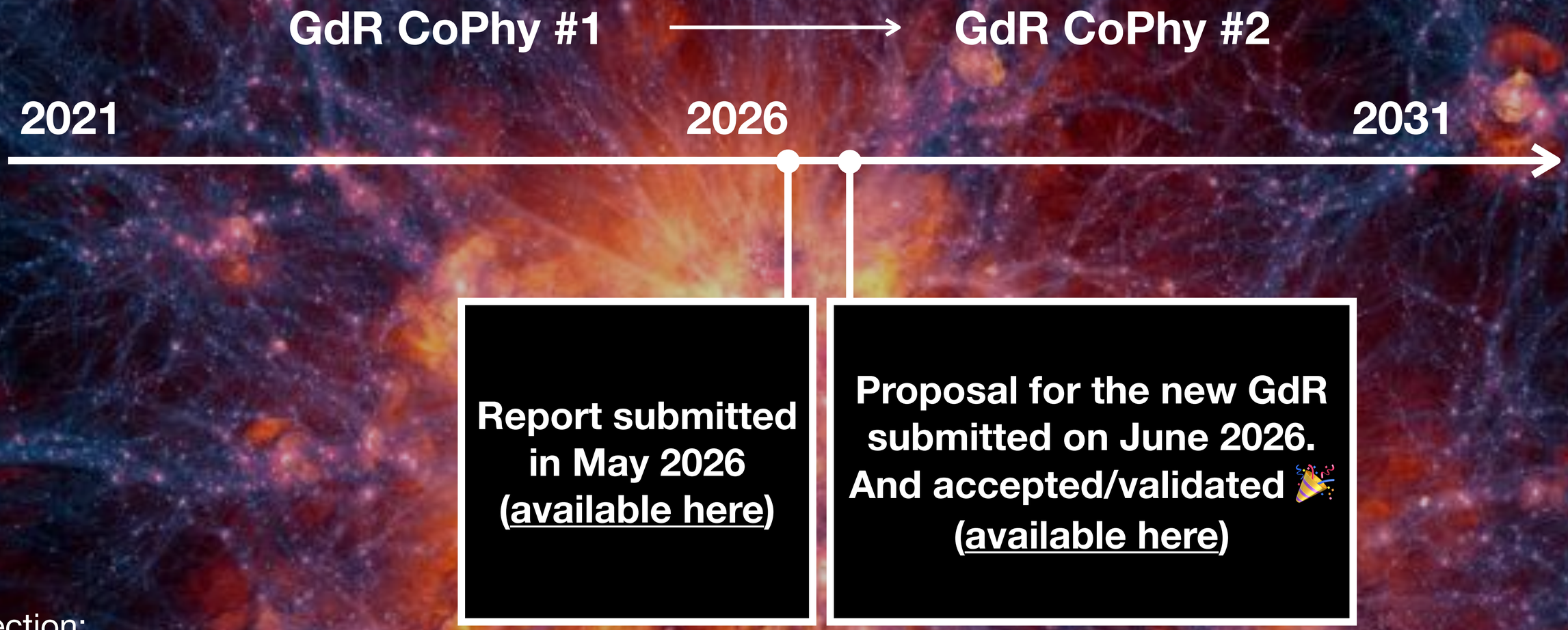
## Pauline Zarrouk, cosmologiste au LPNHE, lauréate de la médaille de bronze du CNRS

**Explorer l'histoire de l'Univers à travers la répartition des galaxies, tester la gravité aux plus grandes échelles et traquer les indices d'une énergie noire insaisissable : à 34 ans, alors que sa carrière est toujours à ses débuts, Pauline Zarrouk fait déjà parler les cartes du cosmos comme personne. Chercheuse au LPNHE (CNRS / Sorbonne Université), coordinatrice au CNRS du projet DESI (Dark Energy Spectroscopic Instrument), elle analyse les données portant sur la distribution spatiale des galaxies dans le cosmos, issues de grands relevés spectroscopiques tels que le Sloan Digital Sky Survey ou encore DESI, pour mettre à l'épreuve les modèles cosmologiques actuels, de la constante décrivant l'accélération de l'expansion de l'Univers à la théorie de la relativité générale d'Einstein. Jonglant entre recherches de fond et responsabilités institutionnelles, elle n'en est pas moins une vulgarisatrice convaincue, décidée à transmettre sa passion pour l'Univers à ses étudiantes et étudiants, au grand public et en milieu scolaire.**

"Beyond these individual achievements, this is also a great sign for our field, highlighting both the vitality of cosmology research in France and the growing recognition of our topics. It also shows how important a supportive and collaborative scientific environment — to which the GdR CoPhy contributes — is in enabling these trajectories.

We are all very happy to share this news, which further strengthens the visibility and attractiveness of our field."

# GdR CoPhy administration




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# A Vision for the Next GdR CoPhy (2026-2031)

Preparing the French cosmology community for the era of precision, multi-probe cosmology.

**Euclid**
(on-going)

**Rubin/LSST**
(2026-2036)

**DESI**
(on-going)

+other
LSS!

**Simons Observatory**
(on-going)

+21cm

**South Pole Observatory**
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+other CMB!

**+ several other past, current and future projects**

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**Lazuli**
(2028-2030)

**SKAO**
(2030s)

**South Pole Observatory**
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**Gravitational Waves (Einstein Telescope, LISA)**
(2035)

+other CMB!

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(on-going)

**LiteBIRD**
(late 2030s)

**FOSSIL**
(2040?)

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**combination of probes**

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Address the major questions of cosmology:

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- Fundamental physics and gravity
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- Large-scale structure
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- **Gravitational-wave cosmology**
- **Cross-correlations between probes**

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- Simulations & forward modelling
- HPC and large-scale data processing
- AI and Simulation-Based Inference
- Reproducible community tools

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**Community building**

- Strengthen links between IN2P3, INSU and INP and other institutions (CEA, Universities)
- Increase interactions with the **GdR Gravitational Waves** and international networks
- Support emerging scientific initiatives
- Empower the next generation of cosmologists
- Support **communication** with the general public
- Support schools/trainings

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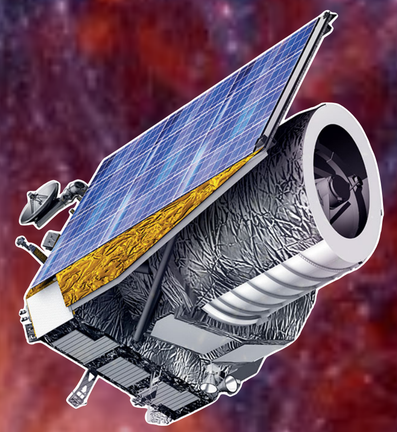
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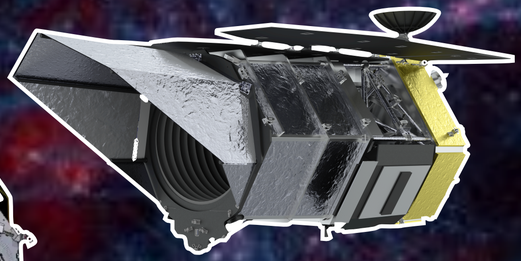
+ on-going discussions about the renewing/ possible change of the coordination team

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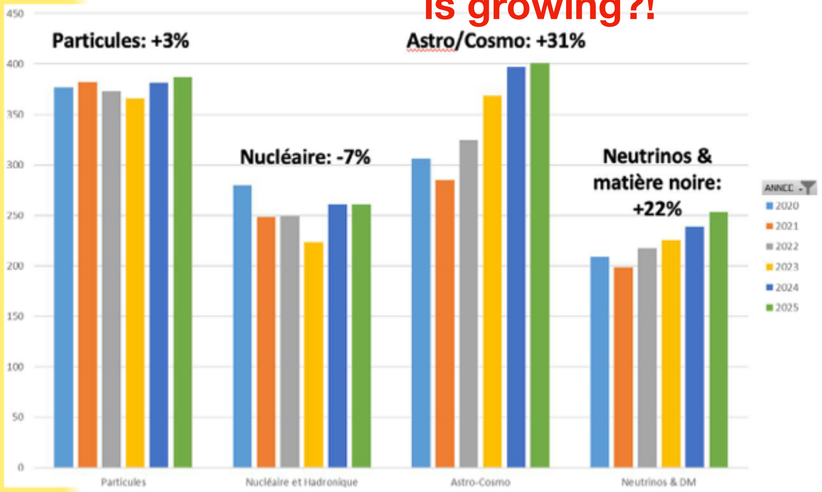




cnrs Nucléaire Particules

## Tendances RH selon les thématiques

**the community is growing?!**

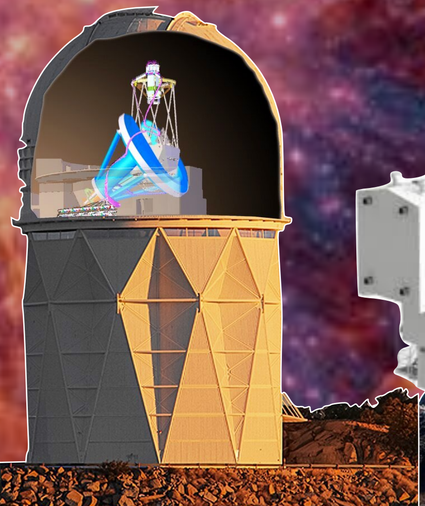



- ✓ +10% ETPT depuis 2020 d'après les déclarations NSIP
- ✓ Essor des thématiques hors particules et nucléaire
  - Ondes gravitationnelles
  - Neutrinos
  - Energie sombre
  - ...

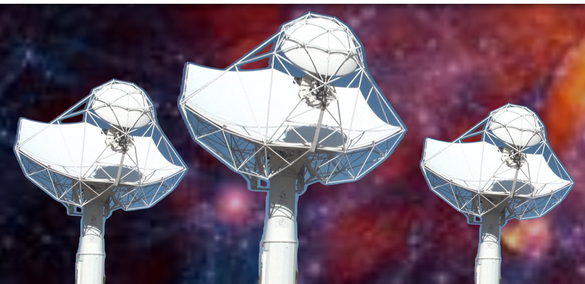
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## A Flood of Exciting New Data!!

at the heart of a new "*CNRS Universe and Particles*" Institute!



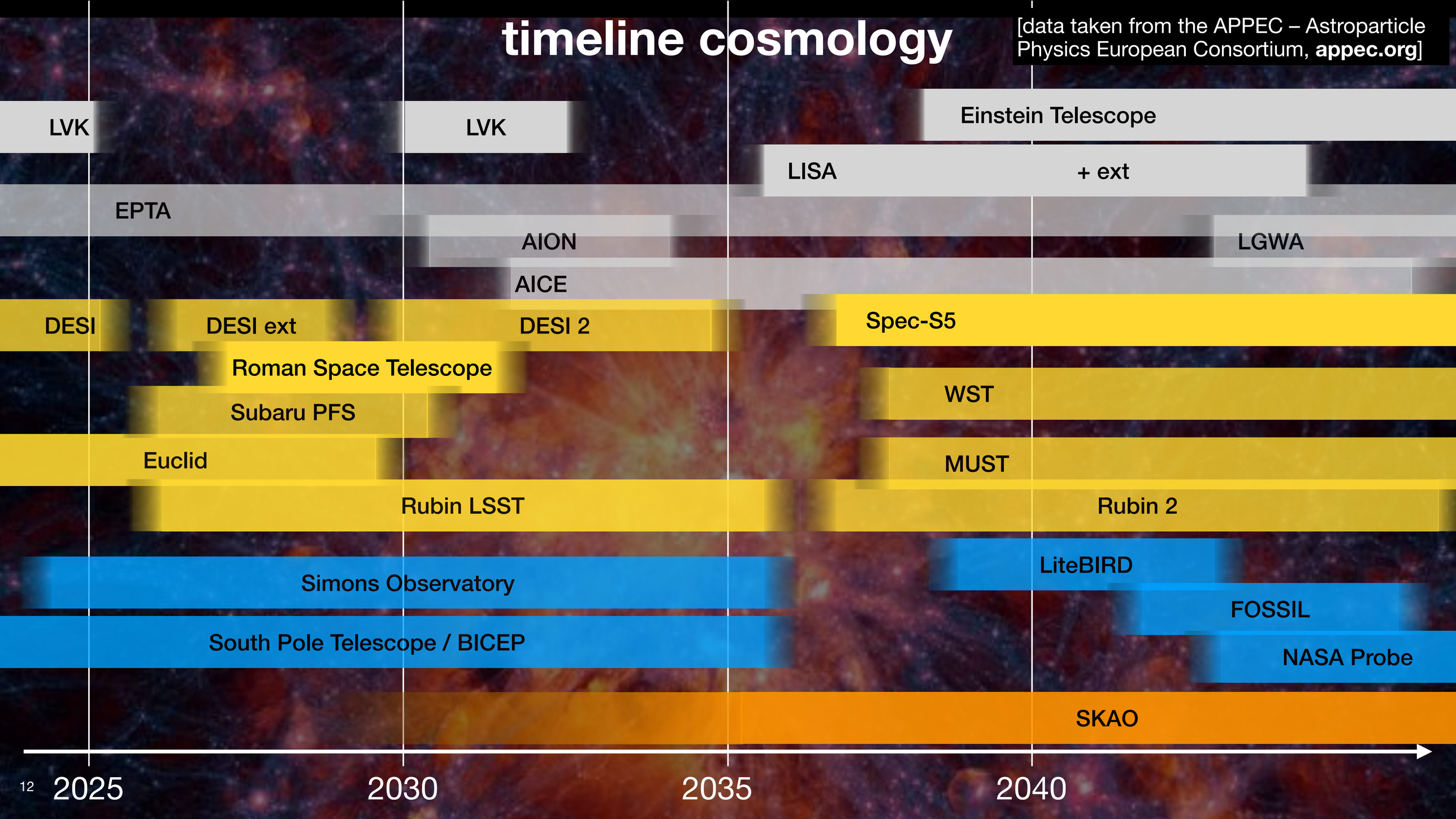






# timeline cosmology

[data taken from the APPEC – Astroparticle Physics European Consortium, **appec.org**]



# Summary
## GdR CoPhy: bringing together the French cosmology community

- **~250 researchers, 30+ laboratories**, across theory, simulations, observations and data analysis
- **A renewed GdR for 2026-2030**, preparing for the era of precision, multi-probe cosmology
- **Gravitational waves are becoming a key cosmological probe**, alongside CMB, LSS and time-domain observations
- **Let's strengthen the connections between CoPhy and GdR Gravitational waves: science, methods, workshops, training & young researchers**

**→ sign-up to the GdR CoPhy mailing list!**