The French Gamma-Ray Community and Its Connections with Latin America

CLAF-CNRS Workshop April 2026

Pierre Cristofari, Anne Lemière

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H.E.S.S.

Fermi
Gamma-ray
Space Telescope

SWGO
The Southern Wide-field Gamma-ray Observatory

LHAASO

Space Variable Object Monitor
SVOM
空间变源监视器

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Cherenkov Telescope Array Observatory (artist view)

CTAO | CONSORTIUM

How it’s going: the array is real !

CTAO Status update

September 2025

The CTAO ‘French’ community

Funding institutions: CNRS (INSU, IN2P3), CEA

- French ‘representatives’ :
T. Stolarczyk : co-spoke & M. DeNaurois vice chair board ERIC

- Coordinators French ‘community’ :
F. Acero, P. Cristofari, S. Fegan

≈13 French teams/laboratories involved in CTAO:
APC (Paris),CPPM (Marseille), IJCLAB (Orsay), IPAG (Grenoble), IRAP (Toulouse), IRFU (CEA Saclay: DAp, DPhP, etc.), LAPP (Annecy), LLR (École polytechnique); LP2I (Bordeaux), LPNHE (Paris), LUPM (Montpellier), Observatoire de la Côte d’Azur, Observatoire de Paris

80 - 100 permanent researchers

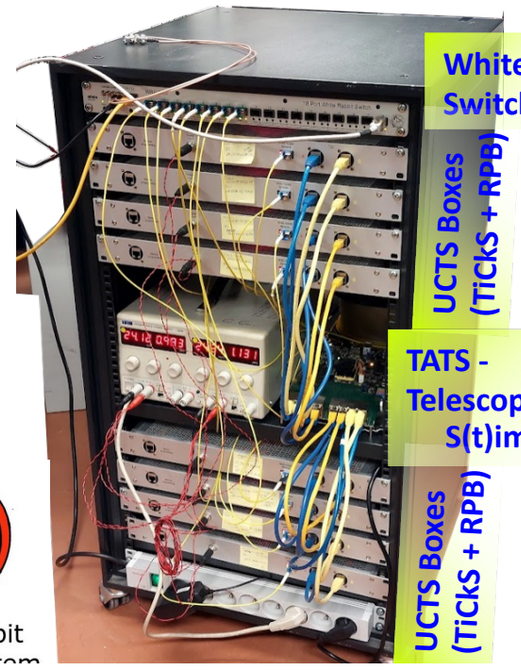
30 - 40 Postdocs/ PhD candidates

Implications on multiple levels: construction LSTs

Construction :

- 4 LSTs almost completed in La Palma
  - All mirrors in place, all cameras installed by spring ‘26
- First two MSTs and SSTs in the South in 2026 (foundation contracted)
- Timing & clock stamping for the trigger system
  - Modules delivered for LST-North+LST-South+NectarCam

TATS based on GeneSys FPGA board



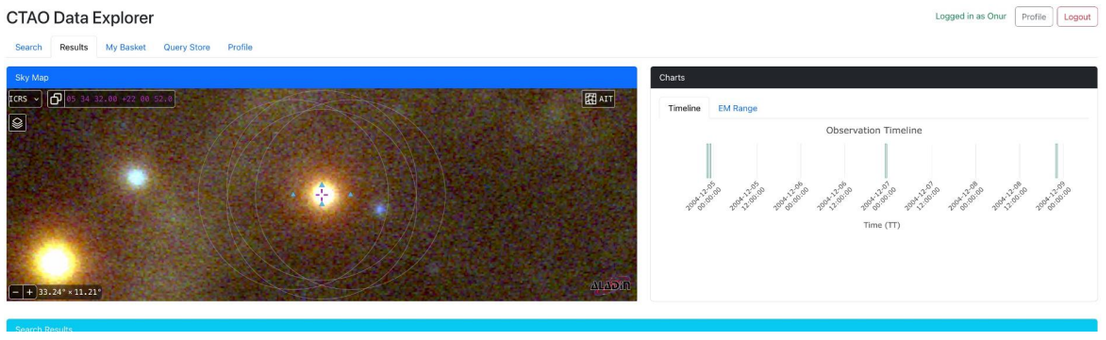
WhiteRabbit Timing System

Implications on multiple levels: Software, data analysis, data access

Software :

- Gammapy v2.0 was released last month (official CTAO science tool)
  - Major Long Term Release. Many improvements

- Array control software implemented & operational
- Data processing : first end to end chain being implemented
- Data portal being prepared for the Science data challenge



- **SUSS: Archive of bulk data, Portal access to data**

Implications on multiple levels:
Small size telescopes

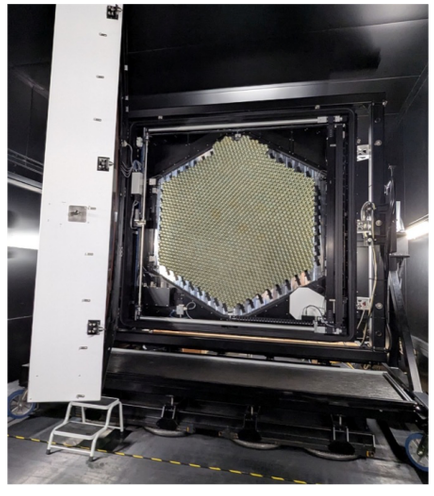
SSTs in France

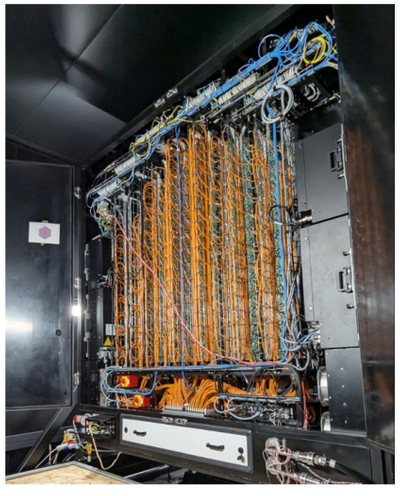
- Start of industrial phase for SST telescopes
- 2026: assembly, shipping to Chili
- 2027: first batch of 5 SSTs on site + 2 MSTs
- ~2028 : 15 SSTs
- ~2029 : 25 SSTs

Implications on multiple levels: NectarCAM MSTs

NectarCAM : a camera for MSTs

- First camera is complete.
- Under extensive tests at CEA/IRFU
- Many technical improvements in the last few years.
- Goal : first camera ready to **be shipped by summer**
- Integration of second camera has started.





Implications on multiple levels: Training Cherenkov Astronomy Data School (CADS, Paris)

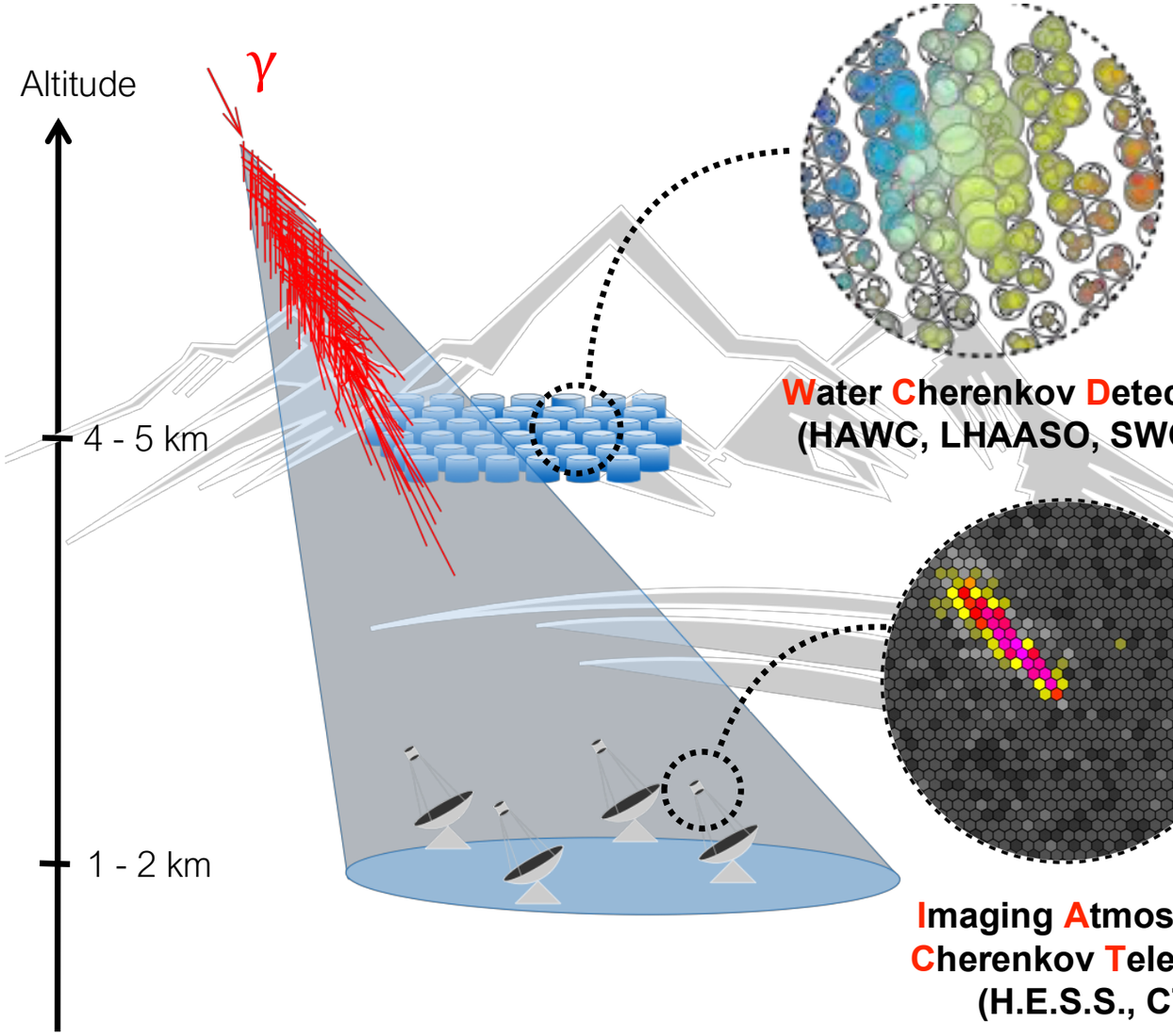
November 2-6th 2026

(3rd edition, 35 slots, Lectures and Hands-on session beginners and advanced users Gammapy, registration thanks to Observatoire de Paris.

https://indico.obspm.fr/event/2993/

SWGO

The Southern Wide-field Gamma-ray Observatory



	Duty cycle	Field of view	Energy range	Energy resolution	Angular resolution
Water Cherenkov Detectors (HAWC, LHAASO, SWGO)	✓ ~95%	✓ 90°	✓ 0.5 - 100 TeV	✗ 20% at 1 TeV 10% at 100 TeV (on-array events)	✗ 0.8 - 0.1°
Imaging Atmospheric Cherenkov Telescopes (H.E.S.S., CTA)	✗ ~10% ~1000 h/y	✗ 5°	✓ 0.03 - 100 TeV	✓ < 10% for E > 1 TeV	✓ 0.1 - 0.05°

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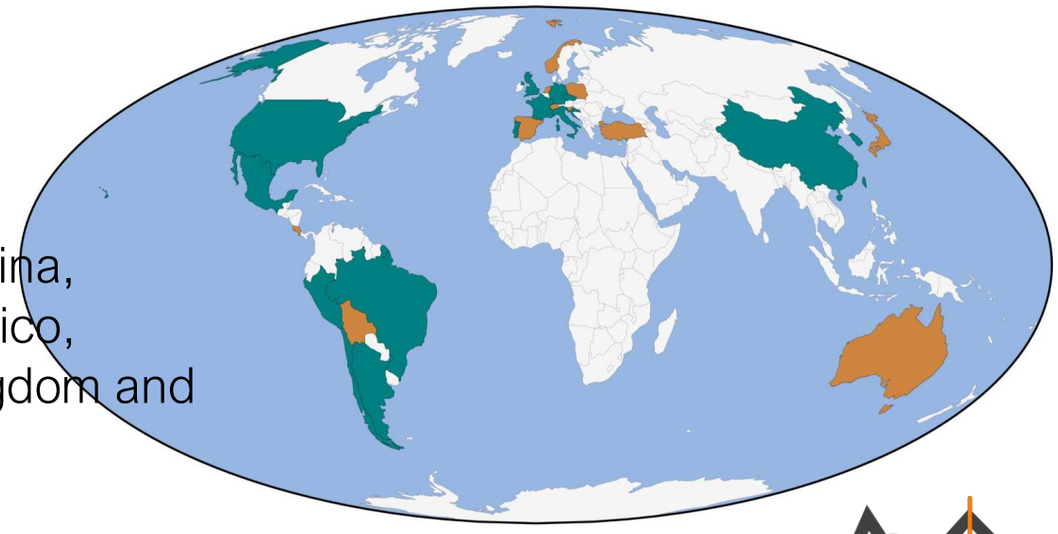
SWGO : The Southern Wide-field Gamma-ray Observatory

The SWGO collaboration

- Founded in 2019
- 90 research institutions from 16 countries
- **Full partner institutes** in Argentina, Brazil, Chile, China, Croatia, Czech Republic, France, Germany, Italy, Mexico, Netherlands, Peru, Portugal, South Korea, United Kingdom and United States
- **Supporting scientists** in 10 additional countries



Spokesperson : Jim Hinton, MPIK Heidelberg, Germany

Vice-spokespersons :

Petra Hüntemeyer, MTU, Michigan, US
Ulisses Barres de Almeida, CBPF, Brazil

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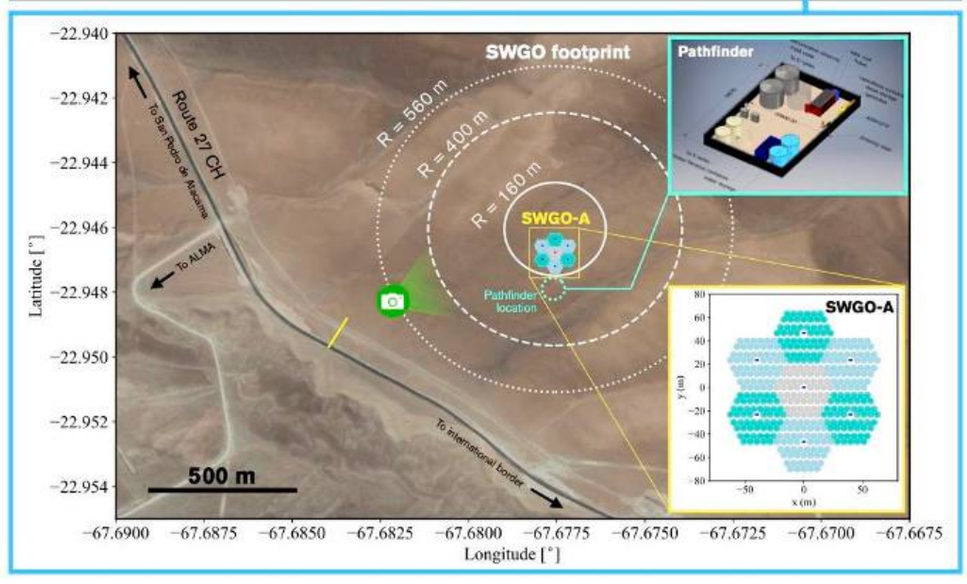
The Southern Wide-field Gamma-ray Observatory

SWGO - Site selection !

- July 2024: preferred site identified: Pampa La Bola, Atacama Astronomical Park, Chile (neighbour of ALMA)
- altitude : 4700 m
- water from the nearby city Calama
- back-up site : Imata in Peru



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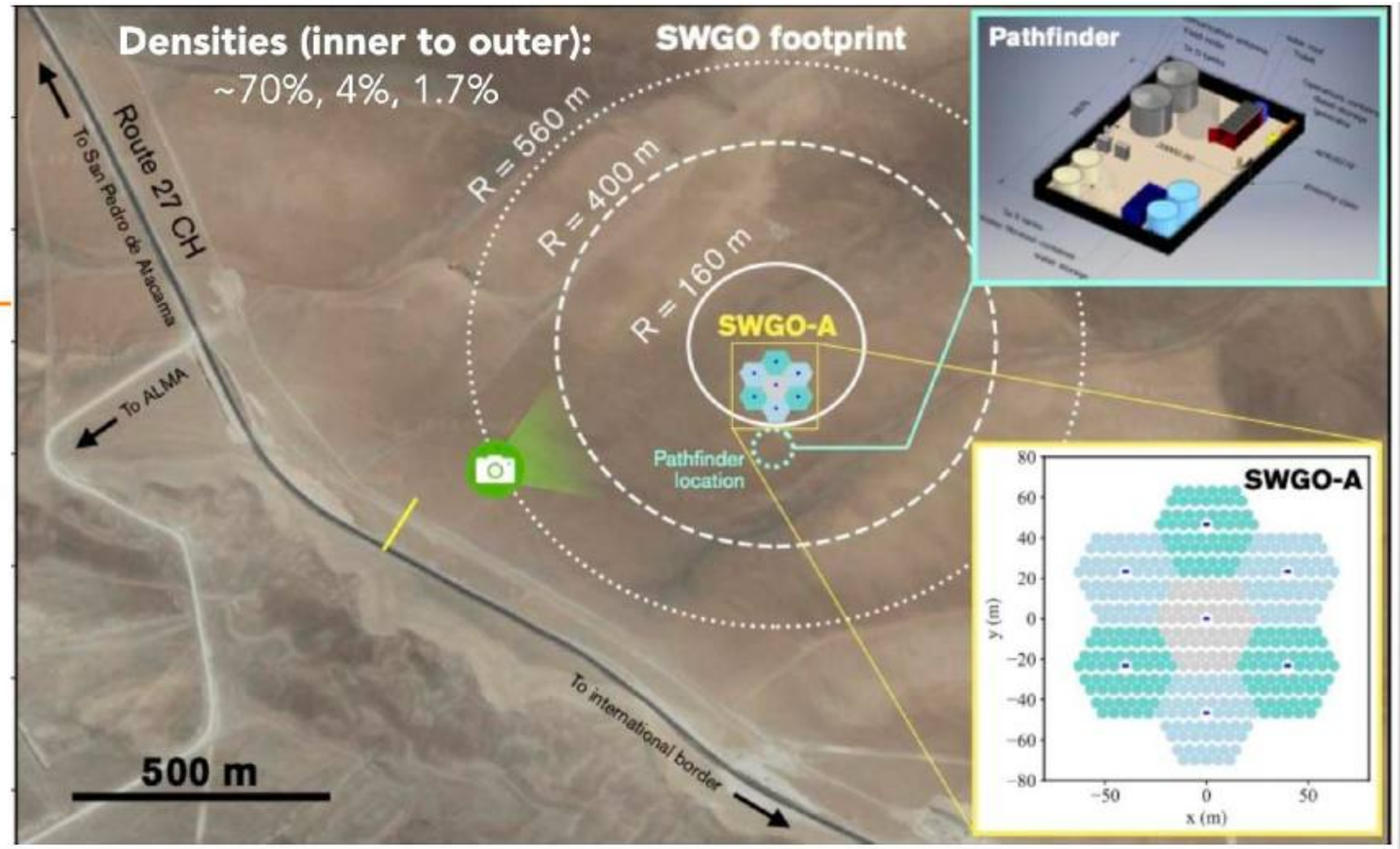
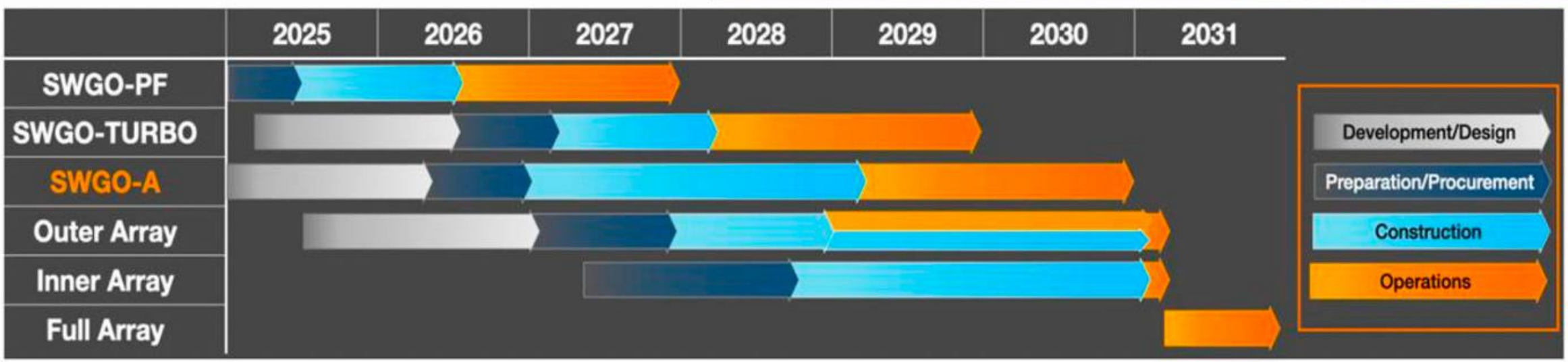
SWGO Stages

- Beyond the pathfinder:
  - SWGO-A – 385 WCDs in inner array
  - Outer WCD engineering array ~50 tanks
  - 800 radio antennae array (SWGO-TURBO)
  - Construction to full scale as funding allows





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SWGO

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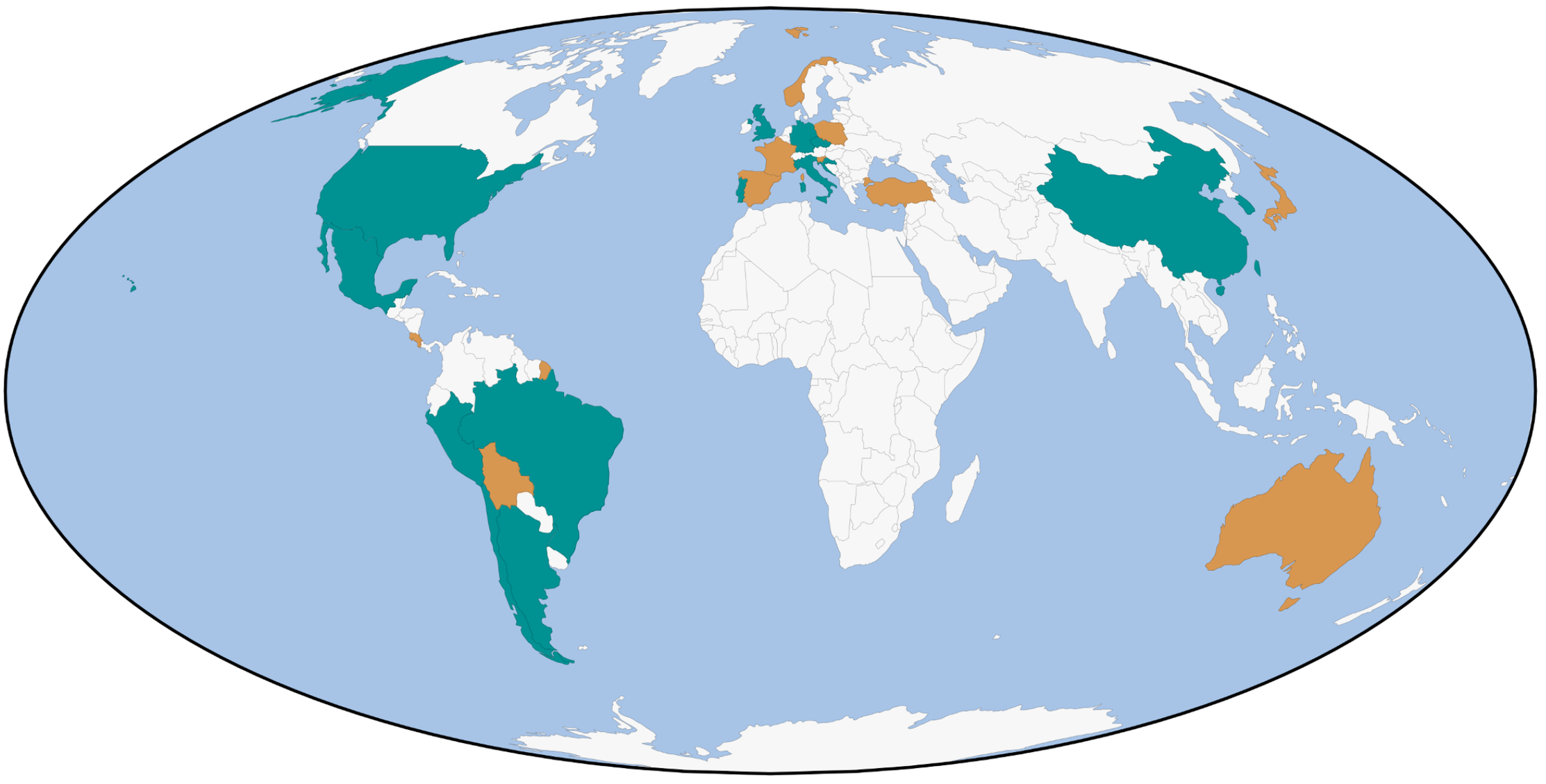

16 countries

2 Laboratories in France : LP2I Bordeaux, APC

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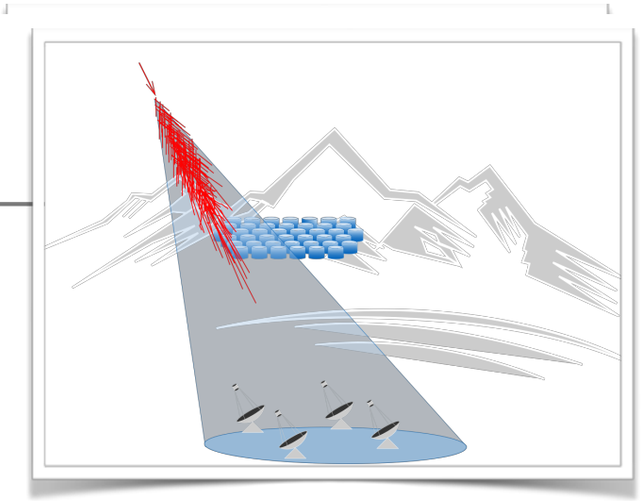
Gammapy (joint analyses),**Extended source analysis** in development (CTAO synergy), theoretical prospects

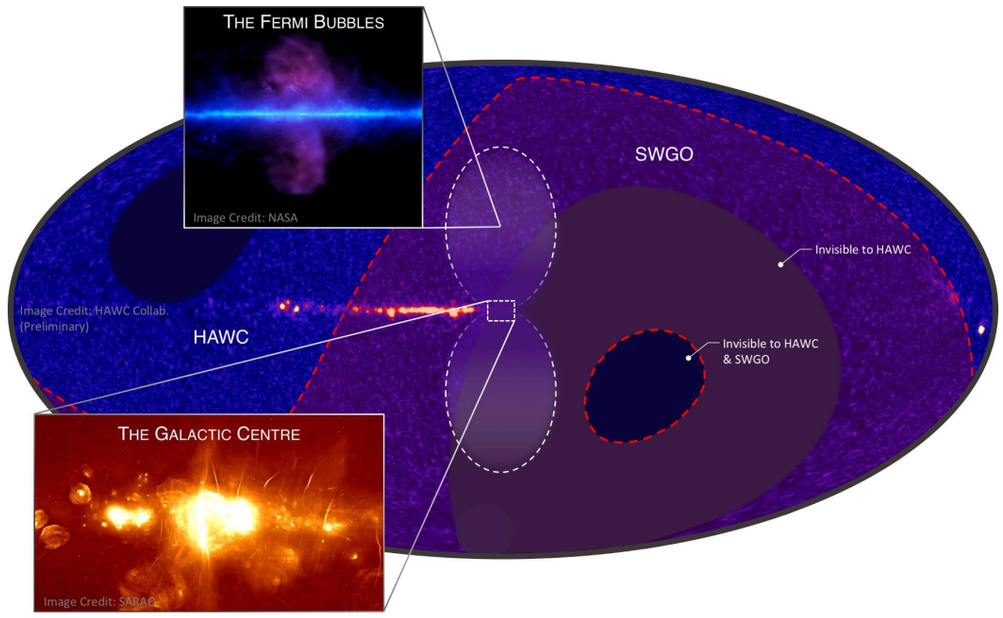
Technical developments : **Bladder tests** in wave basin (resistance & motion under waves)
Solar panels to power the Pathfinder.

IN2P3 Master Project (pre-funded project stage)

Summary



- **Two complementary detection techniques to detect γ rays from the ground**
- HAWC and LHAASO covering the Northern hemisphere.
  SWGO brings the successful wide-field gamma-ray approach to a new hemisphere ! First major instrument of this type in the South
- Complementarity with CTAO for transient, very extended sources and PeVatrons) ; synergy with neutrino and GW alerts
- NOW approaching construction:
- Pathfinder in Pampa la Bola in 2026
- SWGO-A construction from 2027 (with NSF support)



See science case white paper for details:
https://arxiv.org/abs/2506.01786

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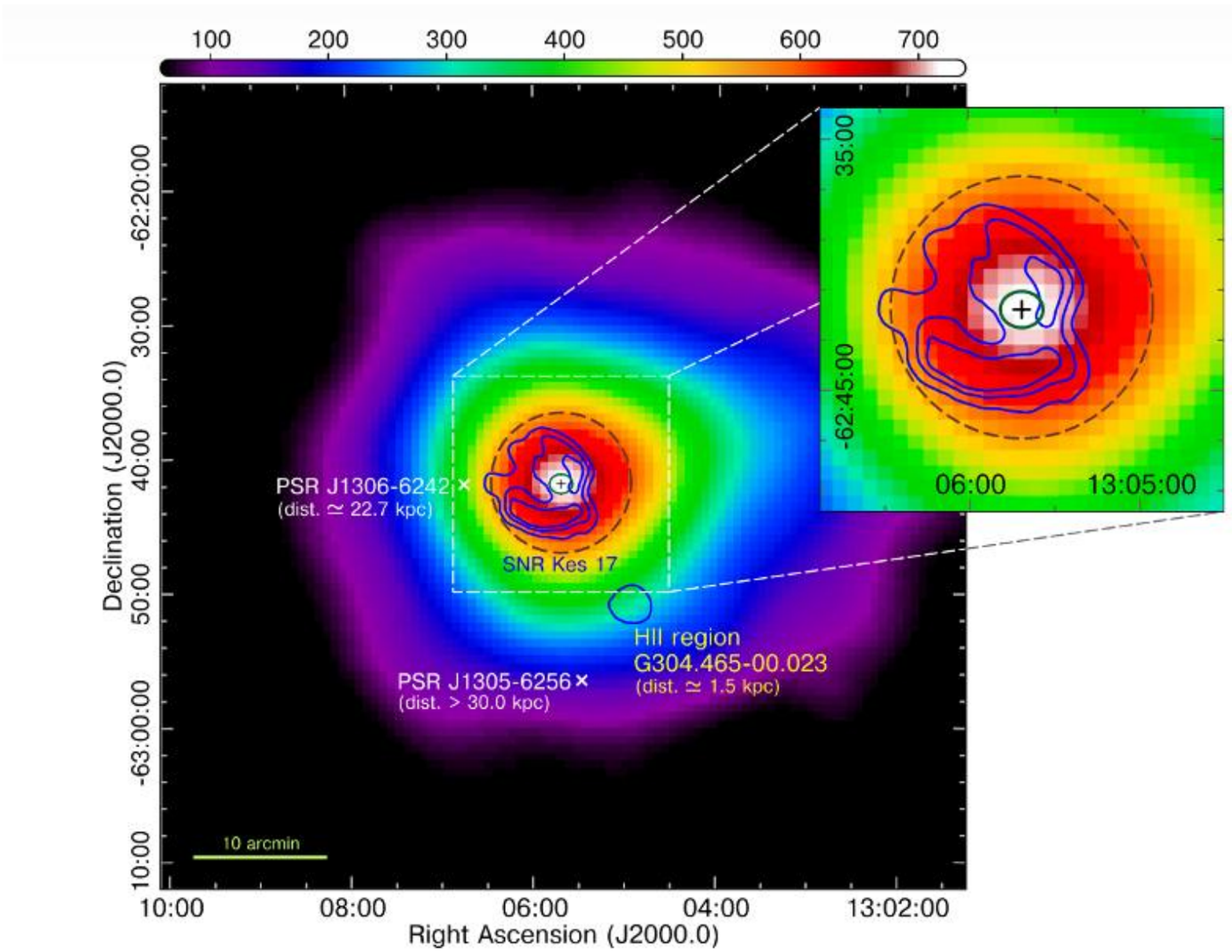
Other ‘smaller’ collaborations

Joint Radio-gamma analyses: supernova remnant Kes 17



+ Many others

Supan, Castelletti, Lemière 2023

Lemière, Castelletti, Maza 2025

IAFE & CNRS