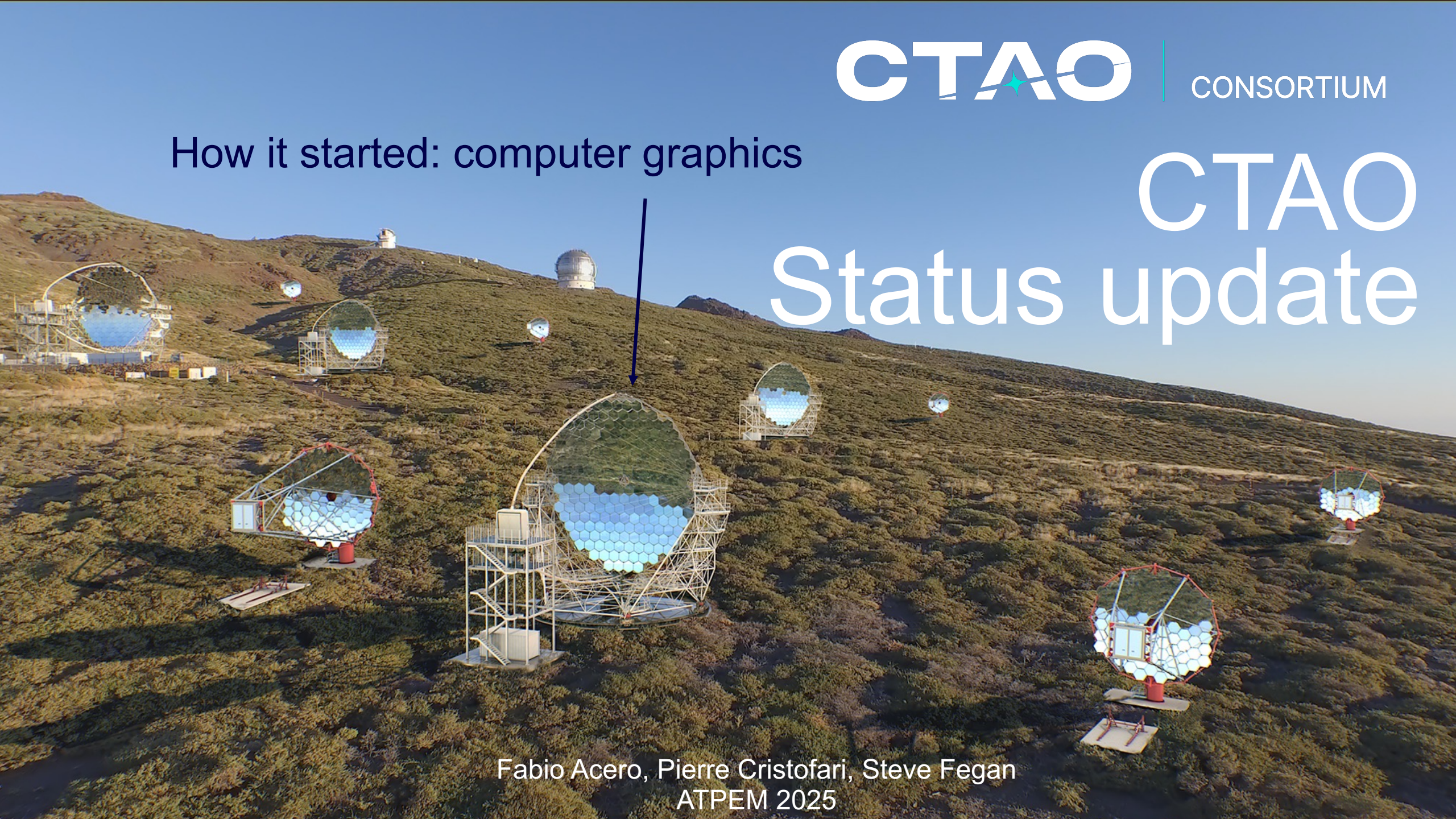


CTAO | CONSORTIUM

CTAO Status update

Fabio Acero, Pierre Cristofari, Steve Fegan

ATPEM 2025

CTAO | CONSORTIUM

How it’s going: the array is real !

CTAO Status update

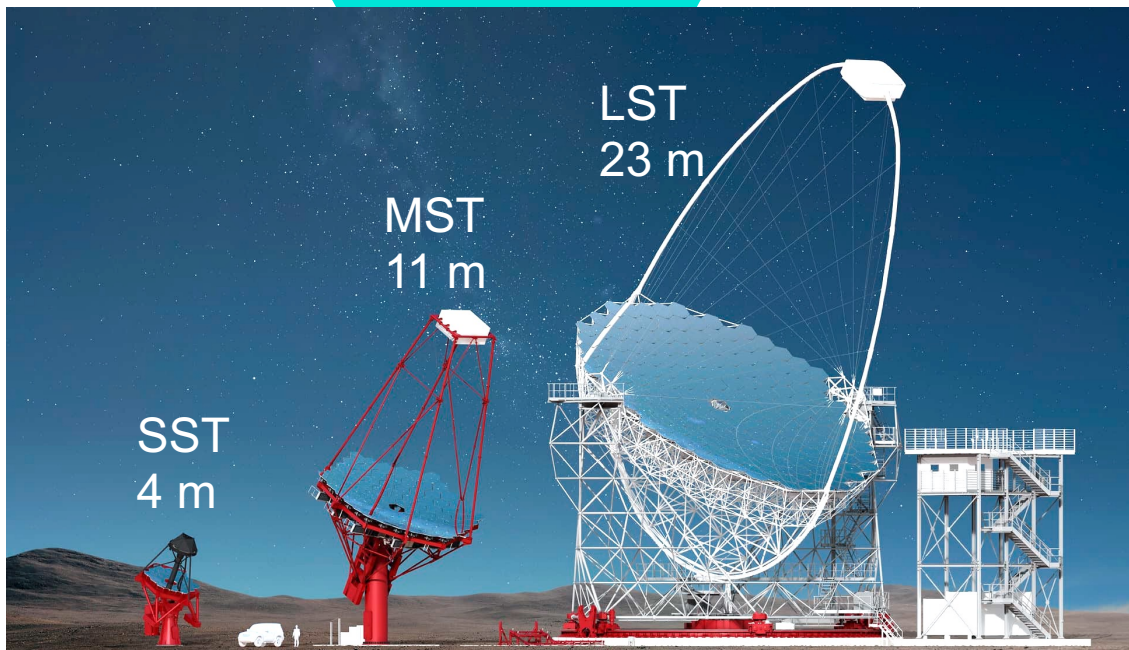
September 2025

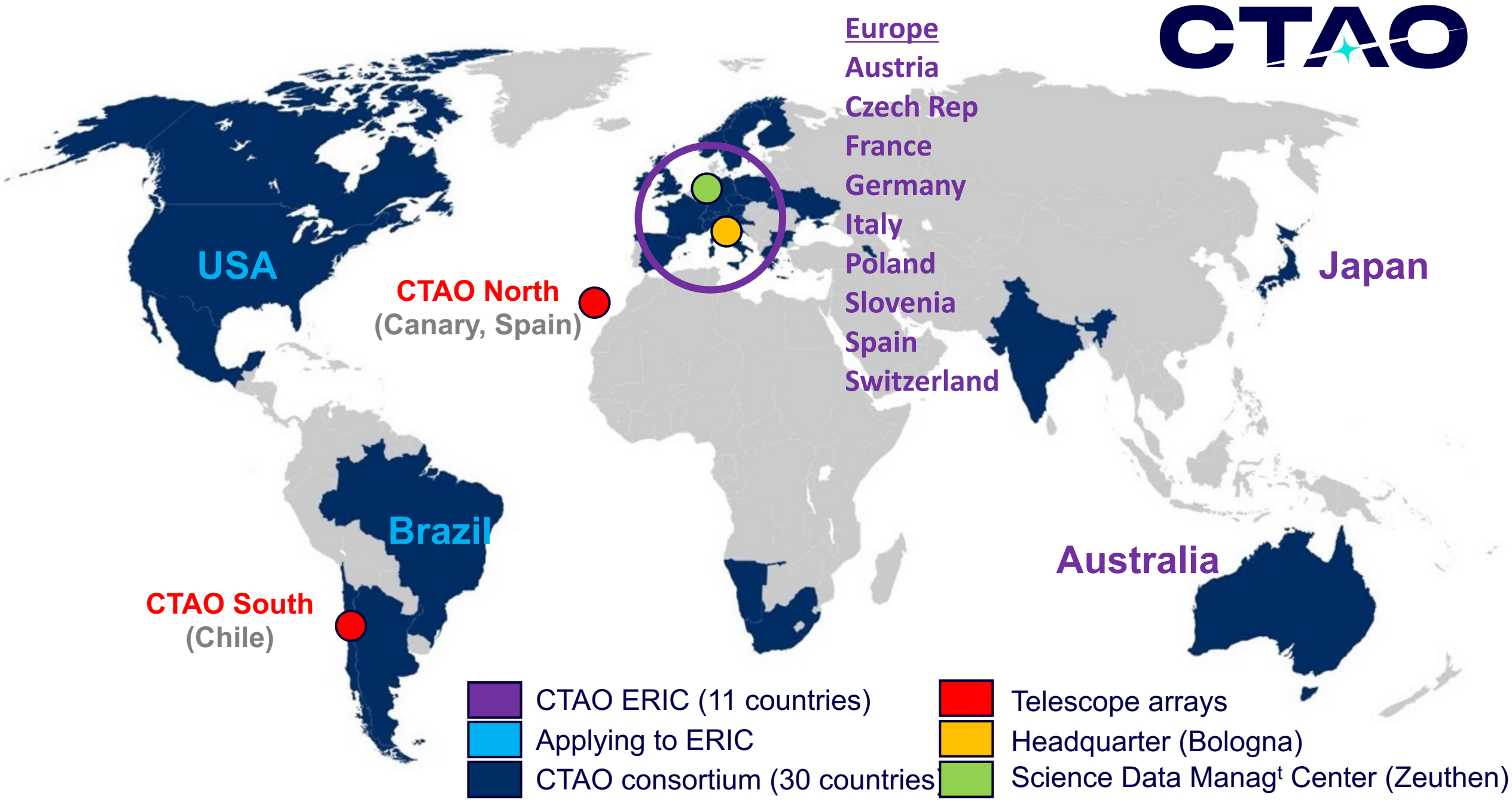

GTC
MAGIC
LSTs

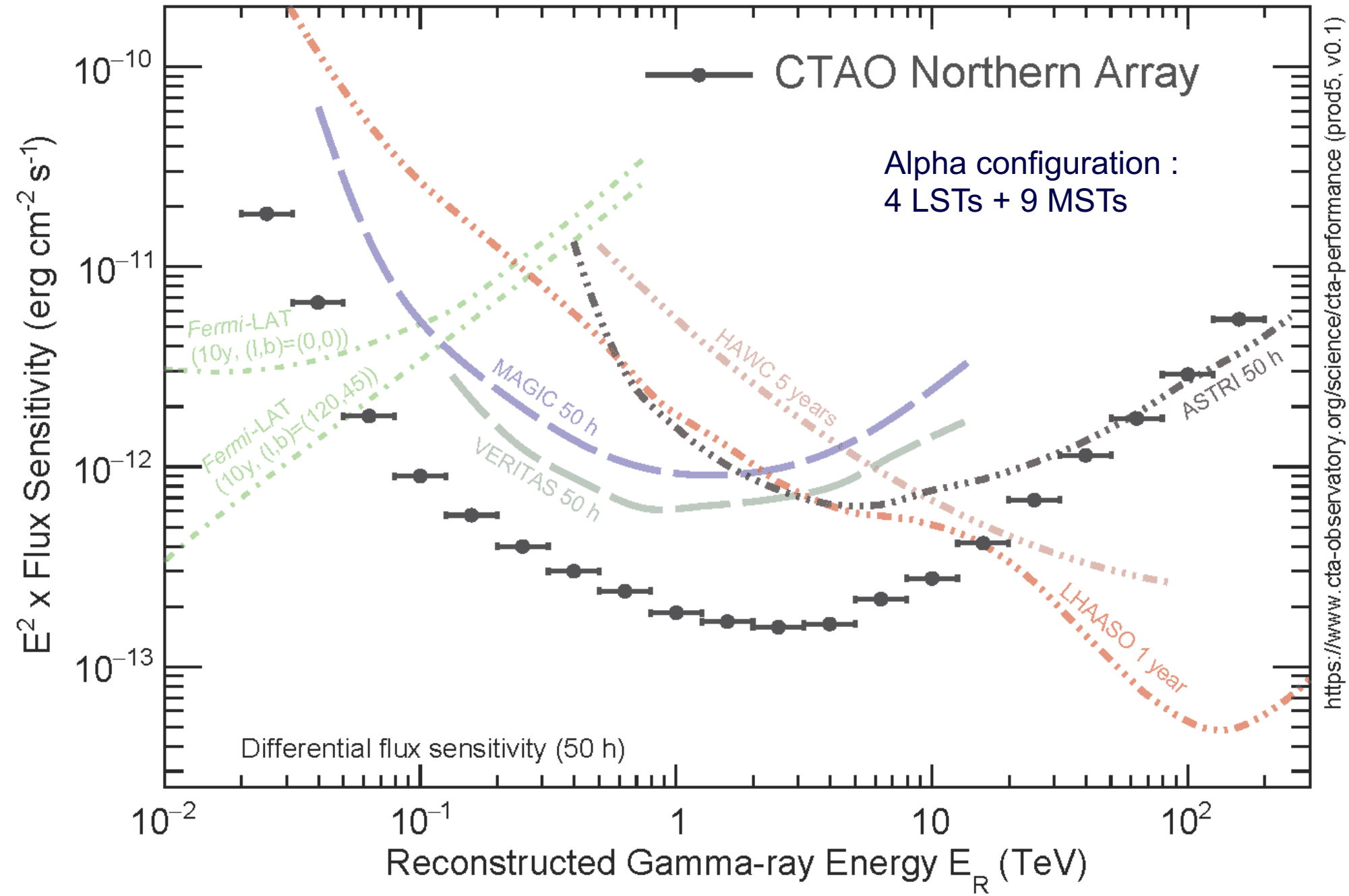
1 observatory

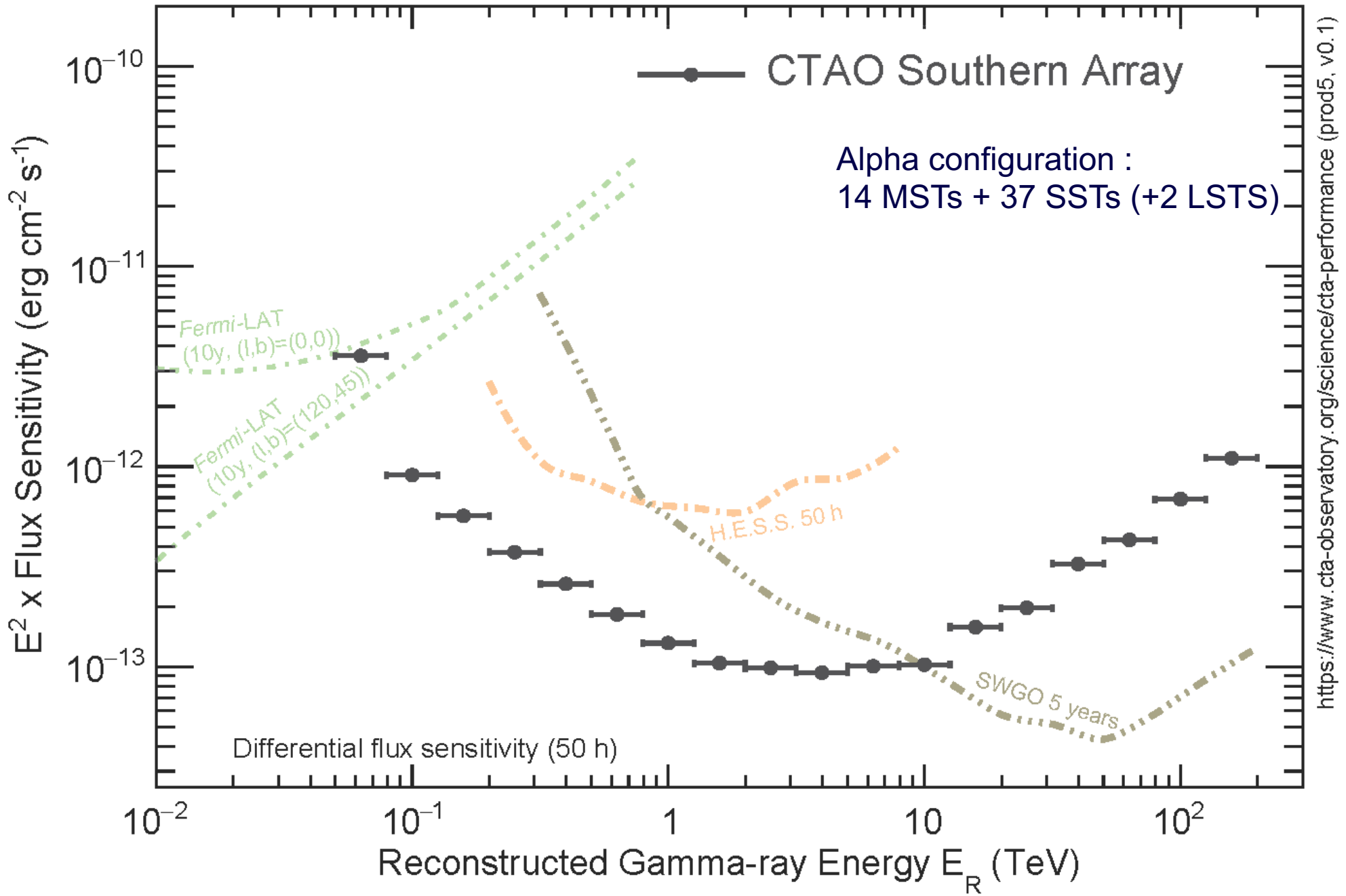
2 sites

3 telescopes




CTAO
Europe
Austria
Czech Rep
France
Germany
Italy
Poland
Slovenia
Spain
Switzerland
USA
Japan
CTAO North
(Canary, Spain)
Brazil
Australia
CTAO South
(Chile)
CTAO ERIC (11 countries)
Applying to ERIC
CTAO consortium (30 countries)
Telescope arrays
Headquarter (Bologna)
Science Data Managt Center (Zeuthen)


CTAO Northern Array
Alpha configuration :
4 LSTs + 9 MSTs
Fermi-LAT (10y, (l,b)=(0,0))
Fermi-LAT (10y, (l,b)=(120,45))
MAGIC 50 h
VERITAS 50 h
HAWC 5 years
ASTRI 50 h
LHAASO 1 year
Differential flux sensitivity (50 h)
E² x Flux Sensitivity (erg cm⁻² s⁻¹)
Reconstructed Gamma-ray Energy E_R (TeV)
https://www.cta-observatory.org/science/cta-performance (prod5, v0.1)


CTAO Southern Array
Alpha configuration :
14 MSTs + 37 SSTs (+2 LSTS)
Fermi-LAT
(10y, (l,b)=(0,0))
Fermi-LAT
(10y, (l,b)=(120,45))
H.E.S.S. 50 h
SWGO 5 years
Differential flux sensitivity (50 h)
E² x Flux Sensitivity (erg cm⁻² s⁻¹)
Reconstructed Gamma-ray Energy E_R (TeV)
https://www.cta-observatory.org/science/cta-performance (prod5, v0.1)

A lot happened in the last year

Organisation :

-ERIC is a reality since Jan' 2025

- French representatives :

T. Stolarczyk : co-spoke & M. DeNaurois vice chair board ERIC

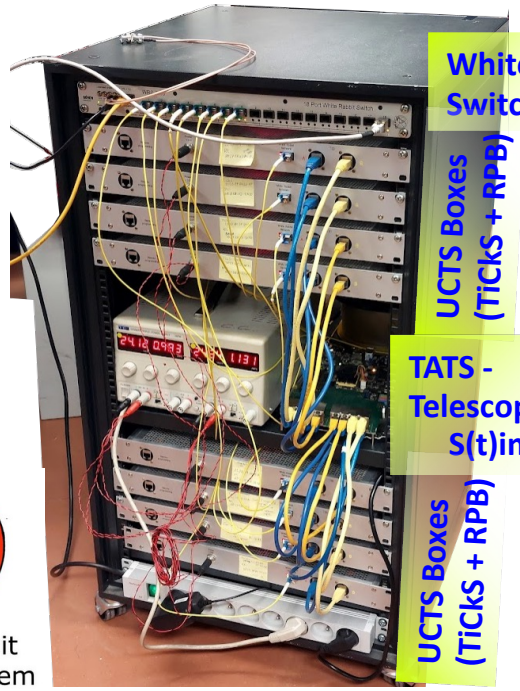
- New staff recruited CTAO, at North and Southern sites, Science Data center in Zeuthen
- Guaranteed time (40% over 10yrs) reserved for the Science collab. (in kind contributors). **60% will be open time to the community !**
- Collaboration will have core (cat1) and extended team (cat2) members
- New award for gamma-ray astronomy: Werner Hoffman prize

A lot happened in the last year

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



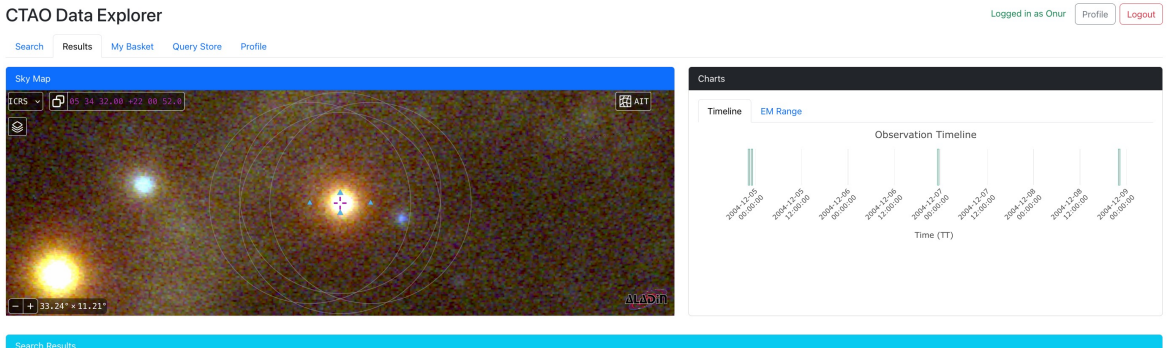
WhiteRabbit Timing System

A lot happened in the last year

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

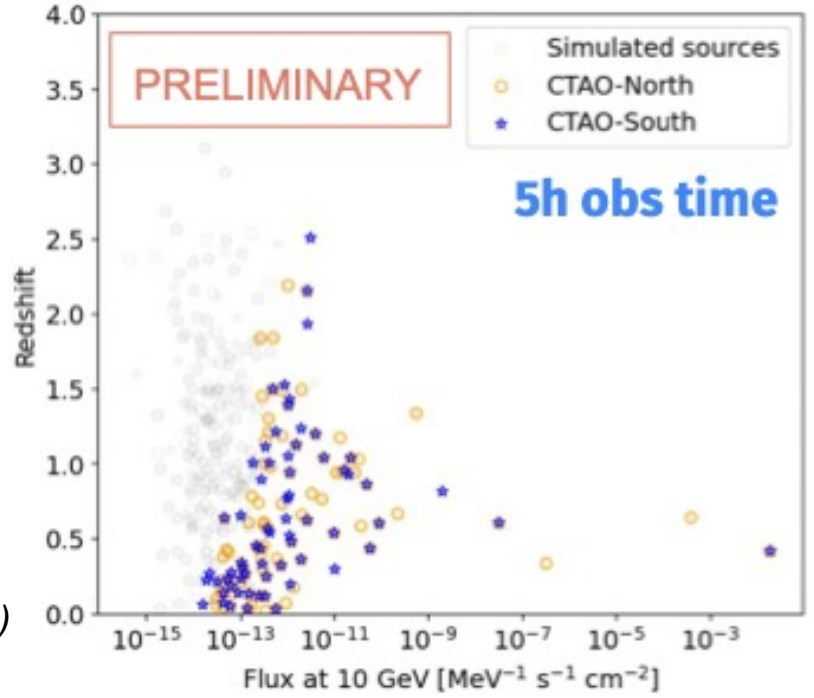


A lot happened in the last year

Science :

- Many exciting papers with LST1 (see later) !
- Early data/science phase calendar fixed (starting in ‘27)
  - 4 LSTs array almost reaching CTAO-North sensitivity below 1 TeV

- Perspective works :
  - Expectation for GRBs ~4/year (North+South)
  - For core-collapse Sne: ~2/year



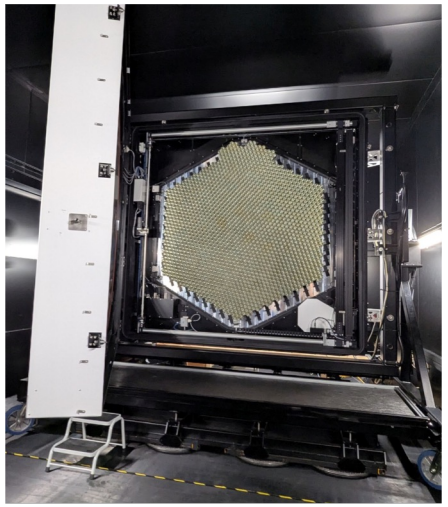
Simulated AGN detections with CTAO, showing its high-z capabilities (Passos Reis for CTAO, ICRC25)

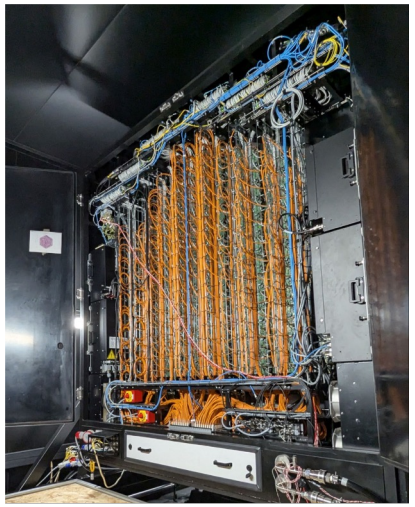
SSTs in France

- 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

NectarCAM : a camera for MSTs

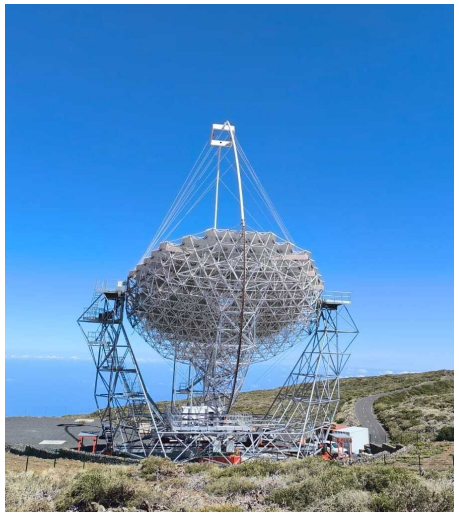
- First camera is complete.
- Under extensive tests at CEA/IRFU
- Many technical improvements in the last few years.
- Goal : first camera ready to **be shipped by summer 2026**.
- Integration of second camera has started.
- Production of detector modules for the next camera will start mid of October 2025
- NectarCAM acquisition card (2560 cards): end of production in april 2026.



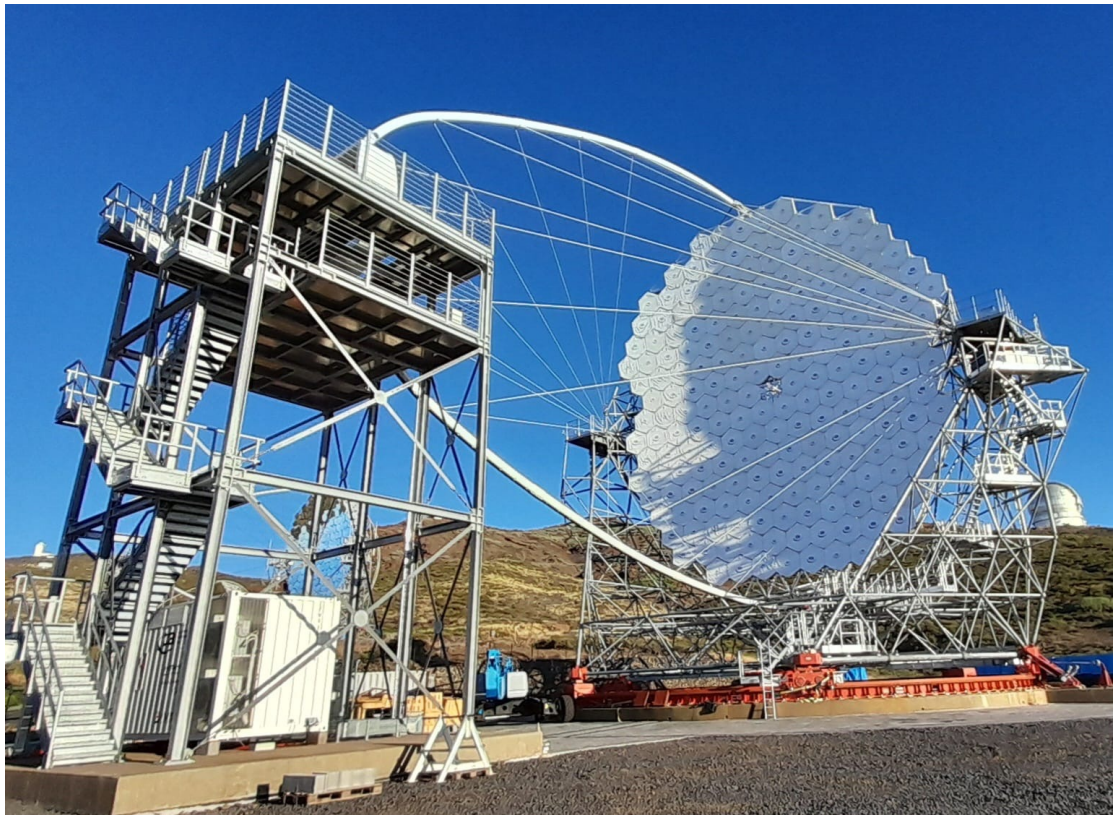


LST construction: ✅ (almost)

Arch



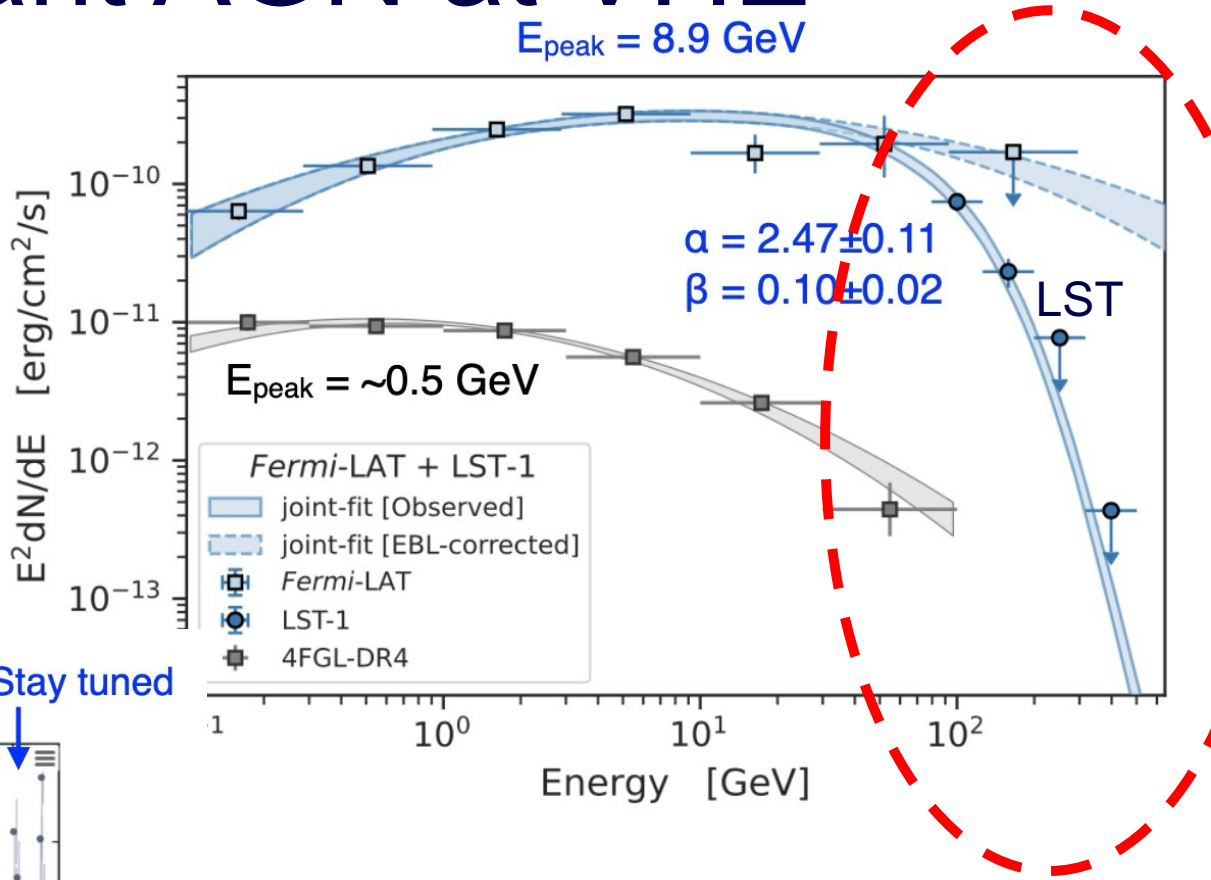
Camera

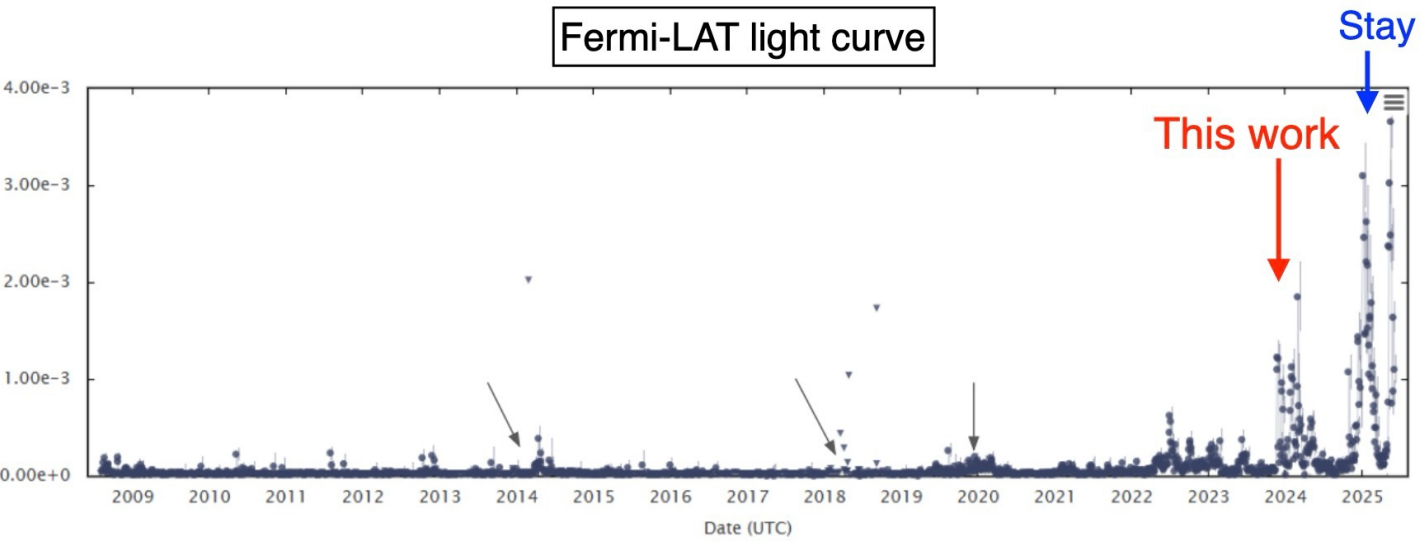


Camera + arch + mirrors

LST: OP313 most distant AGN at VHE

- Flare of November ‘23 – January 2024
- Z = 0.9973 ; constraint on EBL
- Detection possible thanks to low threshold !

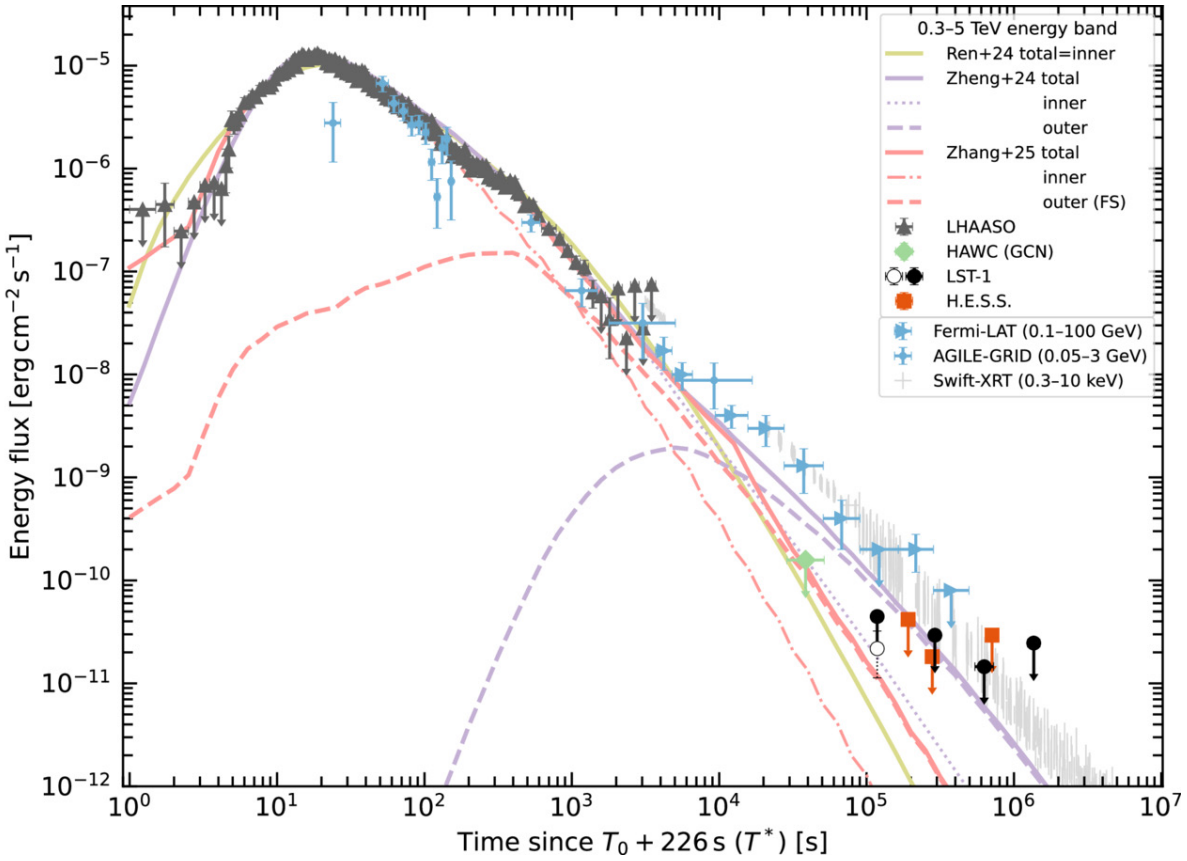


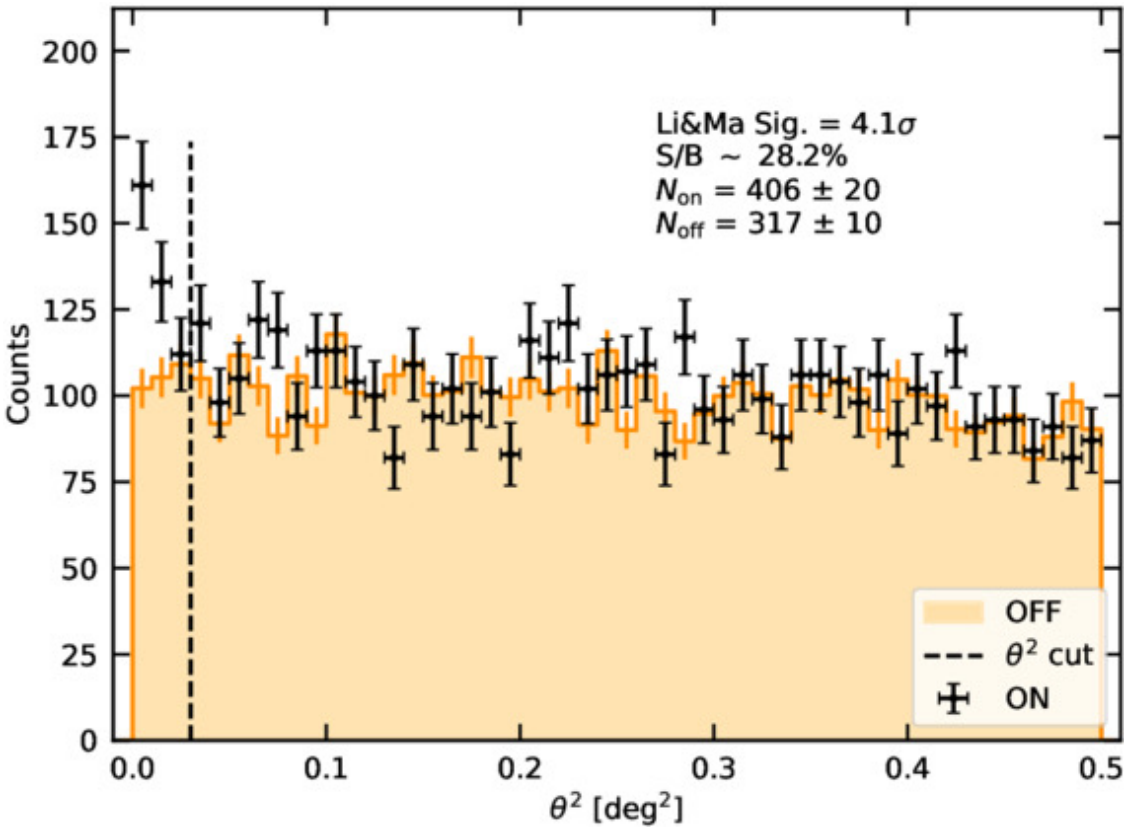


Ryuji Takeishi, ICRC 2025

LST constraint on the BOAT GRB

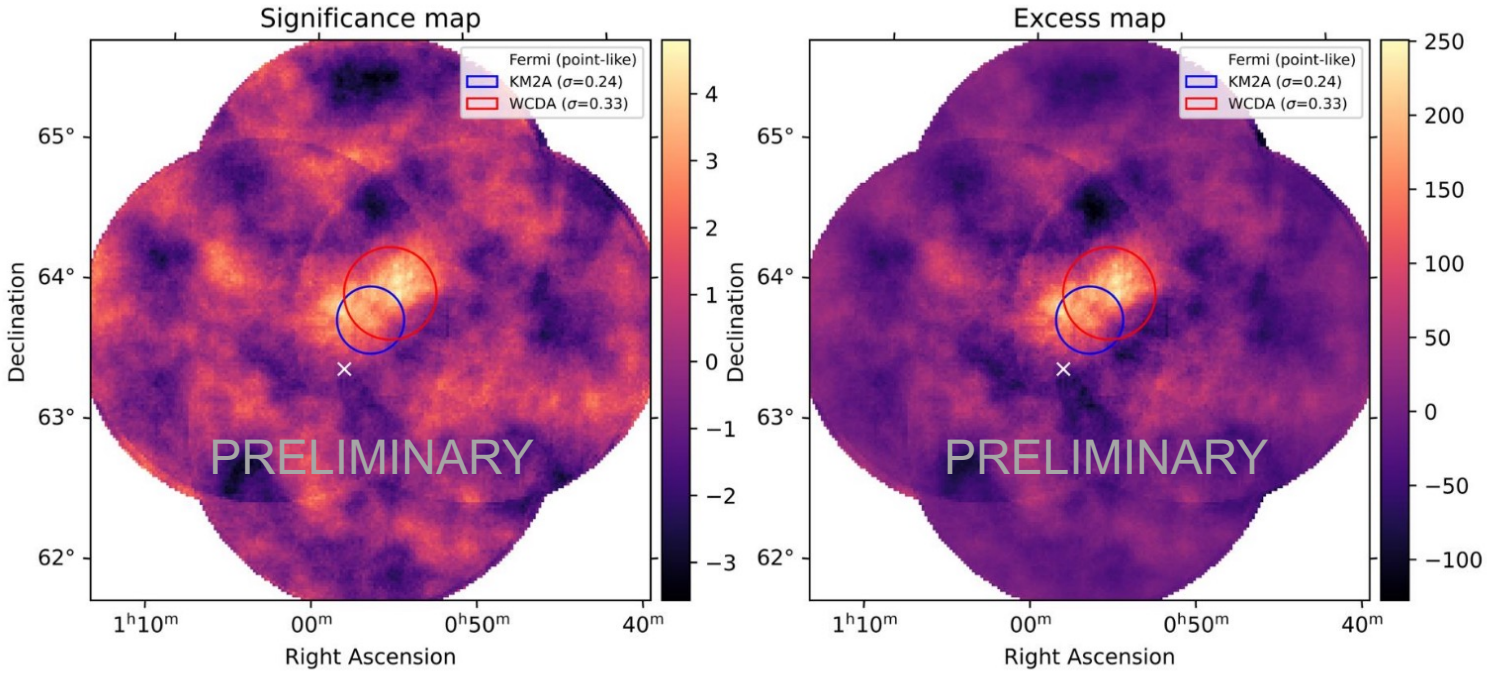
LST consortium, 2025

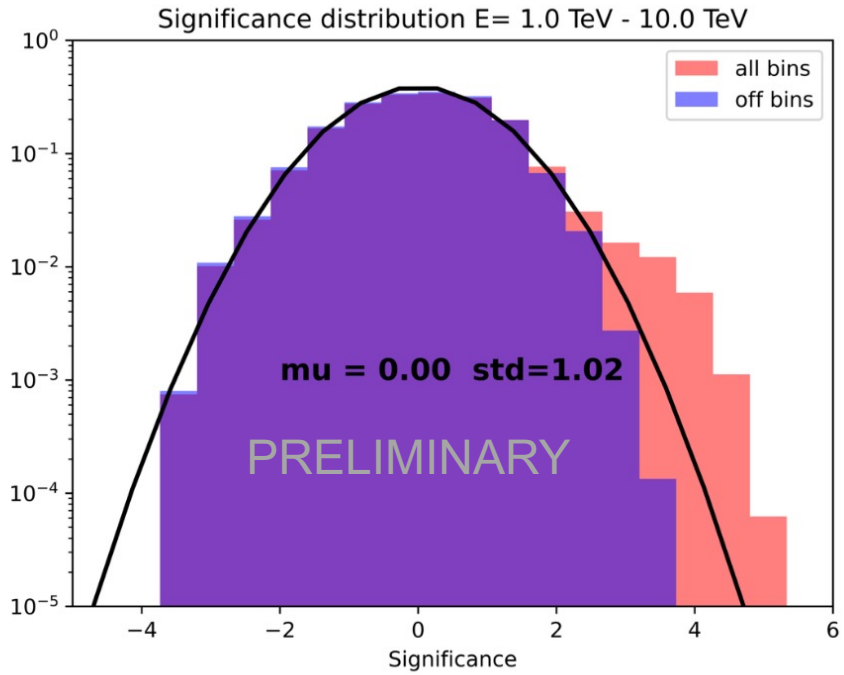




- Simulations with CTAO expect ~4 GRBs/year (North+South)

Follow-up of unidentified PeVatron 1LHAASO J0056+6346u

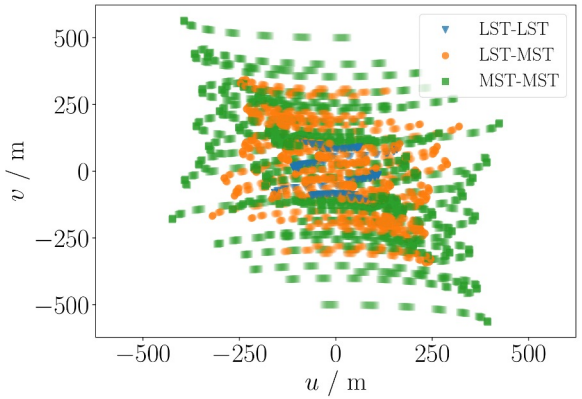




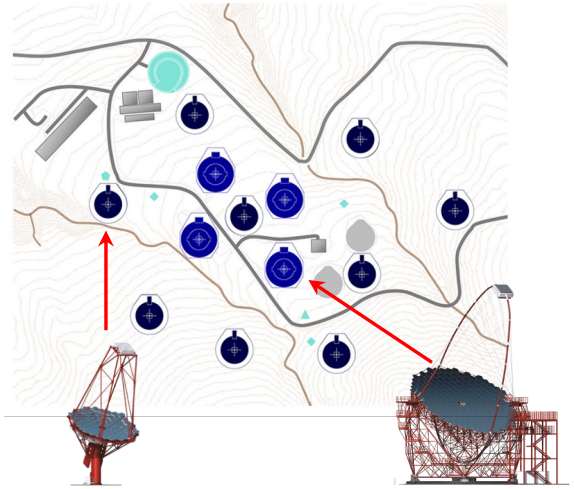
PhD work from A. Briscioli

CTAO as an intensity interferometer under discussion

Unprecedented coverage in the (u,v) plane

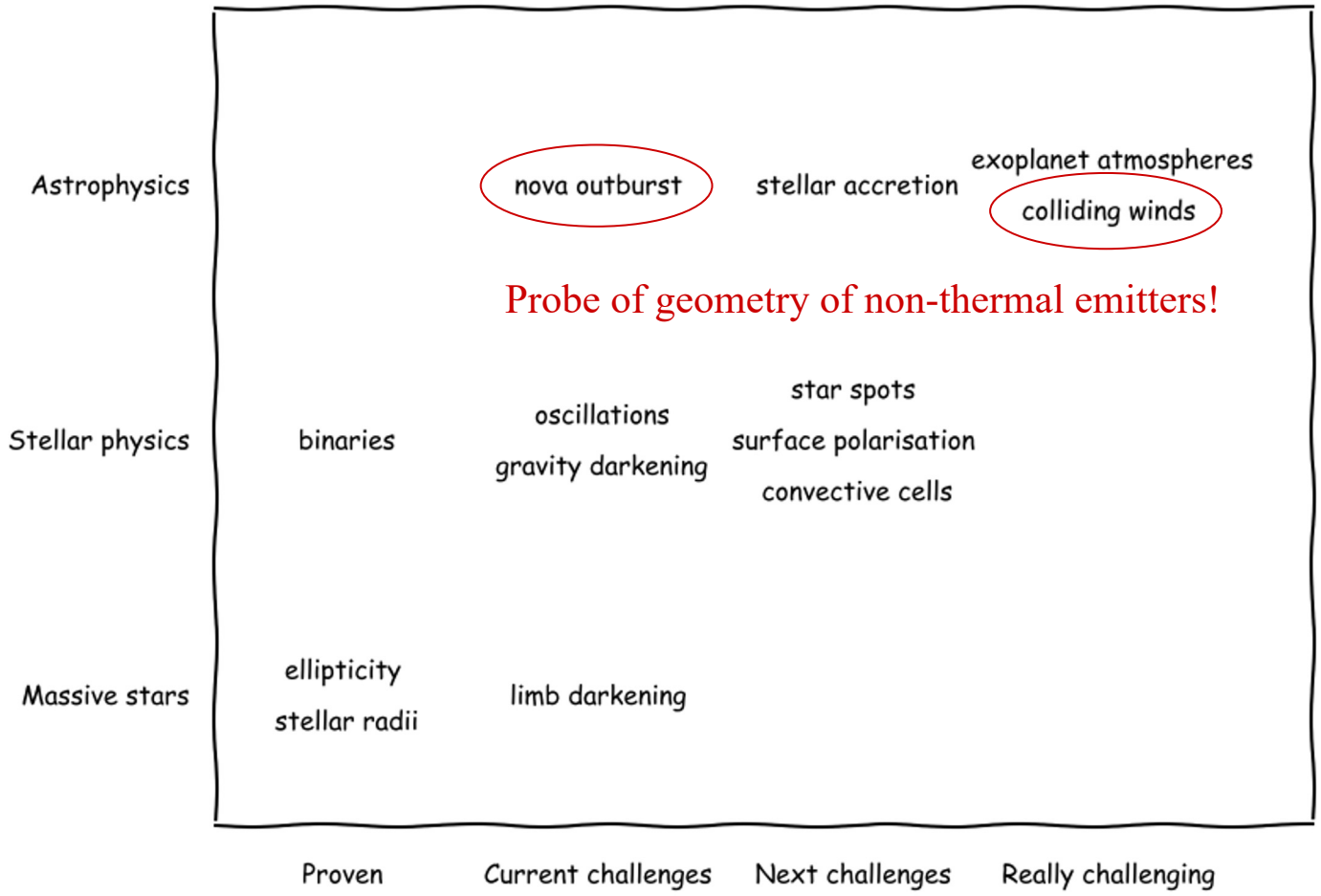


∑ mirror area > ELT



Credits: Luce et al. PoS(ICRC2025)736

Science case for CTAO (White paper in prep.)



Credits: Saha et al. PoS(ICRC2025)959

CTAO schools & workshops

Second CTAO school June 2025 (organized by CTAO)

- 25 participants for 10 days. Participated to LST operation in La Palma
- Next edition will be fully in La Palma (ground level+observatory)
- Focused for PhD students or young postdocs. Send your students !

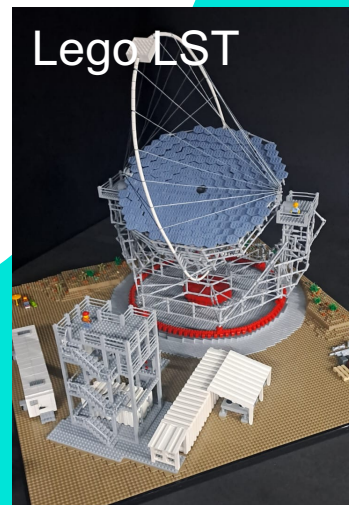
Cherenkov Astronomy Data School (Obs. de Paris)

- Learn about gamma-ray astronomy data and the specific challenges of Cherenkov observations and of high-energy data analysis.
- Hands-on session on gammapy analysis. Send your students !

Conclusions

- Busy and exciting times !
- Construction of the 4 LSTs nearly finished. First stereo light in 2026
- First telescopes in Chili in 2026/27

- Science data challenge open to the external astro community end of next year
- French labs are involved at nearly all levels and are delivering hardware and software as expected
- CTAO in France has a strong community of ~100 members



LST construction: arch+mirrors ✅