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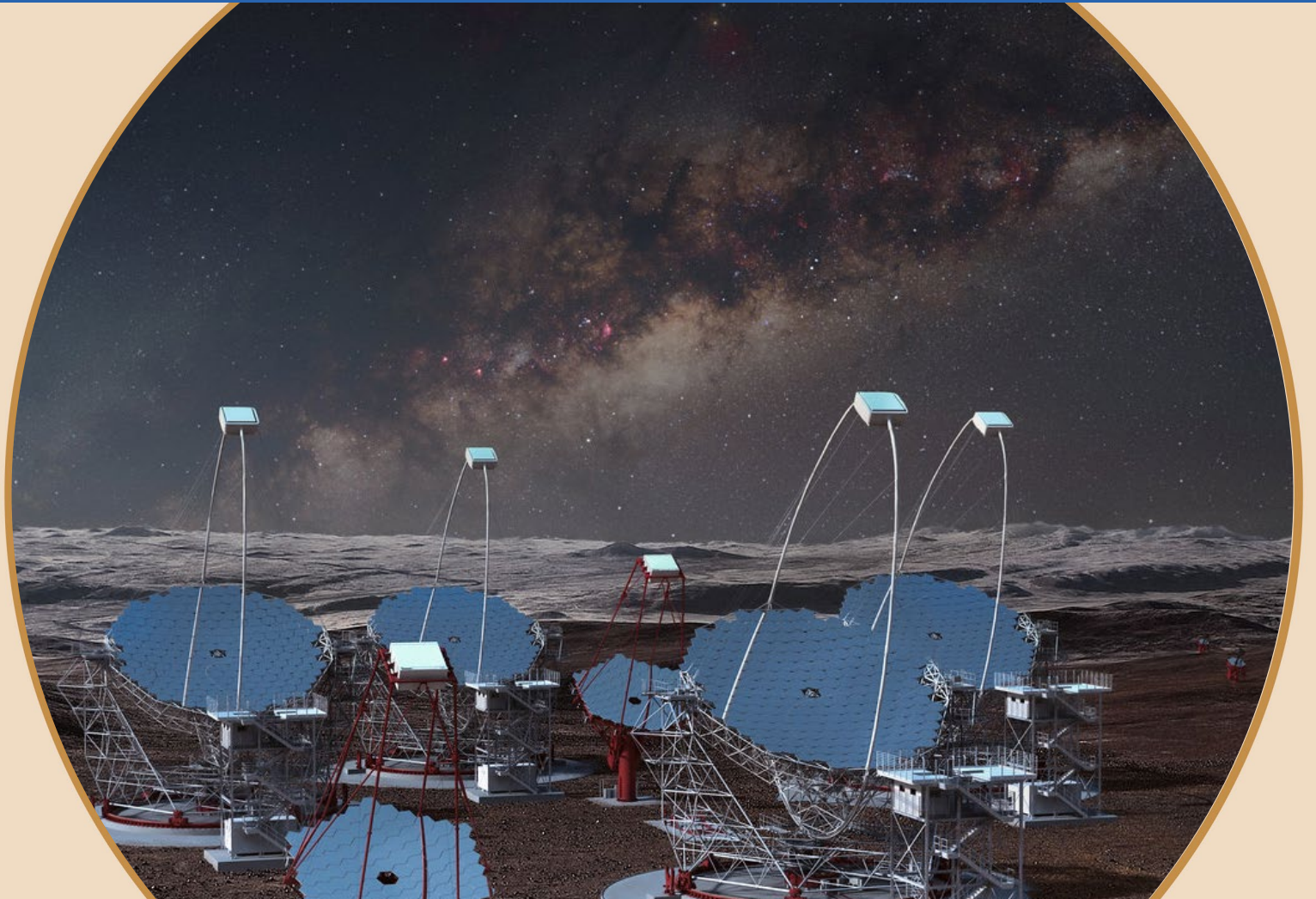
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CTA+: an Italian program to enhance the Southern Cherenkov Telescope Array Observatory

Serena Loporchio, Politecnico di Bari
13th CRIS-MAC, Trapani





The next generation high-energy gamma-ray observatory

CTAO

- The first ground-based gamma-ray **observatory**
- Two array sites to provide **full-sky coverage**
- Increased detection area and improved sensitivity
- 3 telescope designs to span over the broadest energy range amongst IACTs
 - **From ~20 GeV to ~300 TeV**



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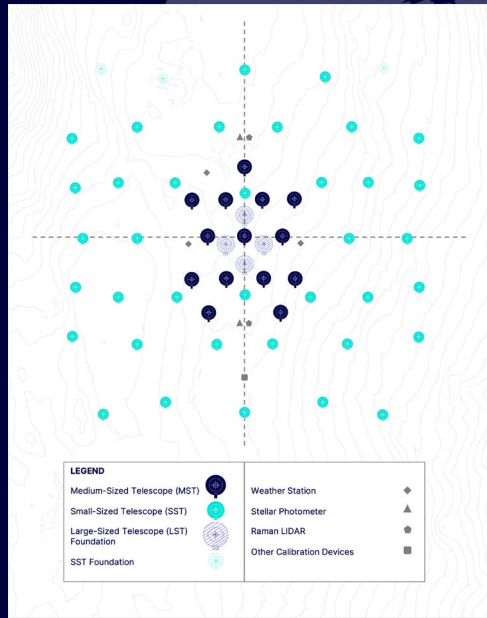
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CTAO South
Paranal, Chile
~ 3 km² area

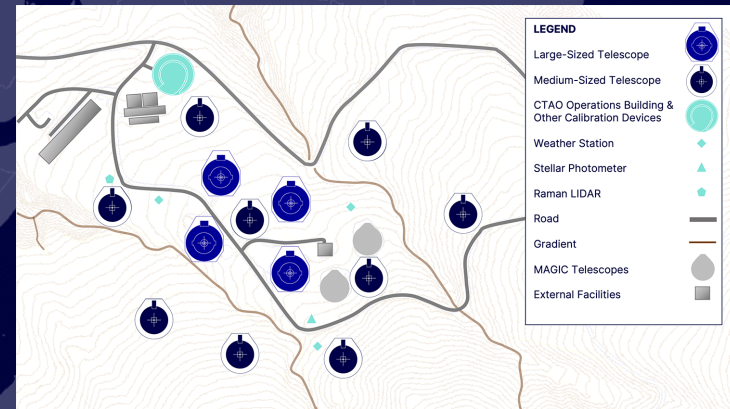


CTAO North
La Palma, Spain
~ 0,25 km² area



Science Data Management Centre
Zeuthen, Germany

Headquarters
Bologna, Italy



CTAO telescopes

MST
Core energy range

LST
Lowest energies
(down to tens of GeV)

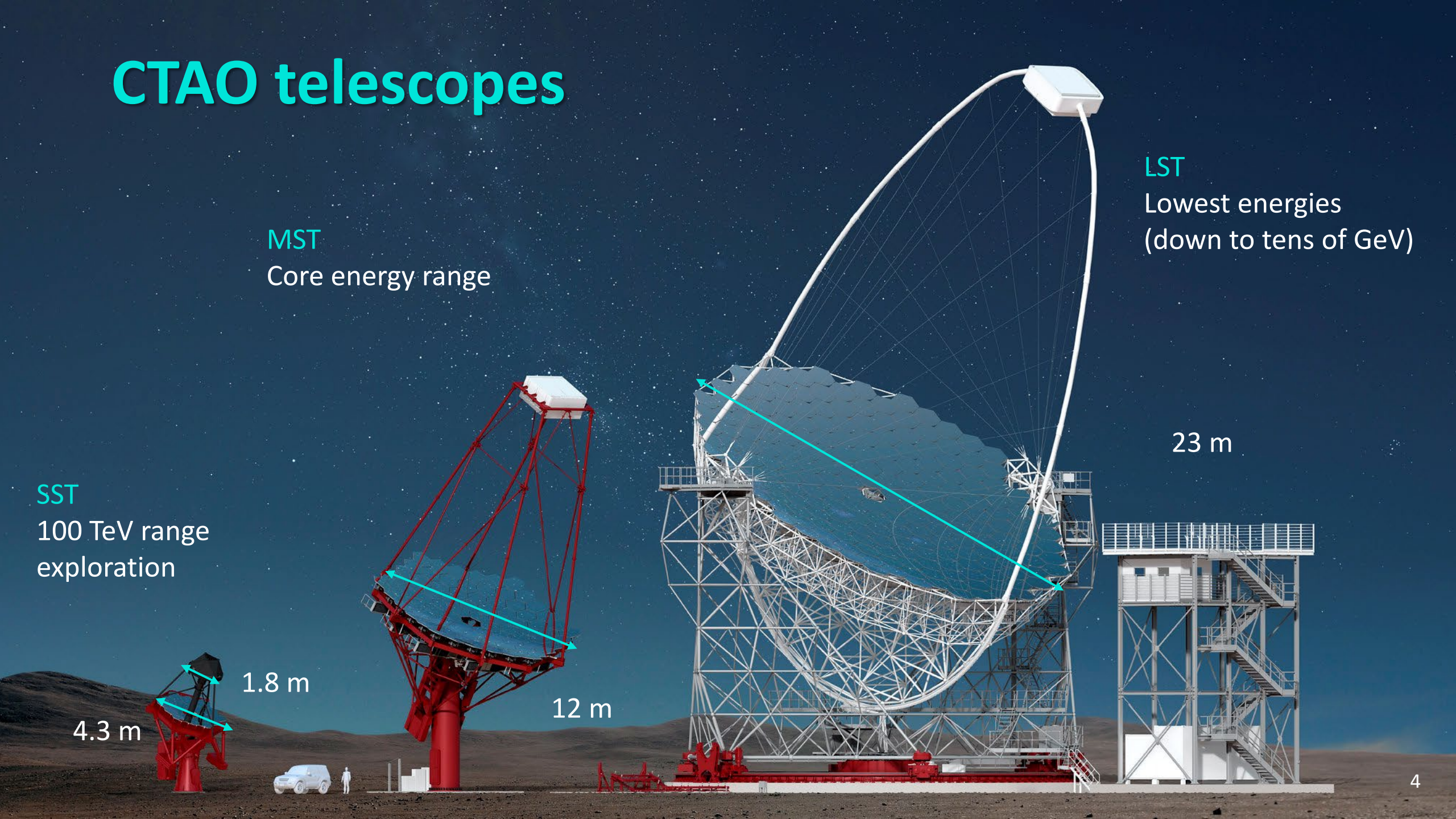
SST
100 TeV range
exploration

4.3 m

1.8 m

12 m

23 m



CTAO telescopes

MST

PMT camera with 2 designs

- NectarCAM 1855 pixels
- FlashCam 1764 pixels

8° FoV

LST

PMT camera

1855 pixels

4.3° FoV

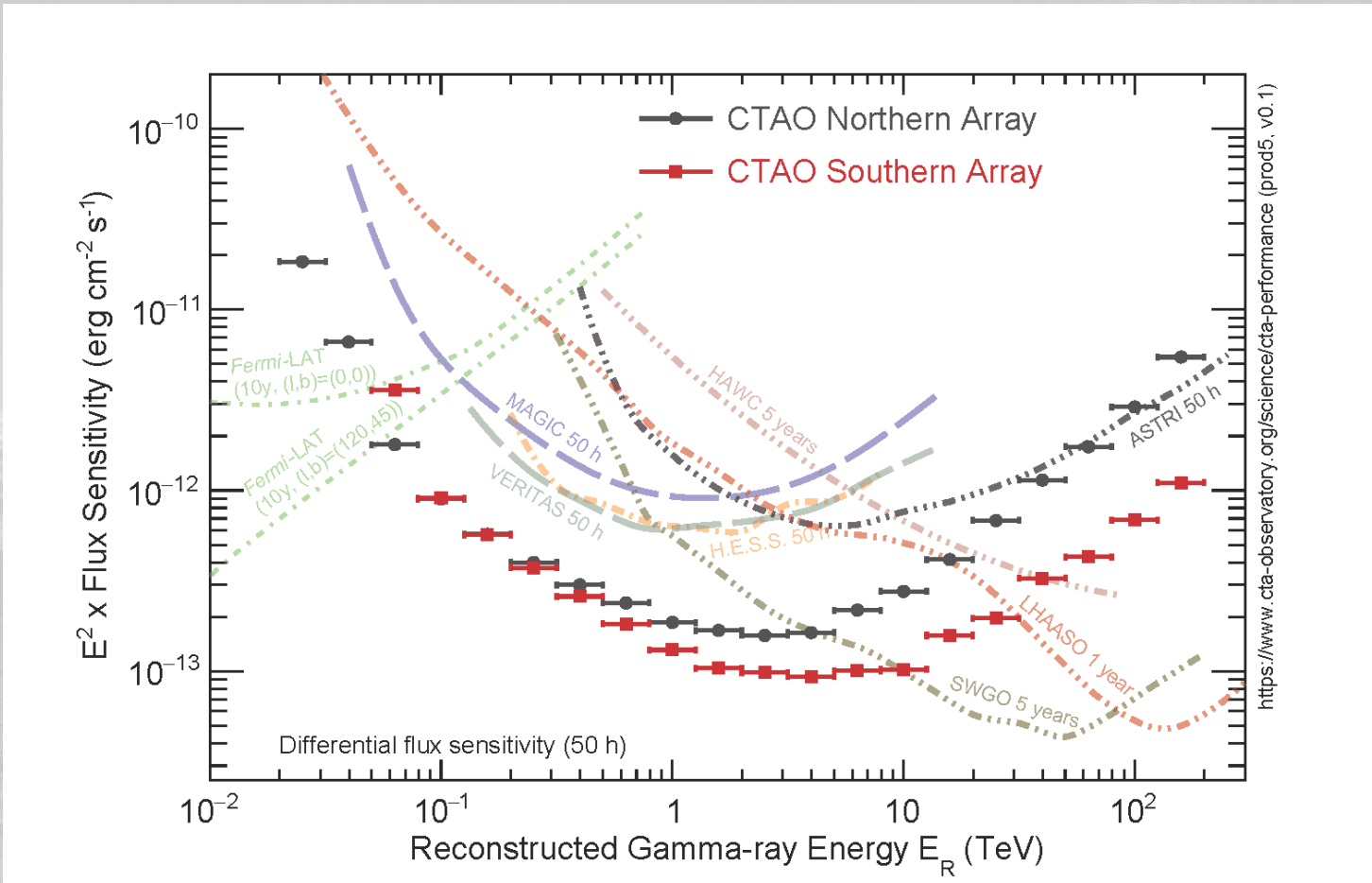
SST

SiPM camera

2048 pixels

8.8° FoV





CTAO

The first (open) Observatory in the TeV energy range

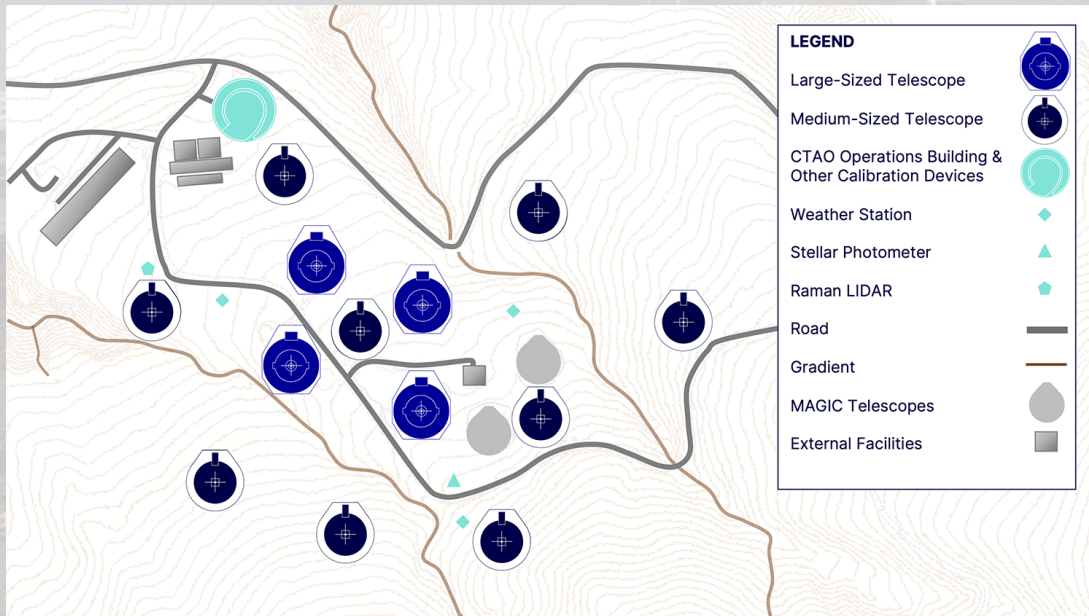
Revolution in the TeV science

CTAO 'alpha' configuration

CTAO North

4 LSTs

9 MSTs



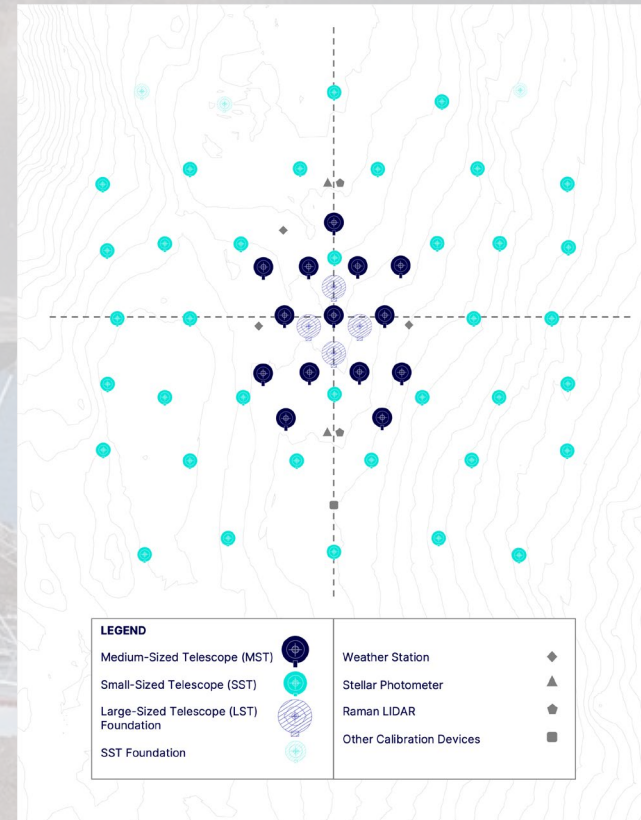
CTAO

CTAO South

14 MSTs

37 SSTs

NO LST!



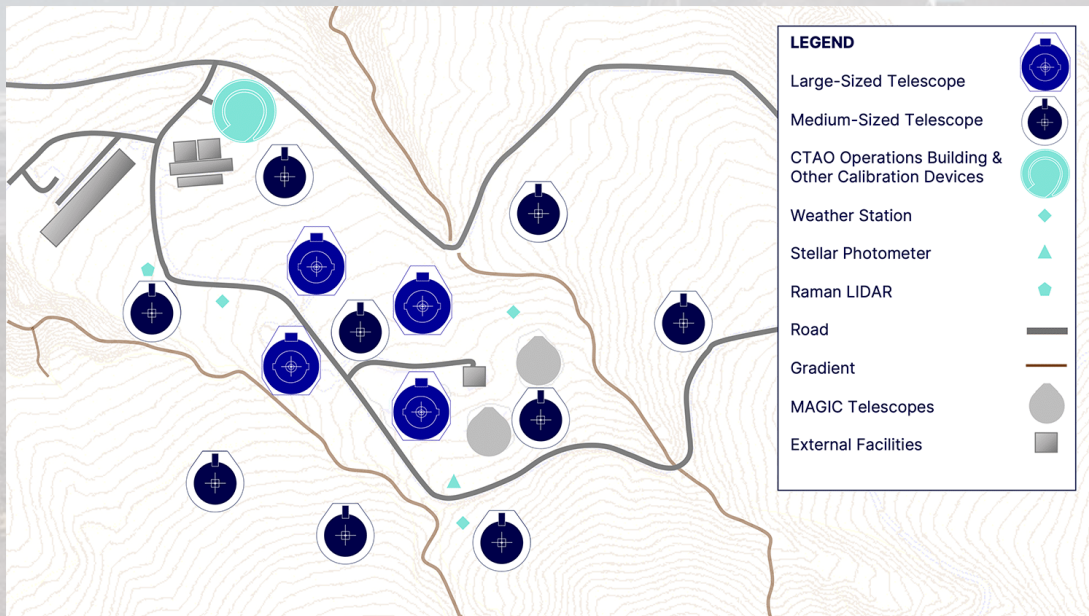
CTAO 'alpha' configuration + CTAPLUS



CTAO North

4 LSTs

9 MSTs

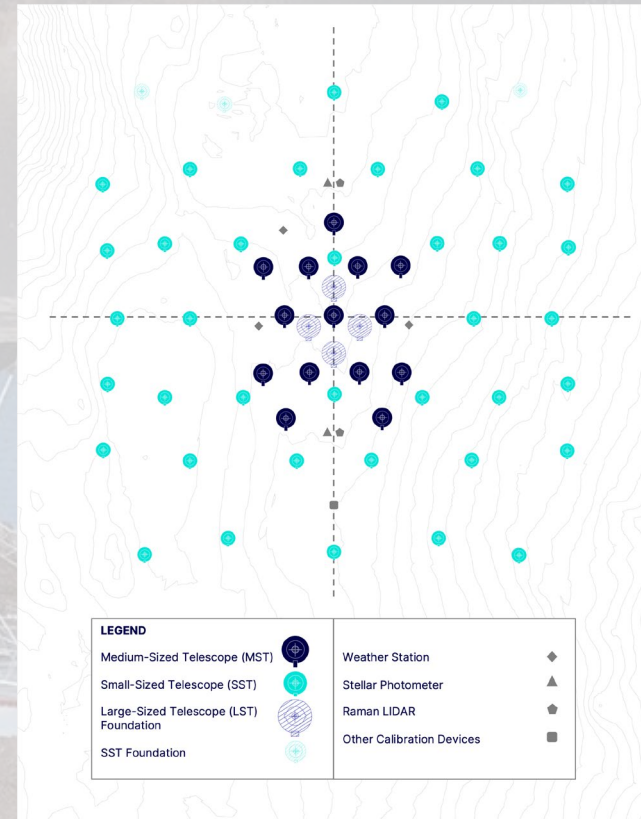


CTAO South

14 MSTs

37 SSTs

2 LSTs + 5 SSTs

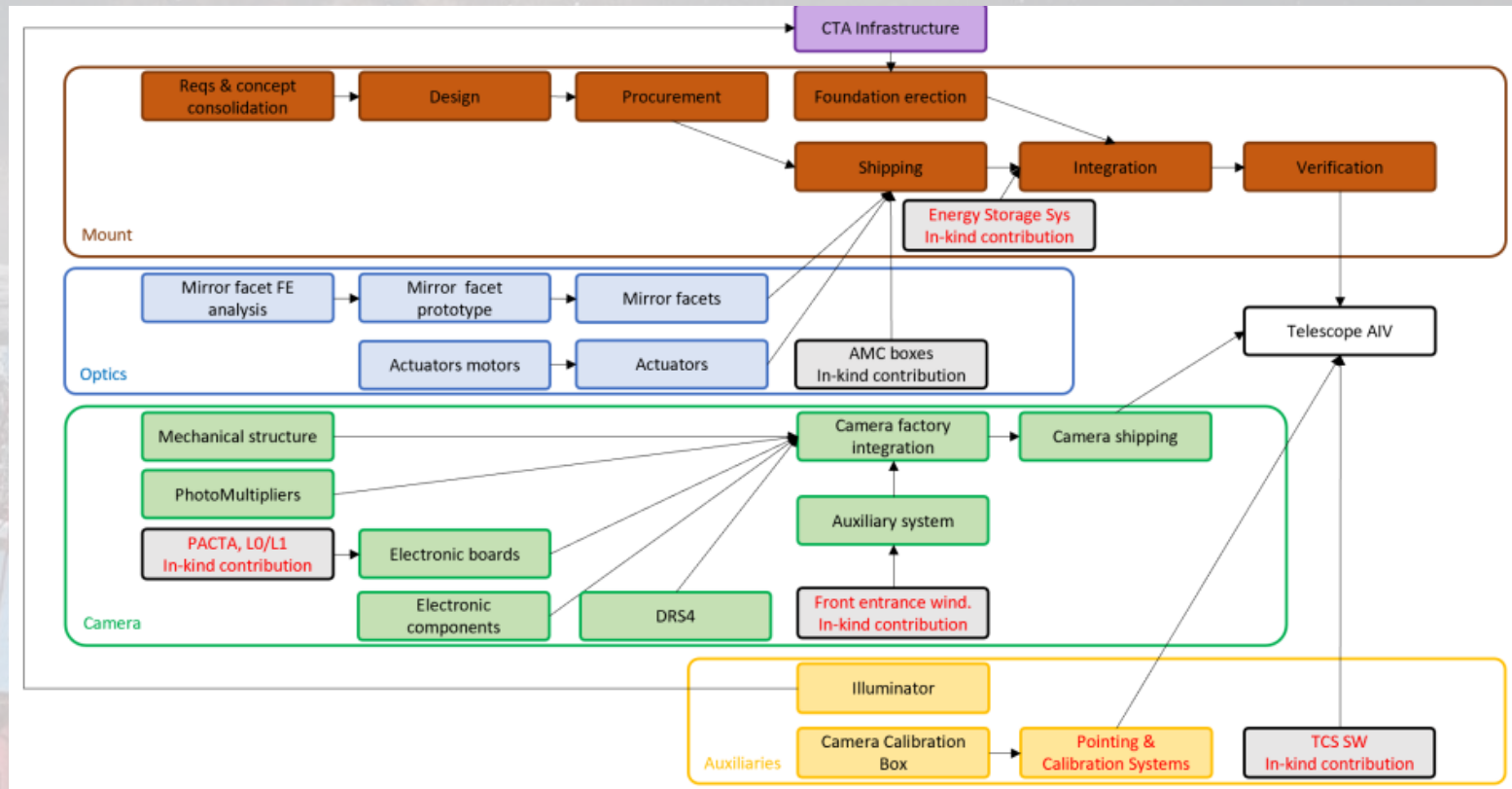


The CTA+ program

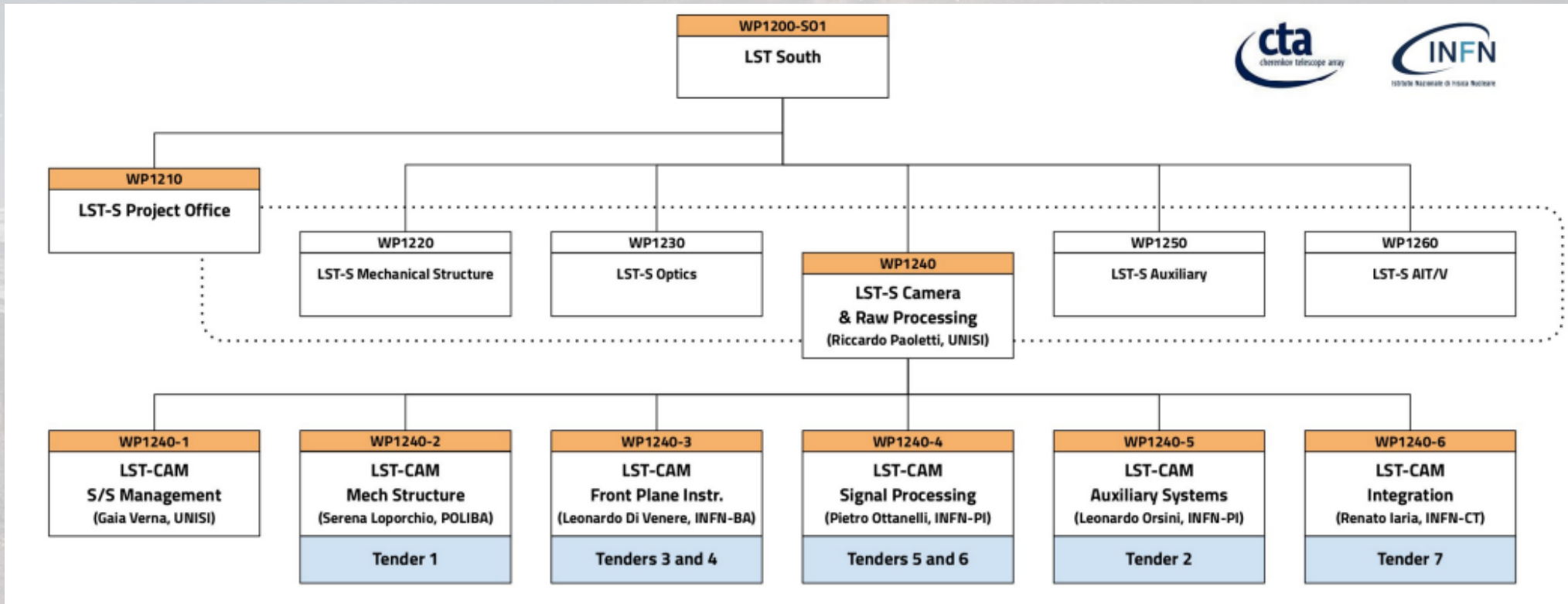
- CTA+ is an Italian program funded by PNRR to enhance the CTAO infrastructure of the CTAO southern array
- ~ 70 M€
- INAF leadership with co-participation of INFN and several Universities
- Main goals:
 - Enhance CTAO southern array at the lowest (< 100 GeV) and highest ($>$ tens TeV) energies
 - Improve multi-messenger facilities for a better synergy with CTAO
 - Science and outreach program with CTAO
 - R&D activities: new detectors for Cherenkov telescopes or complementary

LST-South workflow

- Mount to be adapted to cope with CTAO-S site conditions
- Camera, optics and auxiliaries will be as in LST-North



LST-South camera





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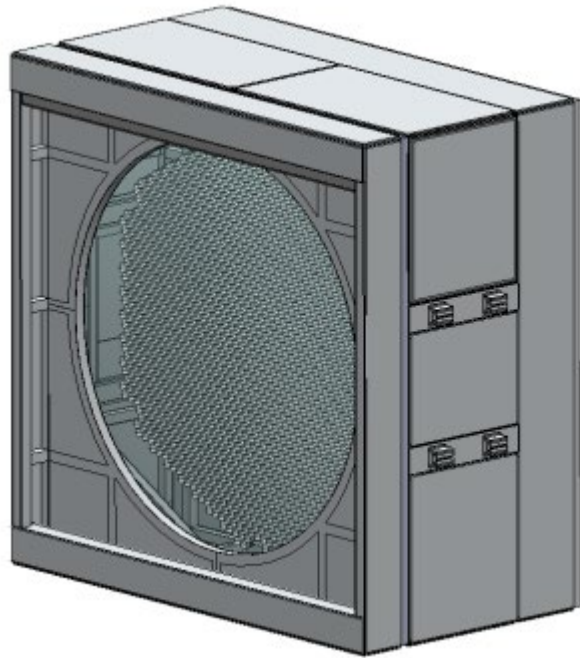


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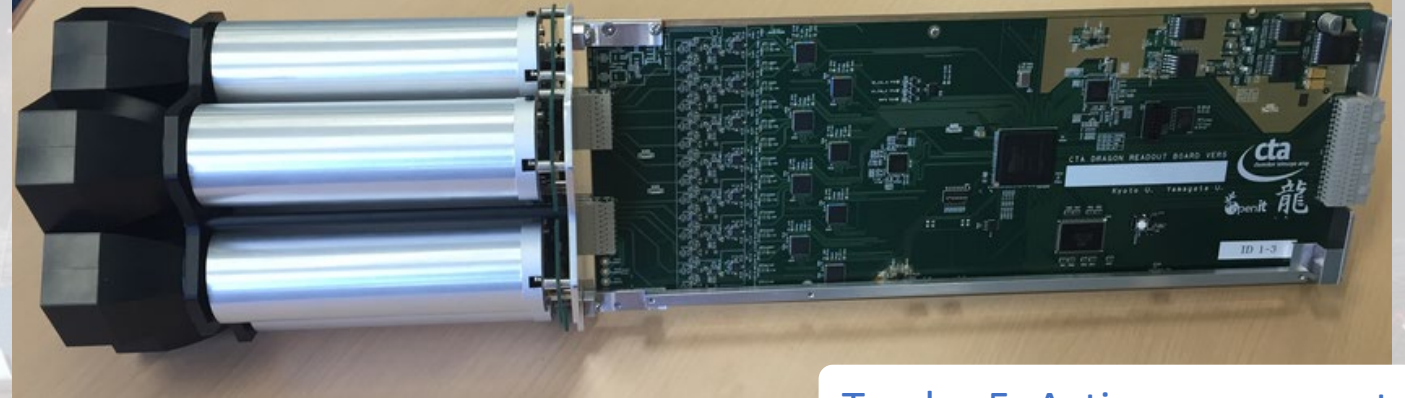
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Tender 1: camera mechanics



Tender 3: PMTs procurement

Tender 6: DRS4



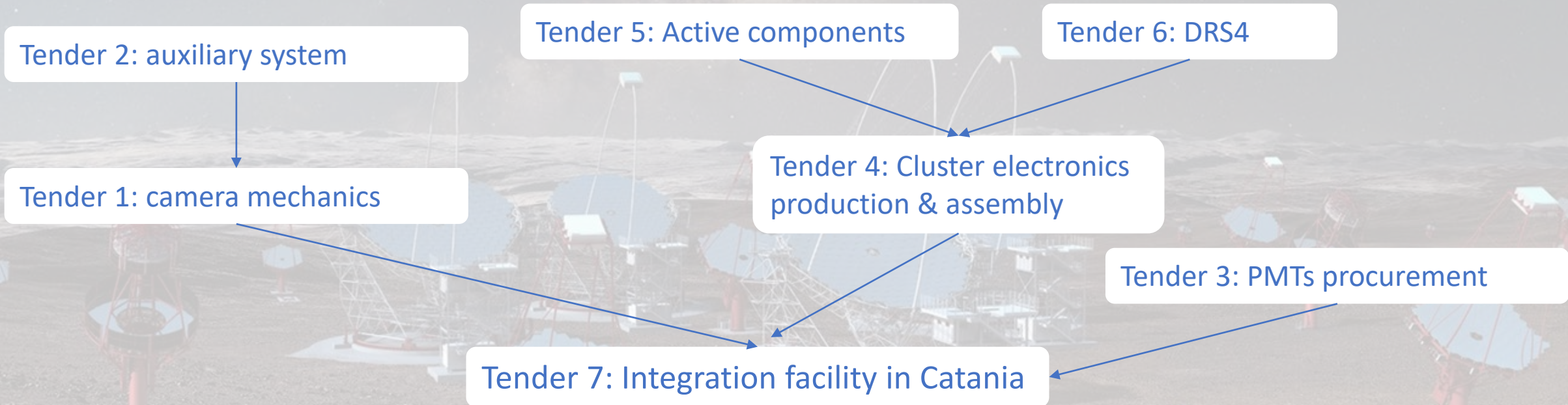
Tender 5: Active components

Tender 4: Cluster electronics
production & assembly

Tender 2: auxiliary system



LST-South camera tender summary



LST-South camera tender summary

Tender 2: auxiliary system

Tender 5: Active components

Tender 6: DRS4

Tender 1: camera mechanics

Tender 4: Cluster electronics production & assembly

Tender 3: PMTs procurement

Tender 7: Integration facility in Catania

Outcome: 2 fully equipped LSTs + 470 spare modules (PMT + readout + backplane) + 1 spare cooling unit



LST-South tender situation

- Several tenders delayed due to administrative issues
- However:
 - Delivery times are (often) shorter than expected
 - CTA+ has been extended (expected end of the project June 2025 → Dec 2025)



Conclusions

- CTA+ will improve the performance and the scientific outcome of the CTAO-South array
 - 2 LSTs and 5 SSTs
- Multi-wavelength instrument optimization
 - Electromagnetic follow-up of CTAO sources @ low energies
 - End-to-end prototype for optical intensity interferometry
- R&D program for future CTAO detectors and ancillary instrumentations



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THANK YOU!

