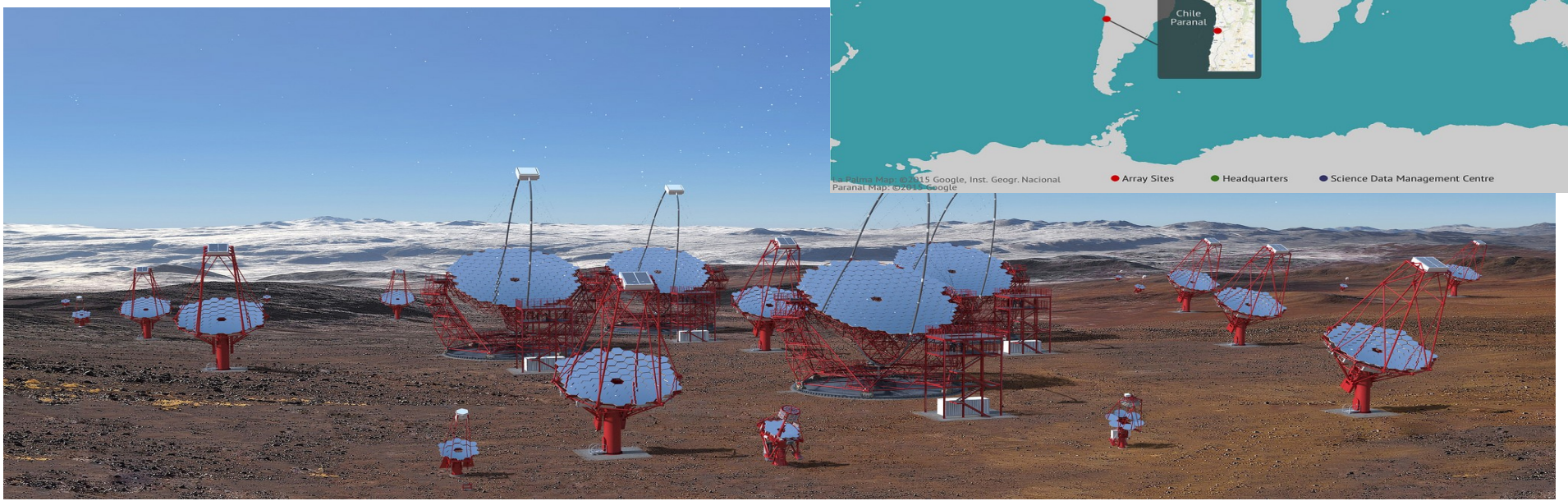
Cherenkov Telescope Array

CAMK Annual Meeting 2023

Rafał Moderski

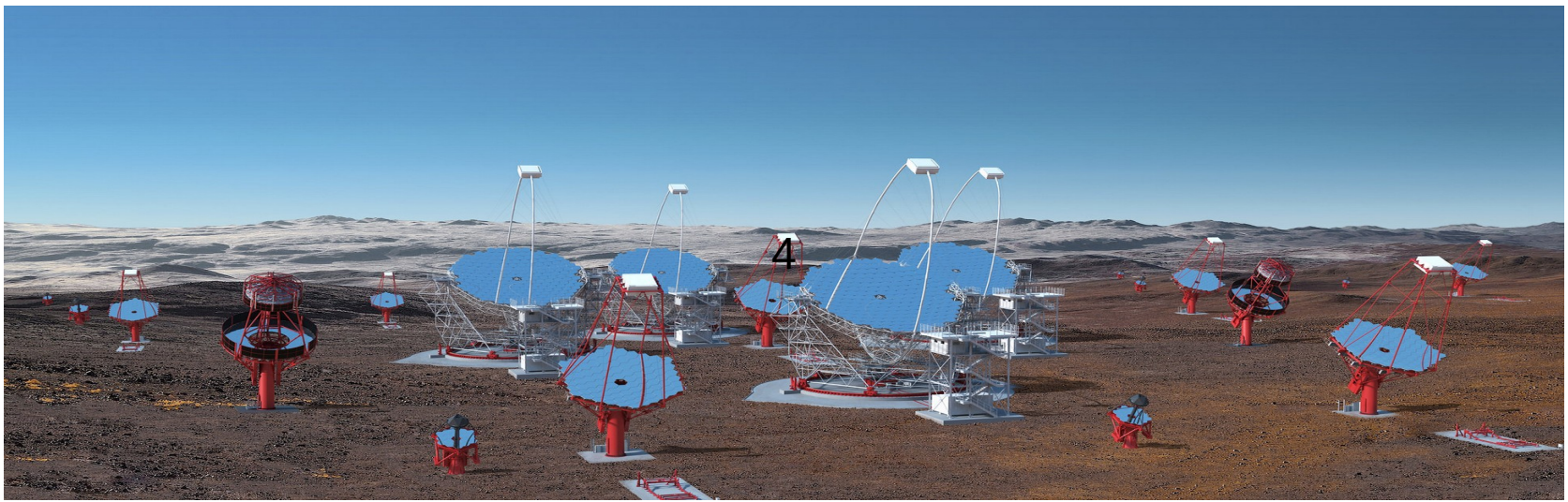
Cherenkov Telescope Array
overview

- next generation **astronomical observatory** of the very high energy **gamma-rays** (20 GeV – 300 TeV)
- **two sites**: Southern site in Chile, Northern site on La Palma Island – **118 telescopes**
- **THE LARGEST OBSERVATORY ON THE EARTH** (e.g. ALMA has only 66 antennas)



Cherenkov Telescope Array
ORGANIZATION

- **CTAO (Cherenkov Telescope Array Observatory) ERIC (European Research Infrastructure Consortium)**
  - **14 founding members** (including **Poland**)
  - approved by the Ministry of Education and Science



Cherenkov Telescope Array

COST

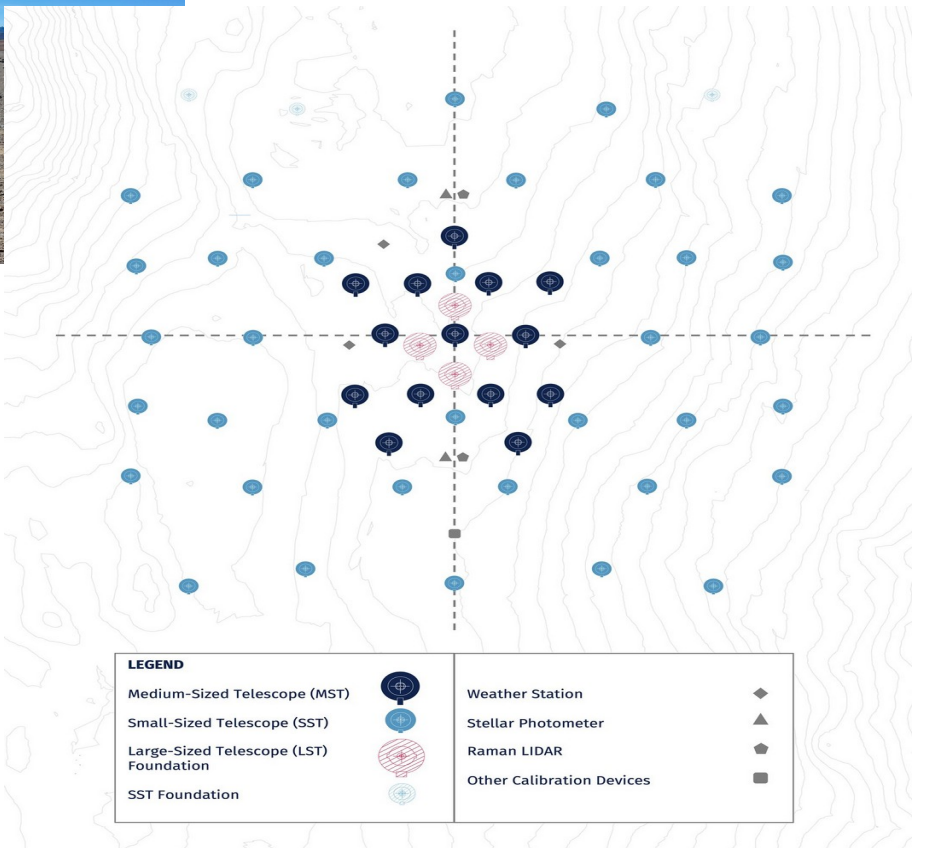
- Approved Cost Book allows the construction of the **Alpha configuration**

Telescope Design	Northern Site	Southern Site
Large-Sized Telescope	4 (4)	(4)
Medium-Sized Telescope	9 (15)	14 (25)
Small-Sized Telescope		37 (70)
Total	**13** (19)	**51** (99)

Number of telescopes reduced **from 118 to 64**

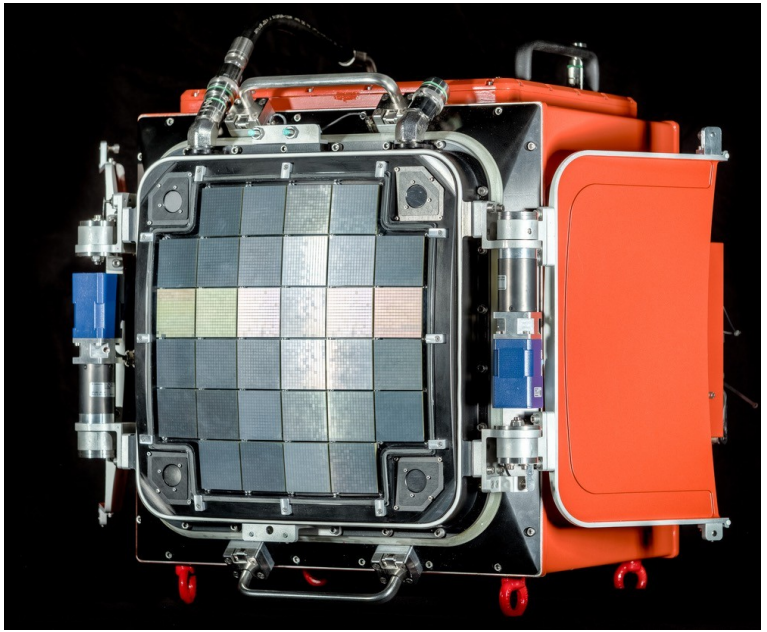
- The cost of the Alpha configuration is **331 M€**

Cherenkov Telescope Array
α SOUTH



Cherenkov Telescope Array

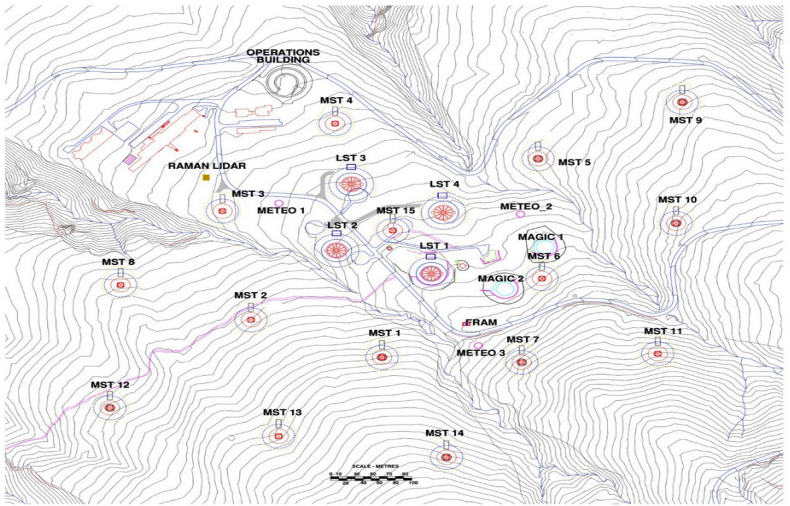
α SOUTH – SST



tender for 37 SST telescopes (mechanical and electrical systems of the structures) to be delivered to Chile within 48 months (2028)

Cherenkov Telescope Array
α NORTH

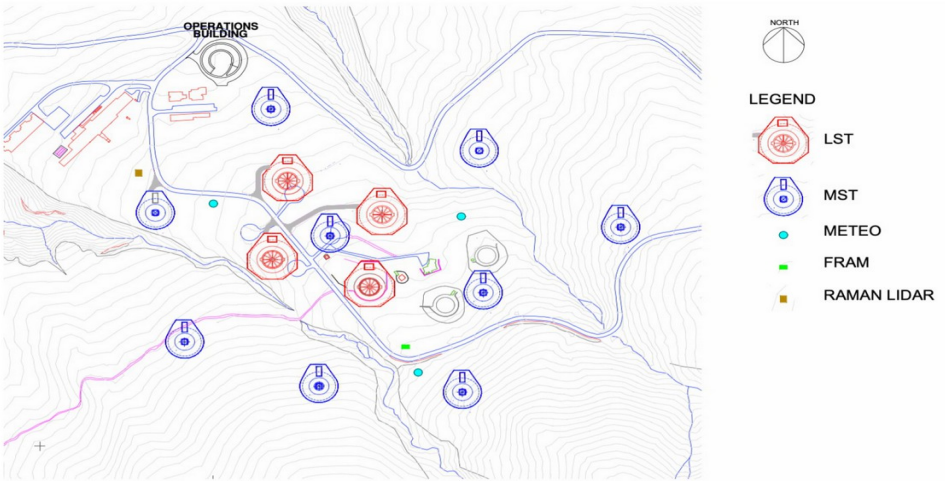
ORIGINAL BASELINE CONFIGURATION



4 LSTs

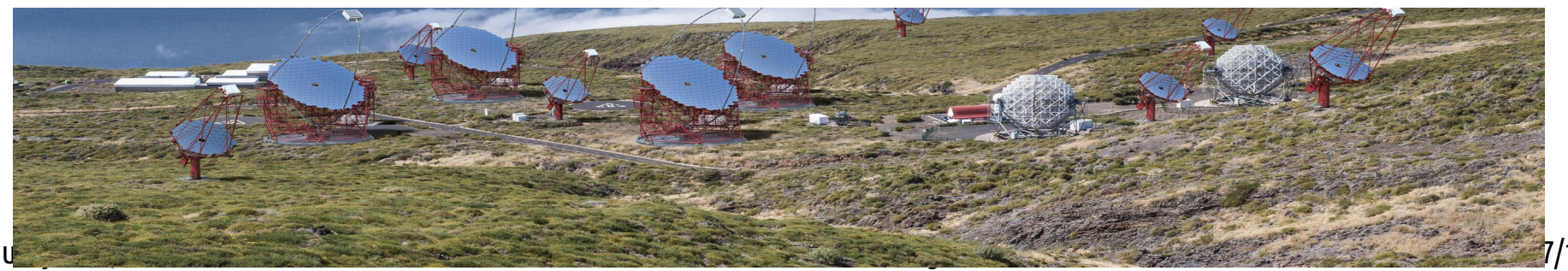
15 MSTs

ALPHA CONFIGURATION



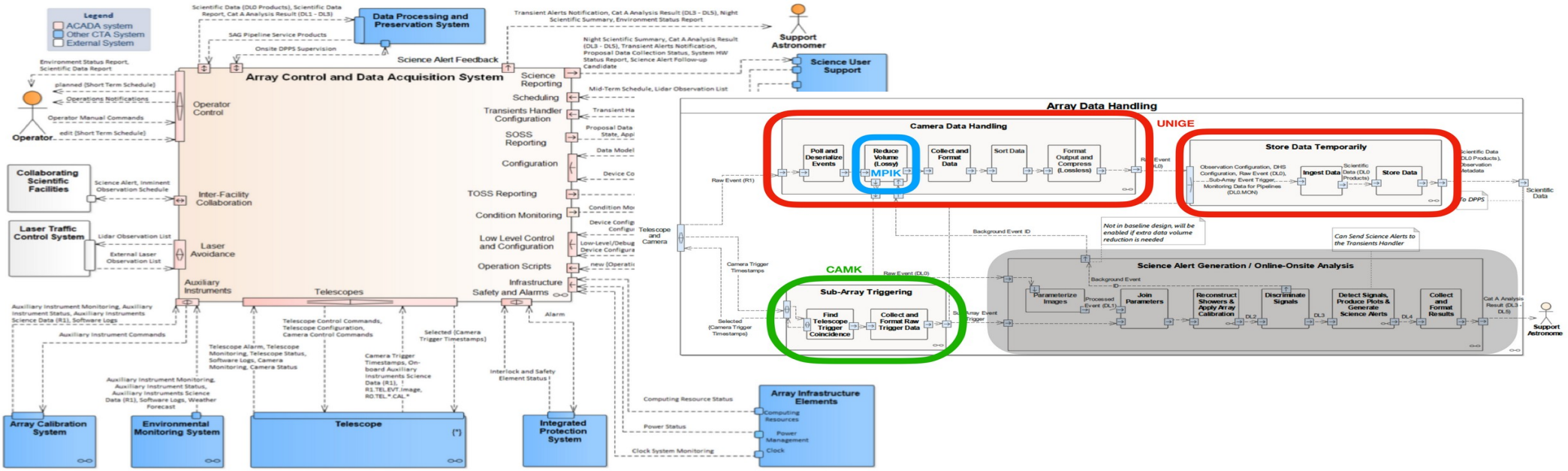
4 LSTs

9 MSTs



Cherenkov Telescope Array

ACADA



ACADA (Array Control and Data Acquisition) is the central software responsible for controlling the operation of CTA telescopes. CAMK team is responsible for **SWAT (SoftWare Array Trigger)** – central array trigger originally developed by Jurek Borkowski

Current CAMK Team consists of Bronek Rudak (coordinator), Jurek Borkowski, Adam Muraczewski, and Rafał Moderski

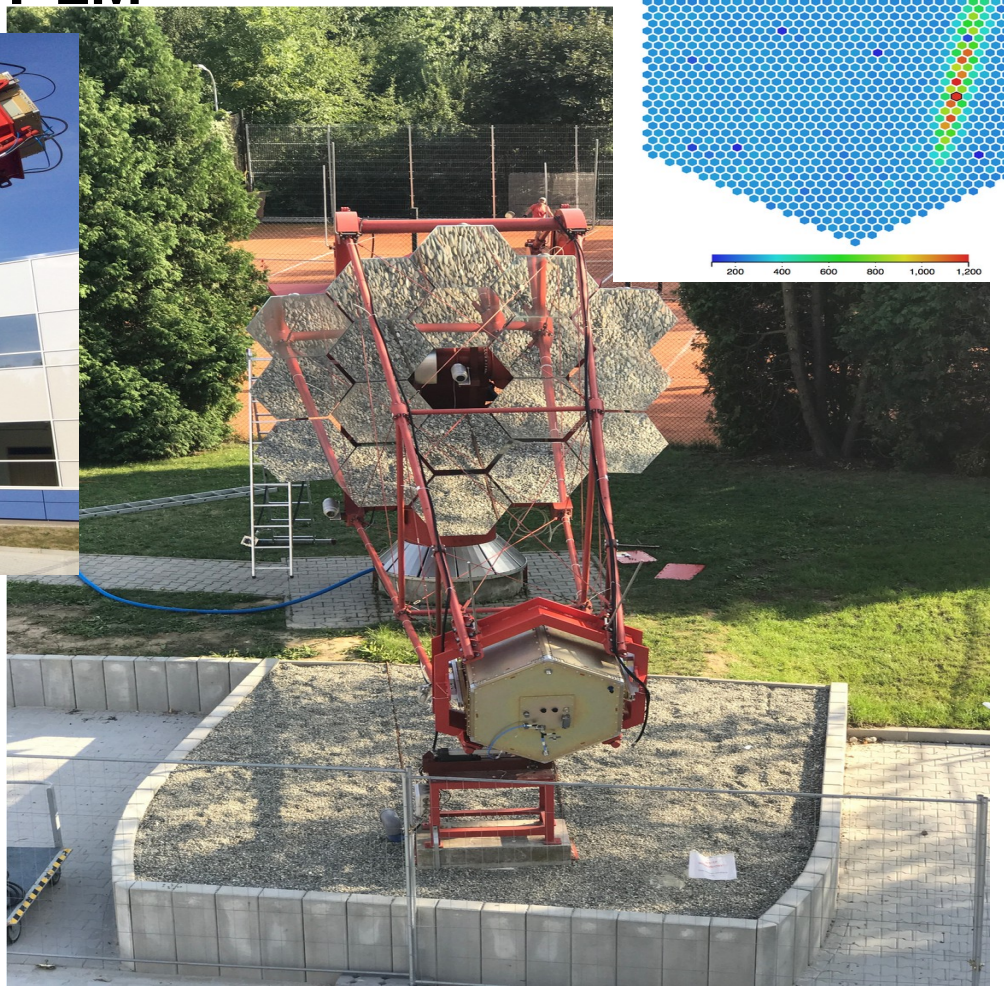
Cherenkov Telescope Array
α NORTH – LST-1

ACADA integration campaigns with LST-1 in 2023 – full success!

First detection of VHE gamma-ray emission from FSRQ OP 313 with LST-1
ATel #16381; Juan Cortina (CIEMAT) for the CTAO LST collaboration
on 15 Dec 2023; 14:31 UT

The Large-Sized Telescope (LST-1) on La Palma has been monitoring the very distant Flat Spectrum Radio Quasar (FSRQ) OP 313 (z=0.997, Schneider et al. 2010, AJ, 139, 2360). […] OP 313 was detected by LST-1 with a preliminary offline analysis using data from 2023/12/11 to 2023/12/14. It was detected with a significance greater than 5 sigma and an integrated flux, above 100 GeV, at 15% flux of the Crab Nebula.

Small-Size Single-Mirror Telescope
SST-1M



– supposed to be the main contribution of Poland to CTA – SST-1M but in 2019 the CTA Council decided that **“the CTA-SST design should be based on the ASTRI/CHEC design”**

- – fully working prototype constructed at IFJ PAN, Kraków, funds received to complete the **array of 2 telescopes → S1MA**

S1MA at Ondrejov Observatory

Located 40 km south-east of Prague is the principal astronomical observatory of the Astronomical Institute (Astronomický ústav) of the Academy of Sciences of the Czech Republic. A 2-meter telescope, which is the largest in the Czech Republic is located there.

Two SST-1M mini array under construction at the Ondrejov Observatory – Small-size Single-mirror Mini Array, or **S1MA**

S1MA at Ondrejov Observatory

S1MA at Ondrejov Observatory

stereo Crab, all good obsids (Sep 2023 - 10 Jan 2024)