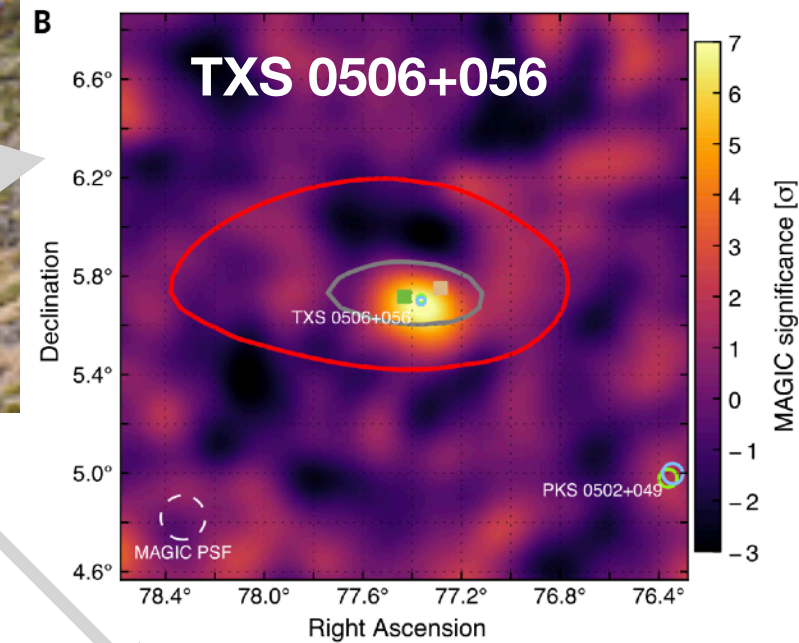


A05: Current status of Very High-Energy gamma- ray observations

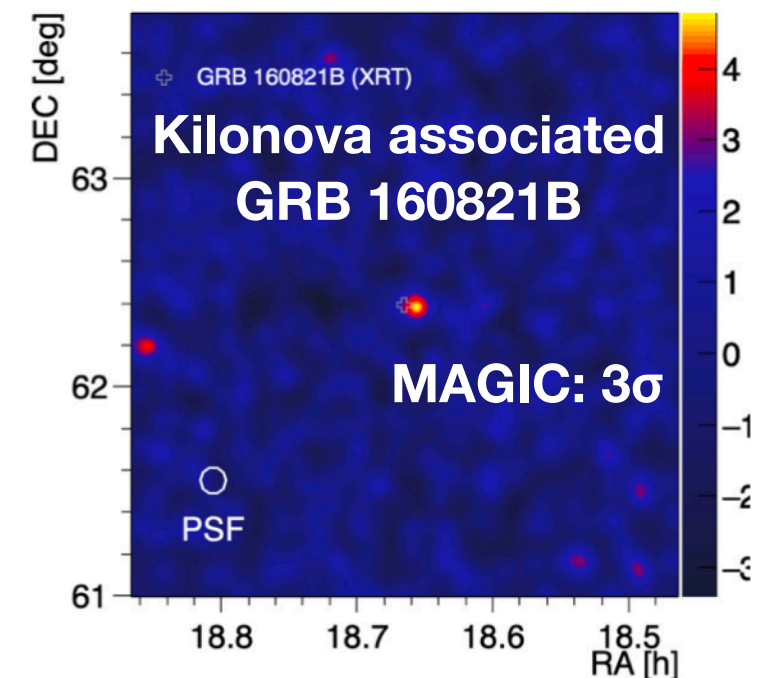
**Yusuke Suda (Hiroshima U.)
for the A05 team**

**Multi-messenger annual conference
Nov. 19, 2024**

Introduction



- Very High Energy gamma-ray telescopes explore physics in extreme environment
- MAGIC is a successful experiment due to its low energy threshold and high-speed repointing capabilities
- Cherenkov Telescope Array Observatory LST is the successor to MAGIC, with further improved performance



The CTAO Enters a New Phase of Growth

DATE 18 April 2024 TOPICS CTAO-North, CTAO-South, LST, Science, Computing, Telescopes, Announcements, Press Releases, MST, SST



Prof. Dr. Masahiro Teshima Elected New Spokesperson of the CTAO Consortium

DATE 19 July 2024 TOPICS Announcements, Consortium



CTAO Science Data Management Centre Inauguration on 14 October 2024, Zeuthen (Germany)

DATE 08 October 2024 TOPICS Announcements, Press Releases, Computing, Central Organisation



Large-Sized Telescope (LST)

Koji's slide from last year

Large Size Telescope

Mirrors: JP
Interface plates: JP, DE, BR
Actuators: JP, CH, DE
CMOS: JP

calibration: IT, HR, IN, DE

Tension cables: IT

Camera Support Structure: FR

Camera electronics: JP, IT, ES
Camera mechanics: ES
Camera safety: FR

Telescope structure: DE

Rail: DE

Another big contribution by Japan
IT center @ LST1
2000 cores, 3PB disk for the whole CTA-N

Critical Design Review of the Large-Sized Telescope Successfully Approved and Closed

DATE 25 September 2024 TOPICS Telescopes, Announcements, LST

- A05 cov including



Construction Status

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Koji's slide
from last year

Status (23 Nov, D. Mazin)



- Confusingly enough, we started from LST4. Let's call it the 2nd LST
- Anyway,,, the next LSTs will come soon! (finally...)

Construction Status (Oct 19, 24)



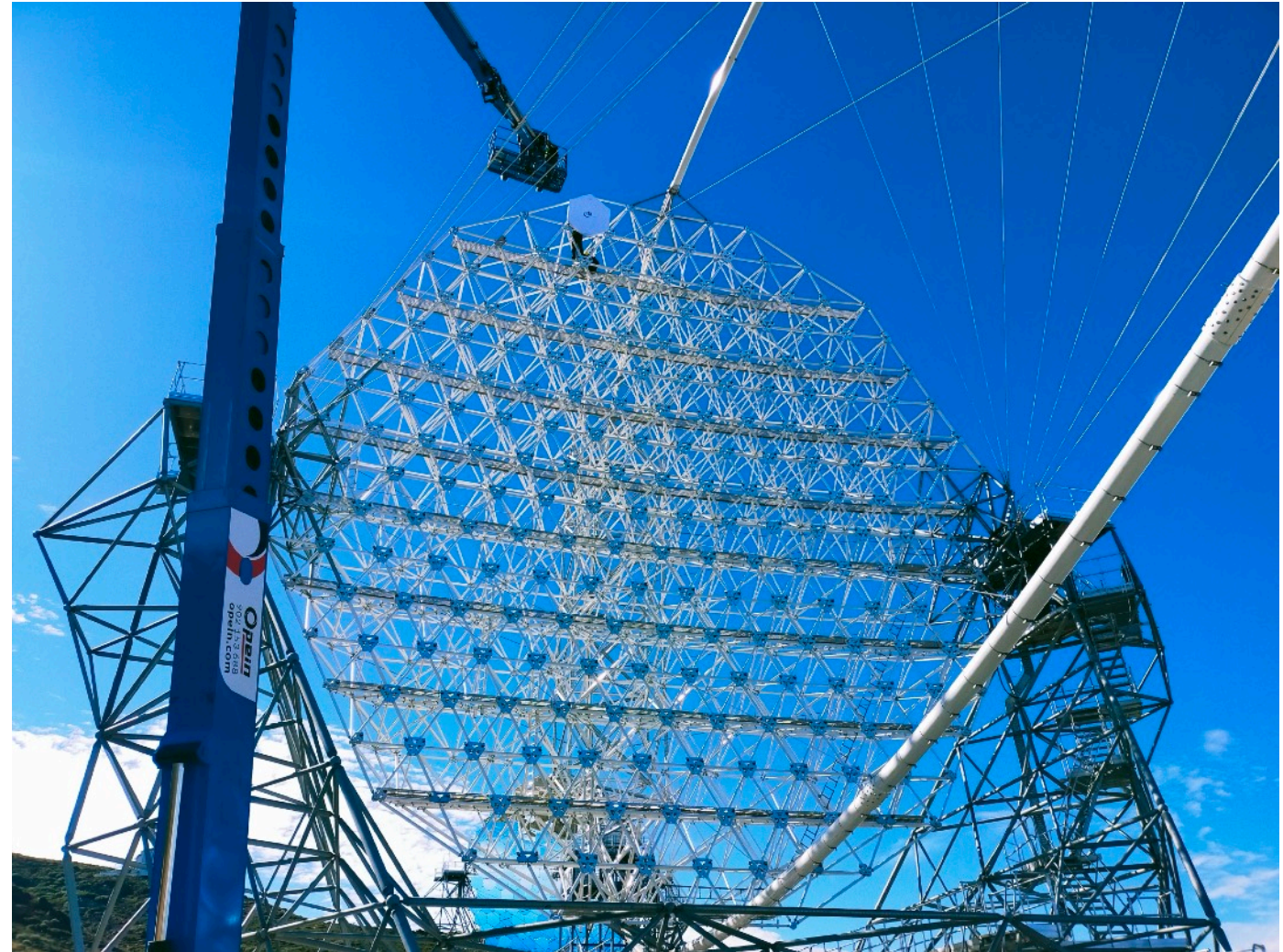
Credit: M. Hashizume

LST4 Mirror Installation

First LST4 mirror



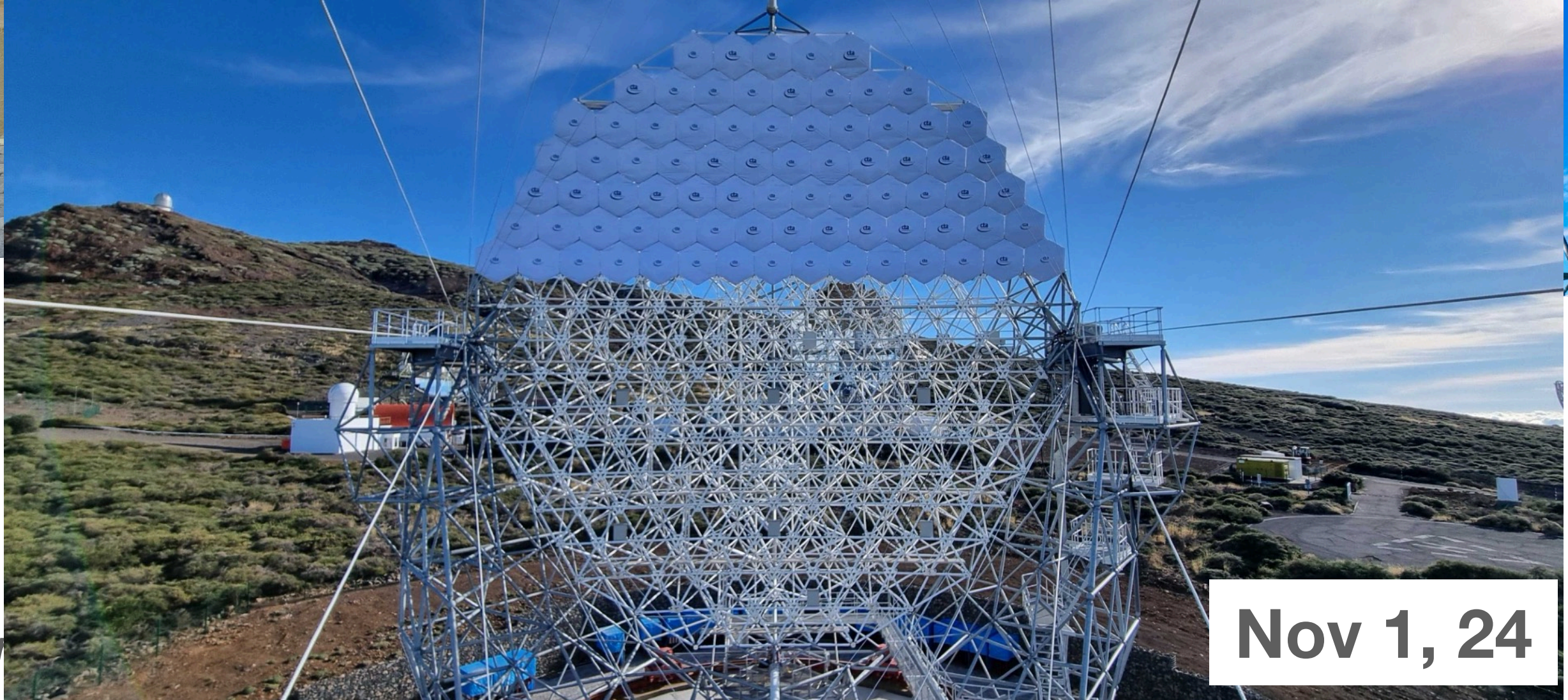
**Hashizume
(Hiroshima U)**



Credit: M. Hashizume

LST4 Mirror Installation

First LST4 mirror

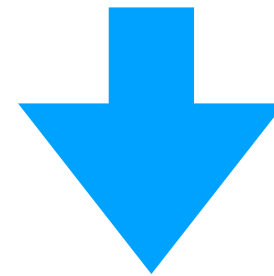


Nov 1, 24

CM

CTAO LST Array

We've been dreaming..



Our dream is coming true!



Credit: M. Hashizume

- FY2023
 - LST1 operation and maintenance
 - First results / papers (LST1 Crab performance, MAGIC + LST1 Crab performance, LHAASO J2108, BL Lac,,)
- FY2024
 - LST1 operation & LST2-4 deployment
 - Set up the neutrino follow-up program and fast ToO observations
 - **AGN study & GRB detection** by LST1
- FY2025
 - Complete LST2-4 construction
 - AGN & GRB studies by LST1
- FY2026
 - Commissioning stereo observation
 - **Neutrino follow-up** results by multiple LSTs
- FY2027
 - All the above transients observation with stereo observation
 - Start observations requiring a high sensitivity (to be continued)

LST-1 Discovers the Most Distant AGN at Very High Energies

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DATE

📅 26 December 2023

TOPICS

☰ Telescopes, Press Releases, CTAO-North, LST, Science



- LST is pushing the VHE horizon

[[Previous](#) | [Next](#) | [ADS](#)]

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

Credential Certification: Juan Cortina (Juan.Cortina@ciemat.es)

Subjects: Gamma Ray, >GeV, TeV, VHE, Request for Observations, AGN, Blazar, Quasar

✕ Post

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) since November 2023. Following the announcement of enhanced gamma-ray emission by Fermi-LAT (ATel #16356) and several optical facilities (ATel #16360) in early December, the Fermi-LAT emission of OP 313 has been closely monitored using the FlaapLUC pipeline (Astronomy and Computing, Volume 22, p. 9-15, 2018). This monitoring revealed the detection of renewed activity in the high-energy (HE, $E>100$ MeV) band and so, Target of Opportunity observations with LST-1 were triggered on December 10th 2023. 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. LST-1 observations on OP 313 will continue during the next few nights and therefore multi-wavelength observations are highly encouraged. LST-1 is a prototype of the Large-Sized Telescope for the Cherenkov Telescope Array Observatory, and is located on the Canary island of La Palma, Spain. The telescope design is optimized for observation of gamma rays in the range from 20 GeV to 3 TeV. The preliminary offline analysis has been performed by Daniel Morcuende (dmorcuende@iaa.es), Jorge Otero-Santos (joteros@iaa.es) and Seiya Nozaki (nozaki@mpp.mpg.de). The LST-1 contact persons for these observations are Masahiro Teshima (mteshima@mpp.mpg.de) and Juan Cortina (juan.cortina@ciemat.es).

Early Science Results

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- Extragalactic sources (Roy “ラーイ”, Hiroshima)
 - 1ES 1218+304, 1ES 1959+650
 - BL Lac, OP313, Mrk 421, Mrk 501, etc.
- Transients (Inoue, Chiba)
 - BOAT, etc.
- Galactic sources (Hadasch, ICRR)
 - Geminga
 - RS Oph
 - LHAASO J2108+5157
 - Galactic Center



- The CTAO enters a new phase of growth
- LST1 discovered the most distant AGN in VHE and keeps producing a lot of interesting results
- 3 more LSTs are finally taking shape
 - LST4 mirror installation going well
 - Construction will be completed in FY2025

