Cherenkov Telescope Array Observatory (CTAO)計画
全体報告(30)

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他CTAO Consortium



CTAO Consortium

25か国
>1500名



CTAO-Japan 136名

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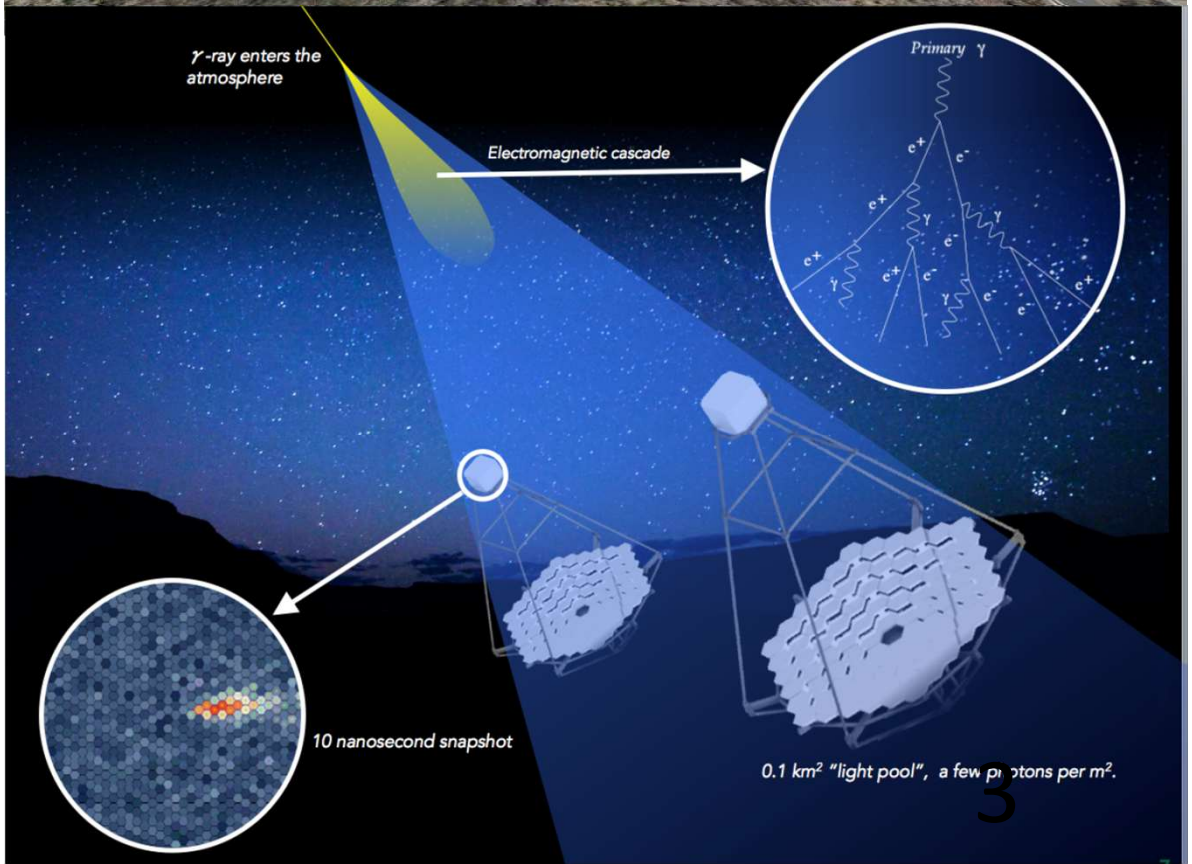
Cherenkov Telescope Array Observatory (CTAO)計画

4~23m口径のチェレンコフイメージング望遠鏡を約100台配置し、20GeV~300TeVの超高エネルギーガンマ線を観測する国際共同実験。

ガンマ線が大気中で引き起こす空気シャワーから放出されるチェレンコフ光を測定し、空気シャワーの形状と明るさからガンマ線のエネルギーと到来方向を推定。

AGN, SNR等ガンマ線を放出する高エネルギー天体検出数を1000個以上にする。
宇宙線起源、ブラックホール物理、ダークマター対消滅、背景赤外線の測定を目指している。



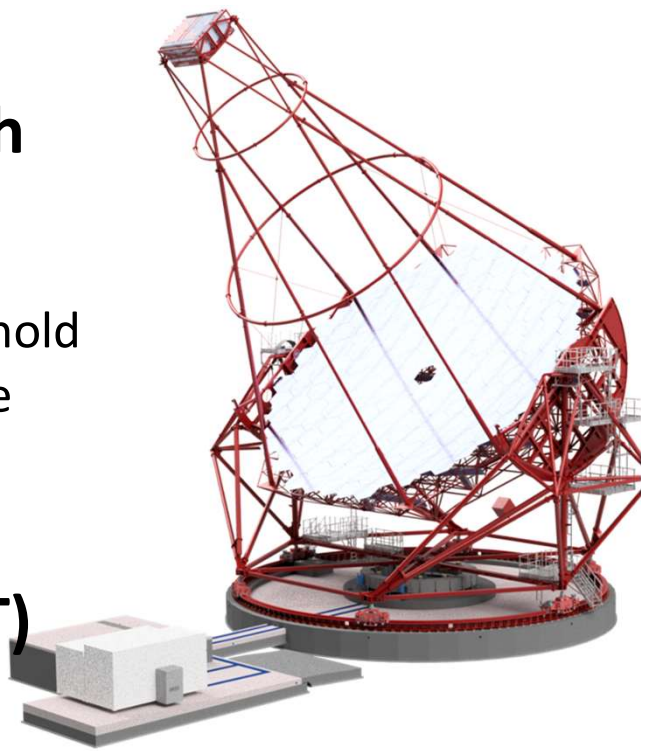




Large Sized Telescope

LST North LST South

23 m parabola mirror
1855 pixels, 0.1° pixel size
4.5 ° FoV, 20 GeV energy threshold
4 telescopes in both hemisphere





Medium-Sized Telescope (MST)

11.5 m Davies-Cotton design
1764 pixels, 0.17 ° pixel size
7.5 ° FoV, 80 GeV energy threshold
14 in the south, 9 in the north



Schwarzschild-Couder Telescope, SCT

9.7 m + 5.4 m dual mirror
11328 SiPM pixels, 0.067 ° pixel size

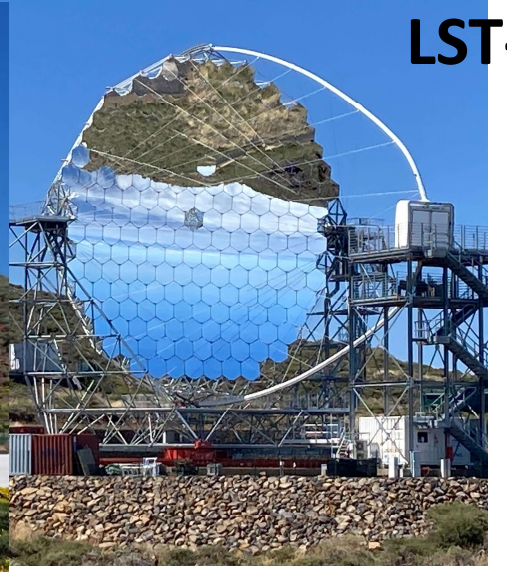


Small-Sized Telescpe, SST

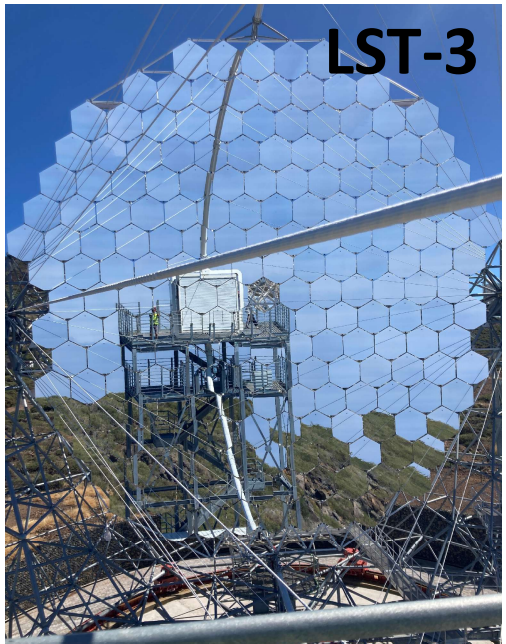
4.2m+1.2 dual mirror
10.5 ° FoV
2 TeV threshold
37 in south


• LST-1 has been in operation since 2019.
• LST-2,3 and 4 will be soon operational.
• 9 MSTs are planned to be built.
MAGIC-2
LST-1
LST-4
LST-2
LST-3
Dormitory
MAGIC-1





LST-1 has been in operation together with MAGIC-I and MAGIC-II since 2018.
~3000 hours of data has been taken.
LST-4 is now online, and several tests are ongoing. LST-4 is expected to join regular observations within this fiscal year. LST-2 and LST-3 are ready for testing.





Production of two LSTs for South completed in Italy. They aim to ship in mid 2027.

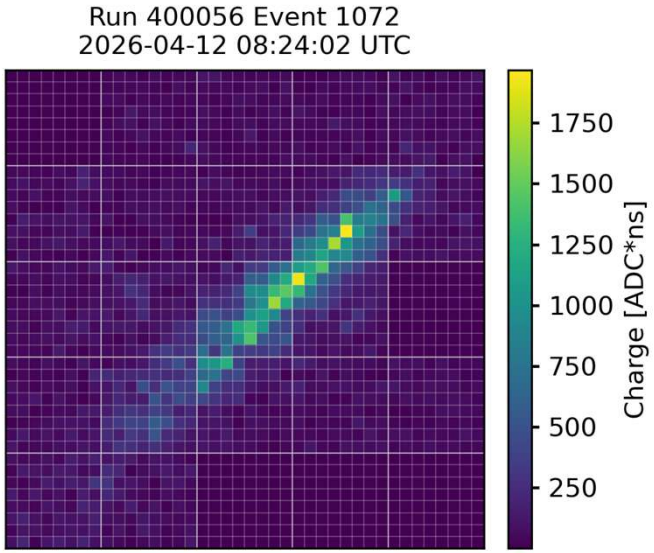




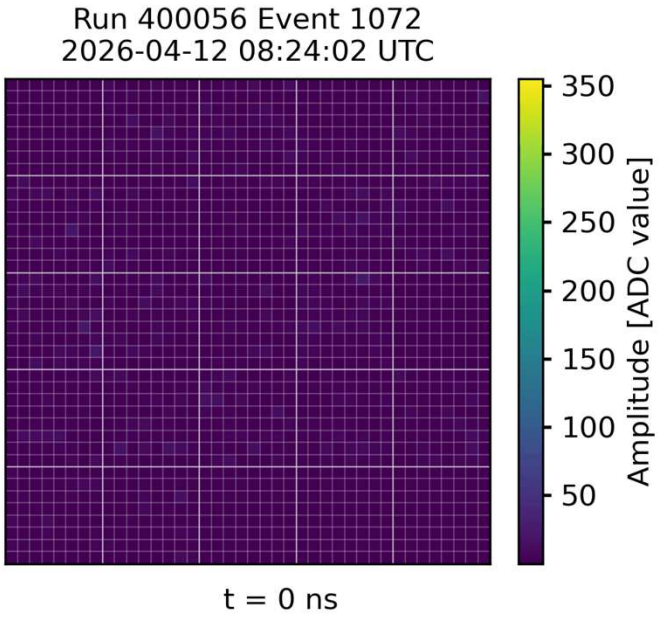


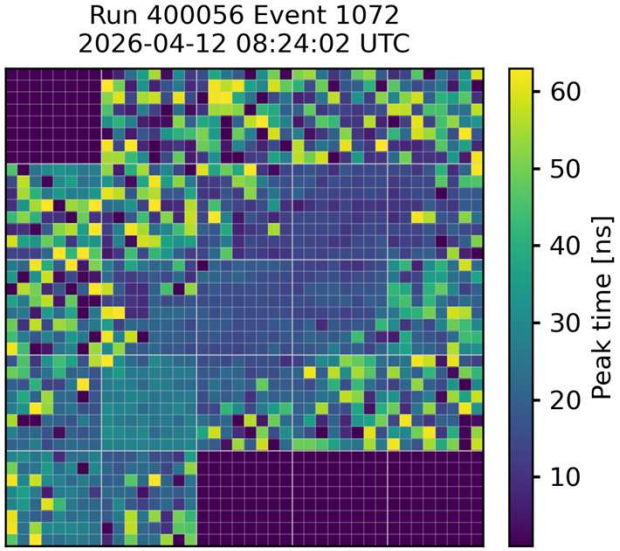


Schwarzschild-Couder Telescope (SCT) commissioning in Spring 2026 at Arizona:



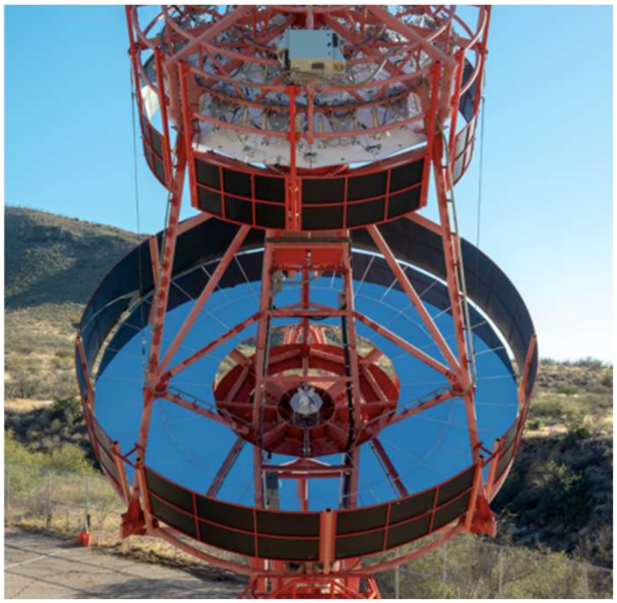
Time-integrated charge

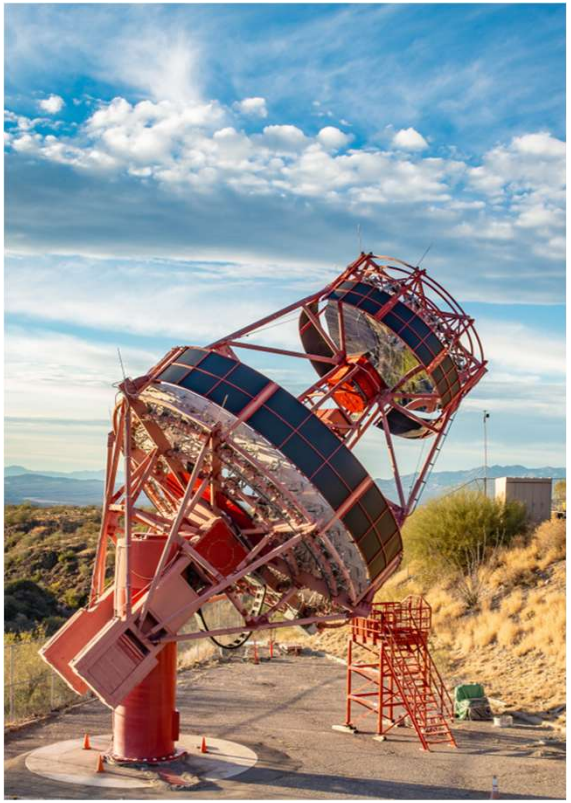




Peak time

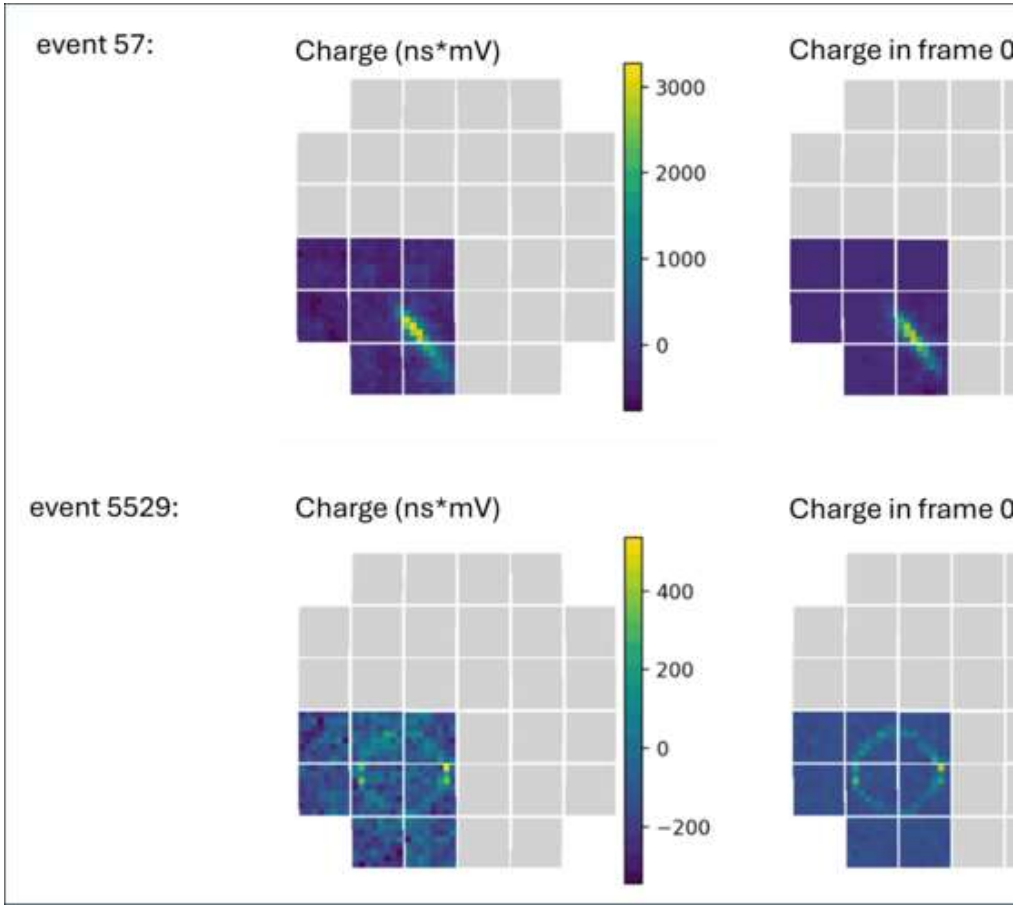
SiPM camera detect proton like events.





SSTs for south are ready to ship

[First Light for SST Camera Prototype on the ASTRI Mini-Array: Max-Planck-Institut für Kernphysik]



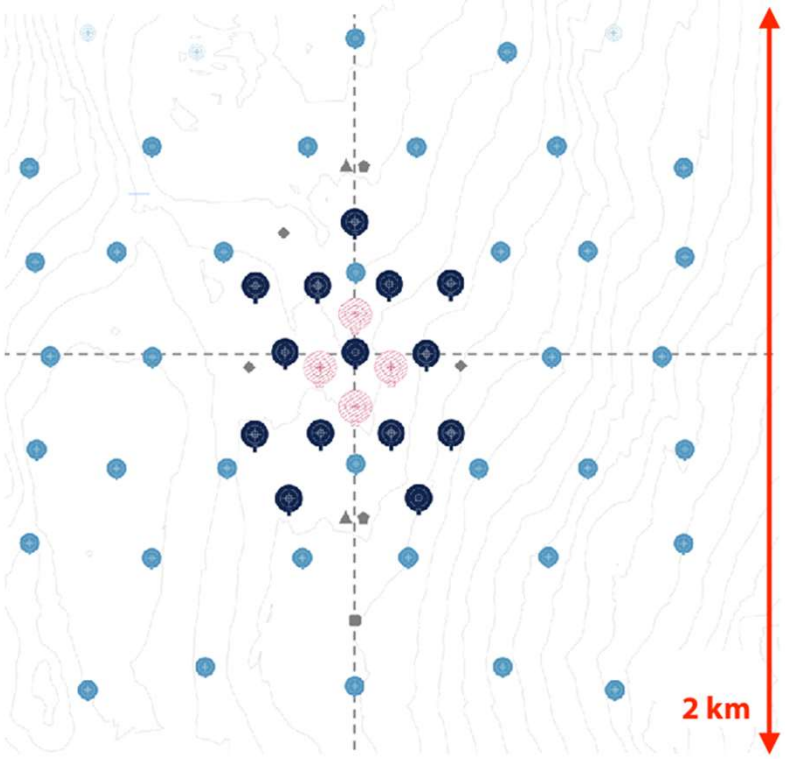


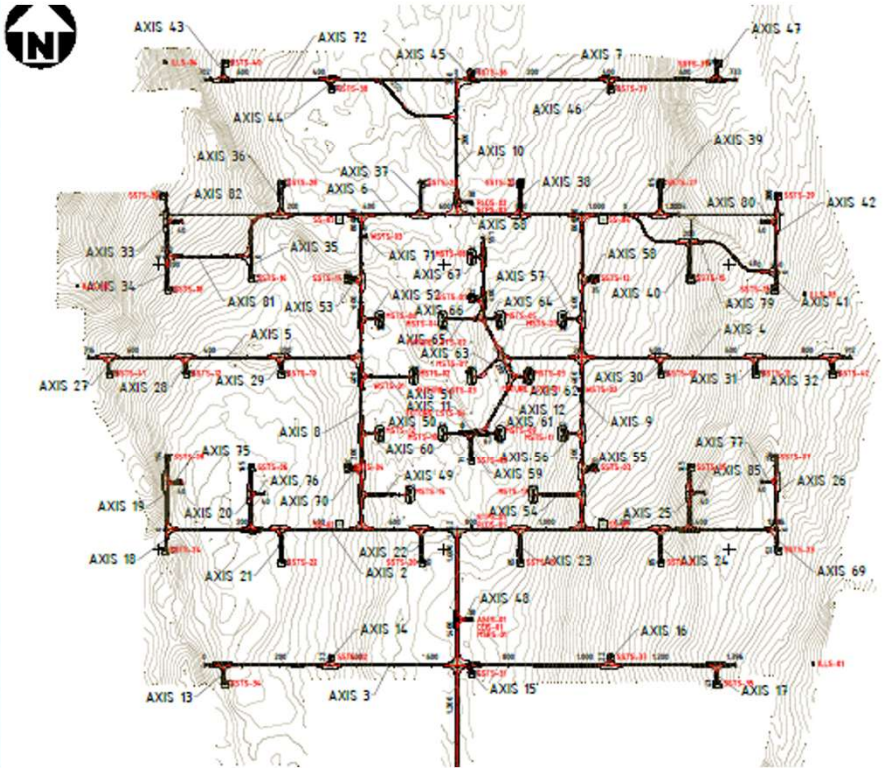
Test observation at Tenerife in Canaria Island in July 2025.

South site: Paranal in the Atacama Desert

The planned array consists of 14 MSTs, 37 SSTs, and 2(4) LSTs.











2km





25 Aug. satellite image

New results 1. Habib Ahammad Mondal, JPS CTAO report 256

FSRQ 4C+27.50 (z=1.255)

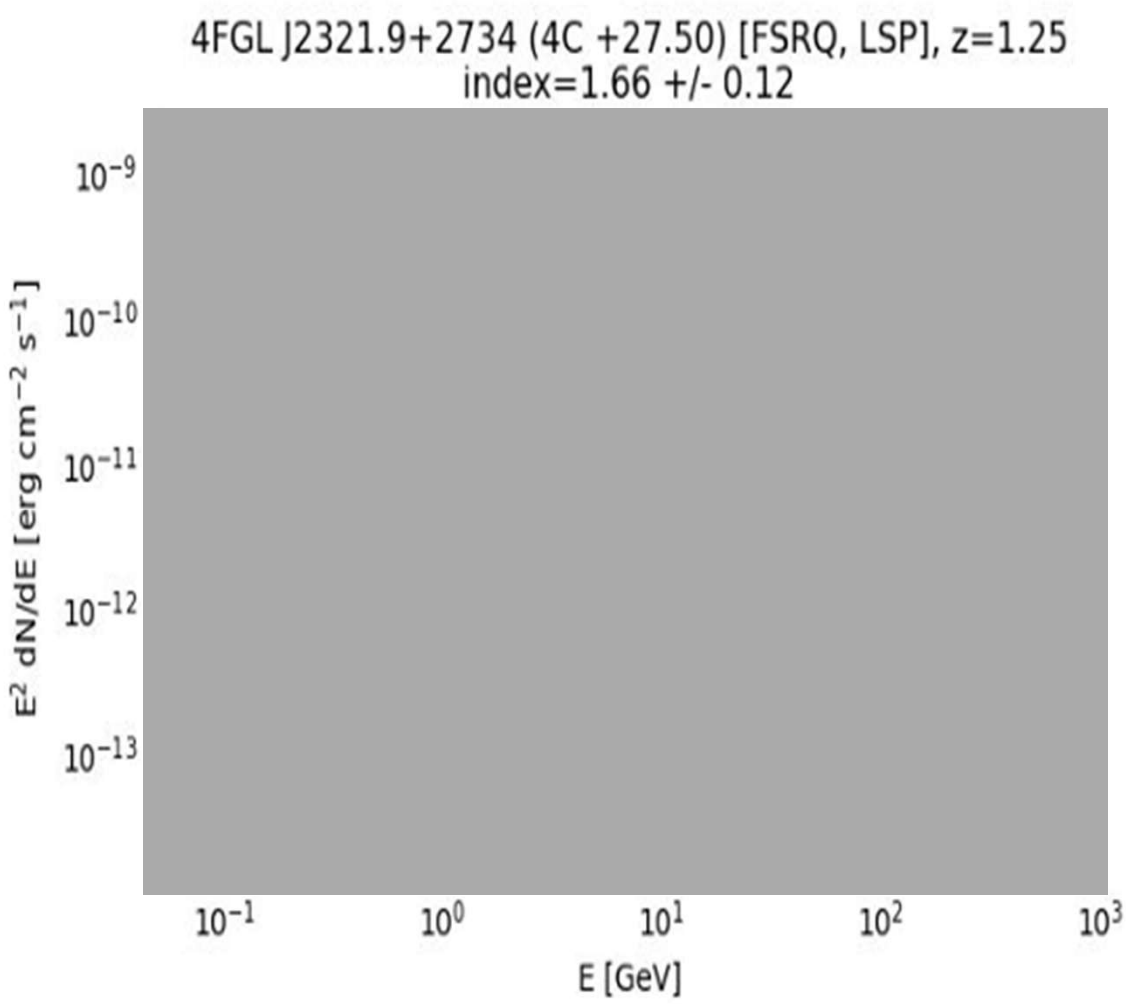
Extending the VHE Gamma-Ray Horizon

The most distant FSRQ previously detected in the VHE band was OP 313 (z = 0.997).

In September 2024, the FSRQ 4C +27.50 (z = 1.255) underwent a flare, triggering follow-up observations.

A total of 3.3 hours of observational data were obtained.

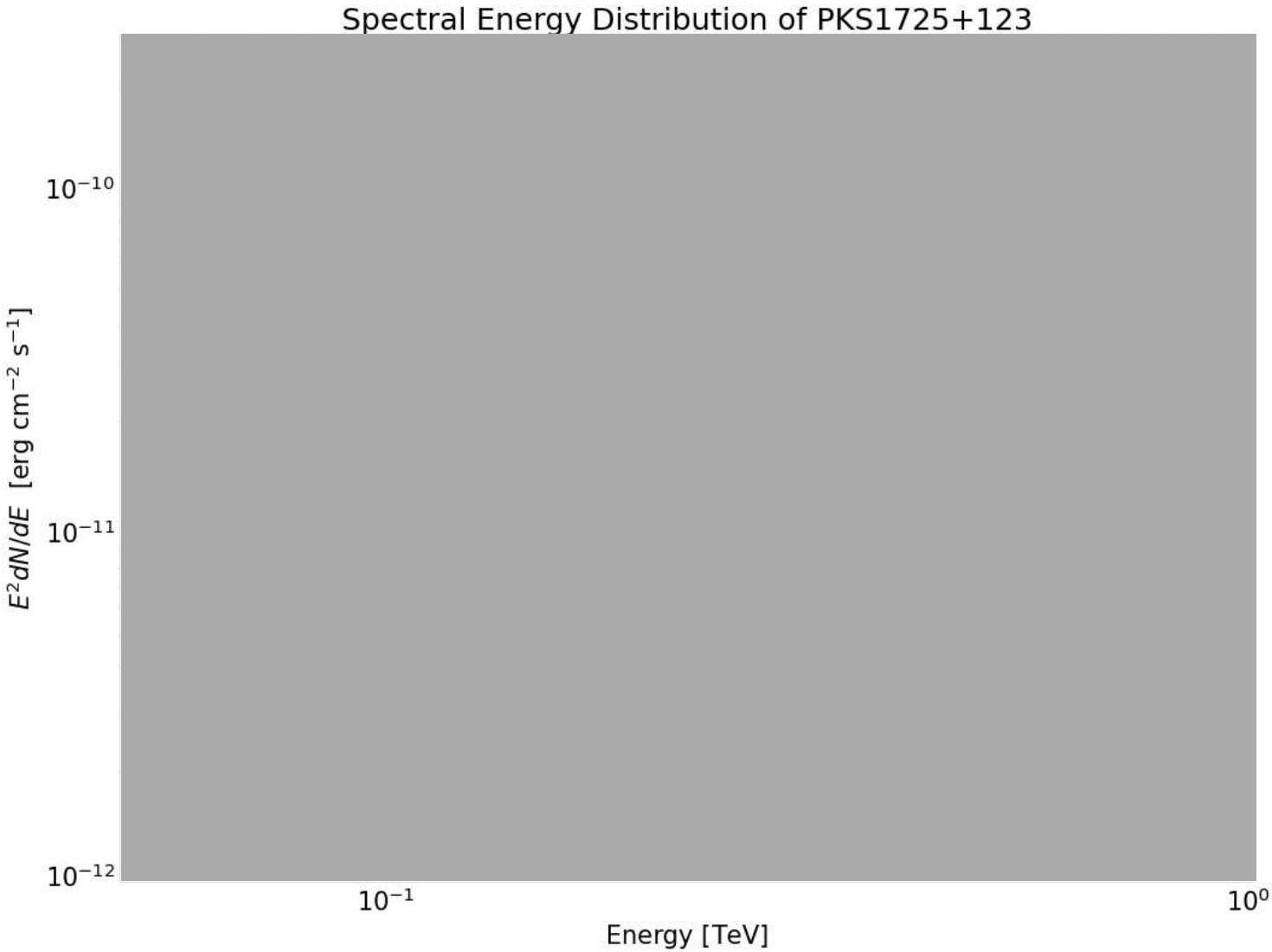
VHE gamma-ray emission was detected at a significance of 5σ.



New results 2: Suda Yusuke, JPS CTAO report 257

PKS 1725+123 FSRQ z=0.586.

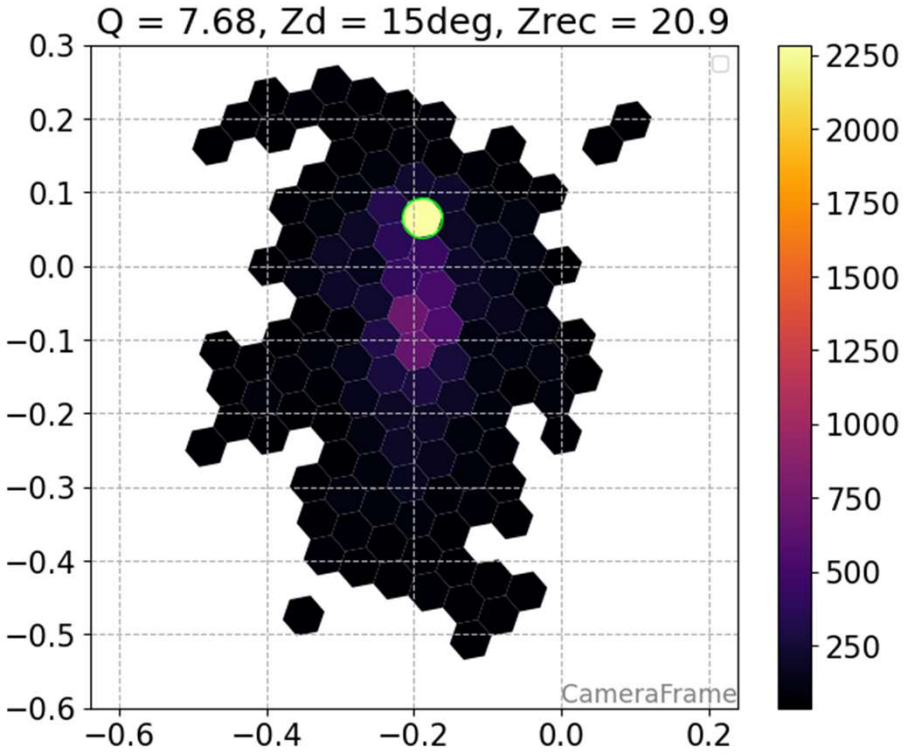
In August 2025, a historic flare occurred. During this flare, LST-1 and MAGIC observed the source, and VHE gamma rays were detected on August 8, 9, and 10. Multi-wavelength analysis is ongoing.



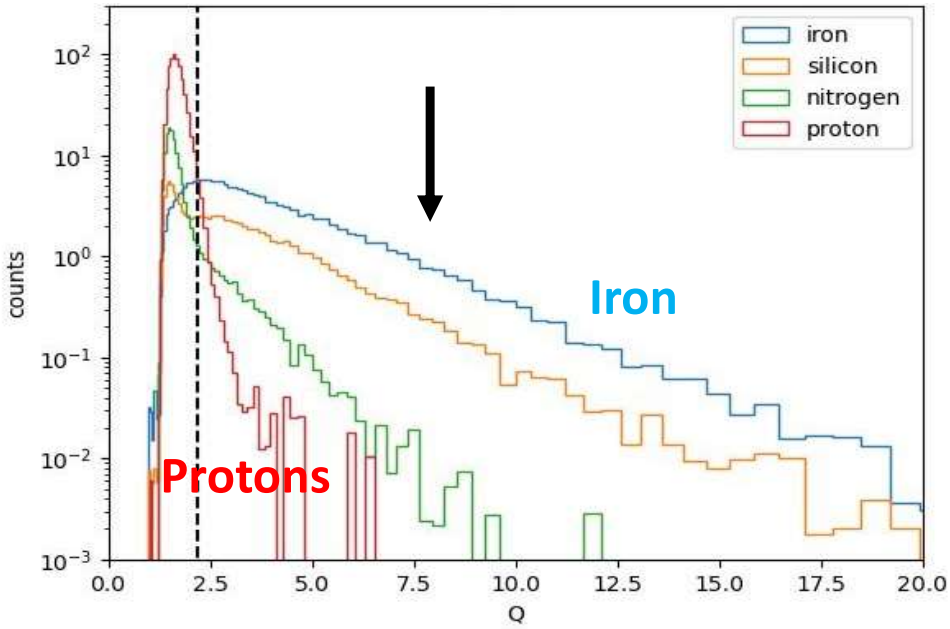
New results 3: Mizuno Masakaze, TeVPA2026
Direct Cherenkov light for TeV cosmic ray composition

Of the 14 million events analyzed during a 30-minute observation, 42 were identified as direct-Cherenkov-like events.

Real data

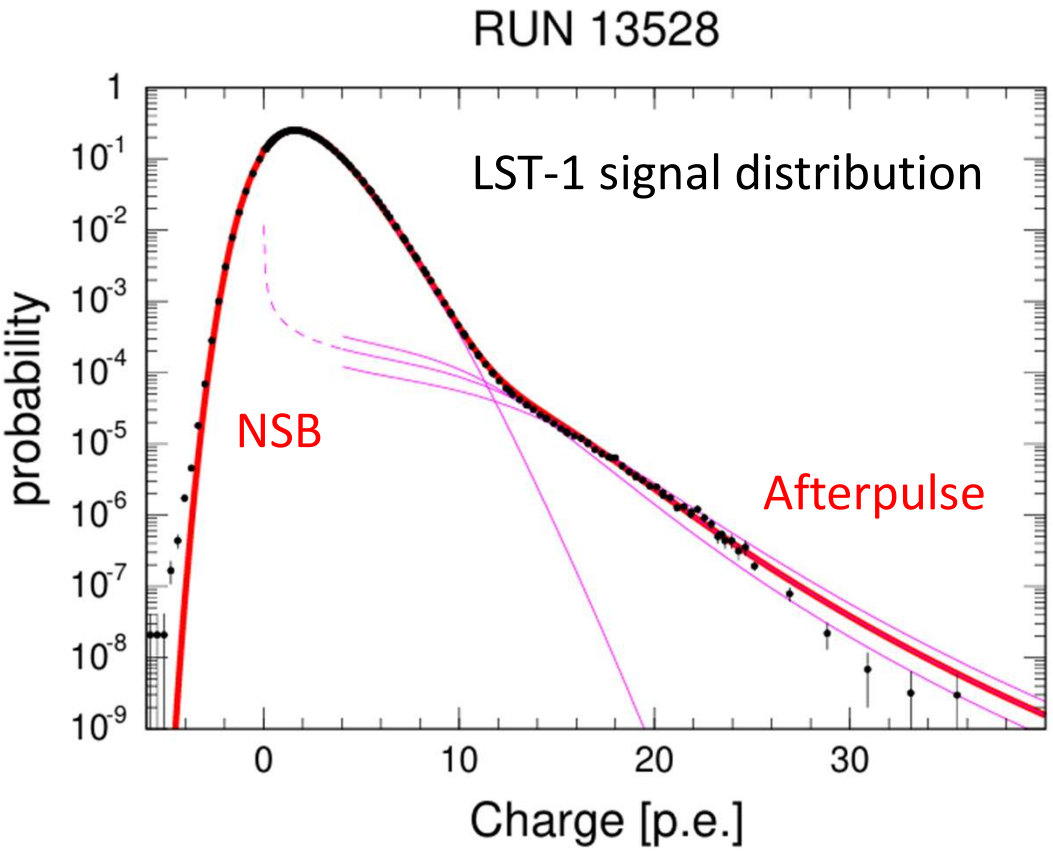


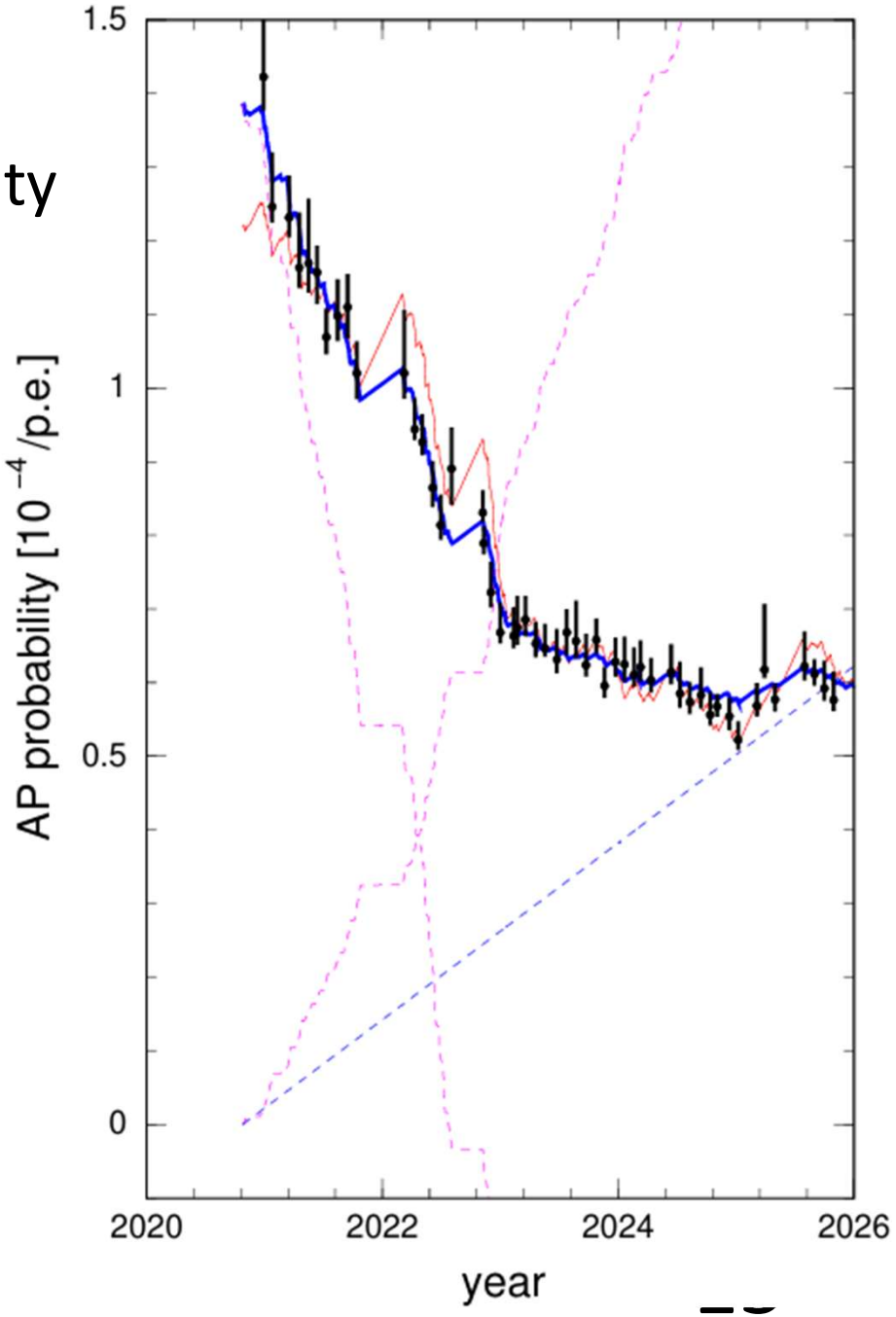
MC simulation



New results4: Mizote Masaya Next Talk

Using five years of observational data, we found that the afterpulse probability of the LST-1 PMTs decreased during operation.





Conclusion

- LST-1 continues to observe VHE gamma-ray sources together with MAGIC.
- More than 3,000 hours of observational data have been accumulated.
- Commissioning activities toward stereoscopic observations are ongoing in parallel.
- Camera testing and calibration have started for LST-4.
- LST-2 and LST-3 are ready for camera testing.
- The MST, SST, and LST components are ready for shipment to the southern site.

New results 1. Habib Ahammad Mondal, JPS CTAO report 256

FSRQ 4C+27.50 (z=1.255)

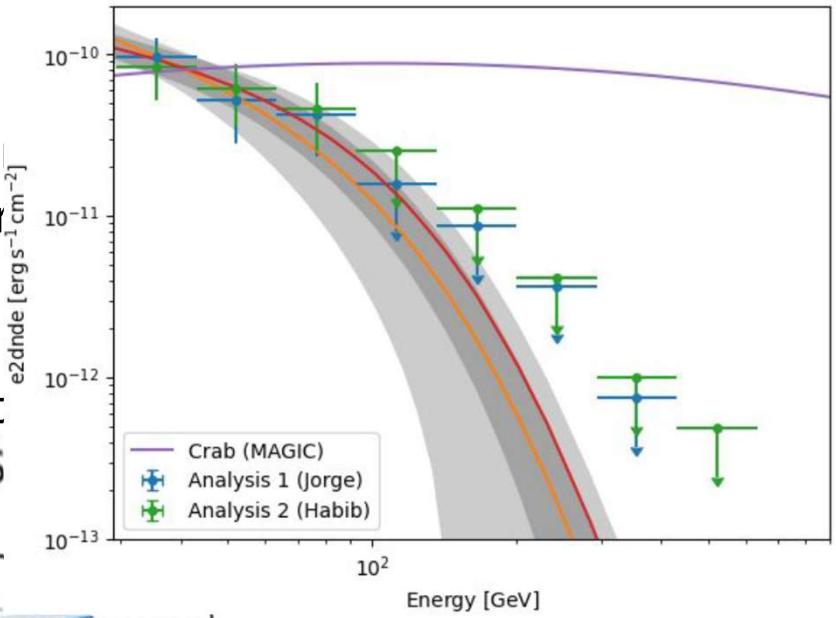
Extending the VHE Gamma-Ray Horizon

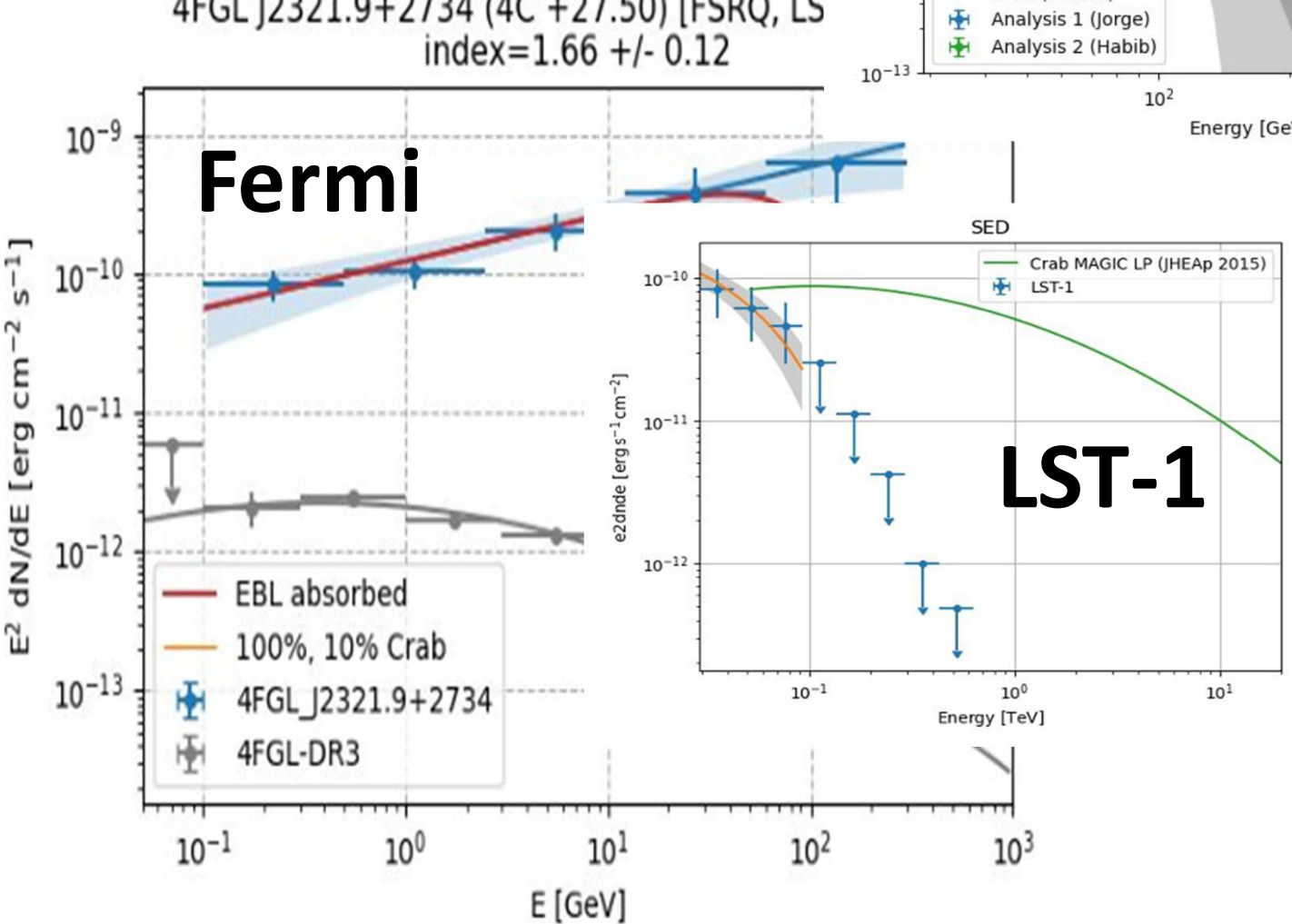
The most distant FSRQ previously detected in the VHE ba

In September 2024, the FSRQ 4C +27.50 (z = 1.255) under observations.

A total of 3.3 hours of observational data were obtained.

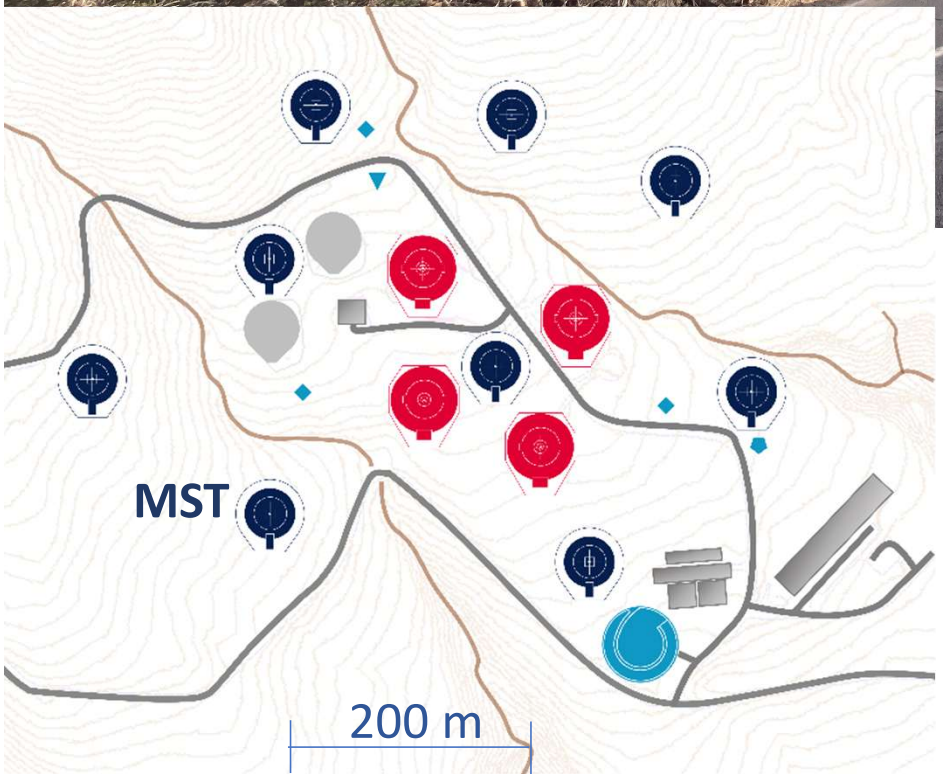
VHE gamma-ray emission was detected at a significance c





North site: Canary Islands La Palma, Roque de los Muchachos Observatory





LST-1 has been in operation since 2019.

LST-2,3,4 are under construction.

9 MSTs are planned to be built.