

Status of the LST1-4 project

2nd VHEGAM meeting, Bari

Alessio Berti (MPP) on behalf of the LST collaboration



CTAO LST COLLABORATION

- First Large-Sized Telescope of the CTAO Northern Site
 - 23m diameter
- Inaugurated in 2018, taking routinely data since end of 2019
- It covers the low energy range, starting from 10-20 GeV
 - ideal for distant or dim sources, transient sources
- In commissioning phase, but already delivering high profile science results (see Alessandro's talk)

CTAO CTAO COLLABORATION The LST-1 Collaboration in numbers

total members 492					TOTAL AUTHORS 333	
Countries	Groups					
COUNTRY	MEMBERS	AUTHORS	% MEMBERS	% AUTHORS	AVG MEMBERS LAST 12 MONTHS	AVG AUTHORS LAST 12 MONTHS
Brazil	14	2	2.85%	0.60%	7.58	2.00
Bulgaria	2	2	0.41%	0.60%	2.00	2.00
Croatia	8	7	1.63%	2.10%	7.25	7.25
Czechia	20	12	4.07%	3.60%	19.42	12.00
France	45	21	9.15%	6.31%	43.42	23.33
Germany	47	39	9.55%	11.71%	48.50	36.75
Italy	132	99	26.83%	29.73%	129.33	93.42
Japan	93	70	18.90%	21.02%	90.08	73.00
Poland	7	4	1.42%	1.20%	6.17	5.00
Spain	108	66	21.95%	19.82%	101.00	64.25
Switzerland	19	16	3.86%	4.80%	19.75	16.33

The LST-1 Collaboration

Credit: D. Mazin

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The LST-1 Collaboration

Credit: D. Mazin

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Not only commissioning...

- LST-1 is in commissioning phase, but the data taken can be scientifically exploited
- The third observation cycle started recently, with 55 proposals submitted
- New: this cycle saw the MAGIC+LST Time Allocation Committee, with a joint proposal call between the two collaborations
- Most of the proposals competing for MAGIC+LST time

TAC evaluation report - Joint LST-MAGIC Cycle 3 / Cycle 20

This document collects the reports produced by the joint LST-MAGIC time allocation committee (TAC) for each proposal submitted for the observing LST Cycle3/ MAGIC Cycle20 (14.04.2025-30.03.2026), evaluated by the LST-MAGIC TAC during the meeting held at the Physics Department of the University of Barcelona, from 2025, February 24th to February 28th. The introductory part of the document has been edited by Pol Bordas and Antonio Stamerra (TAC chairs) and Julian Sitarek (MAGIC Physics Coordinator). The joint LST-MAGIC TAC for this Cycle of observations was composed by 27 members:

Pol Bordas and Antonio Stamerra (TAC chairs); Alessandro Carosi and Julian Sitarek (Physics coordinators), Daniel Mazin, David Paneque, levgen Vovk, Masahiro Teshima (Ex-officio members), Alessandra Lamastra, Alessio Berti, Andrii Neronov, David Green, Daniela Hadasch, Fabian Schussler, Federico Di Pierro, Giacomo Bonnoli, Giovanni Morlino, Josefa Becerra, Juan Cortina, Lara Nava, Marcel Strzys, Marina Manganaro, Mathieu de Bony, Monica Seglar-Arroyo, Ruben Lopez-Coto, Susumu Inoue, and Tomislav Terzić.

A group of advisory members supporting the evaluation by TAC was established, comprising schedulers (Ciro Bigongiari, Marcel Strzys, Alejo Cifuentes, Giacomo Bonnoli). The analysis feasibility reports of MAGIC-only proposals were provided by the MAGIC SoBo coordinators (Cosimo Nigro and Ana Babić), for LST-only proposals by the LST ASWG coordinators (Abelardo Moralejo and Ruben Lopez-Coto) and for joint proposals by joint analysis coordinators (Julian Sitarek, Federico Di Pierro and Elisa Visentin). The technical feasibility for proposals using MAGIC data were additionally evaluated by the MAGIC Technical Board coordinators (Victor Acciari, Alex Hahn) and Deputy Operations and Safety Coordinator (Irene Burelli), while those using LST data were revised by the LST technical coordinator (Alice Donini). The MWL/MM aspects of the proposals were evaluated by the corresponding MWL/MC coordinators (Josepa Becerra and Giacomo Bonnoli for MAGIC and Koji Noda and Gayoung Chon for LST). The XMM technical feasibility report was provided by Rosario Gonzalez-Riestra on behalf of the XMM SOC Community Support Group. All the technical reports were provided to TAC members before the in-person meeting. Technical support on the MPSS was granted by Stefano Ansoldi.

1. Introduction

The LST Cycle3/MAGIC Cycle20 contains 12 periods (for MAGIC, periods 276-287; for LST, periods 75-83), providing approximately 900 hours of dark time, and about 300 hours of Moon time. The observing time will be available for MAGIC+LST and for MAGIC-only and LST-only observations without constraints on the fraction of time taken together and separately by the two instruments.

CTAO LST COLLABORATION Joint data taking with MAGIC

- Proximity with the MAGIC telescopes allows to perform "joint observations"
- Three telescopes observations improve the sensitivity thanks to the better reconstruction and better background rejection
- Performed since ~end of 2020 on specific targets, both for evaluating the performance and scientific purposes
- Detailed performance study available <u>here</u>



LST-1 operation: data taking

- ~2850h with LST-1 since end of 2019
 - Not only regular data taking, but many, many tests!
- ~1/3 in joint data with MAGIC
 - probably increasing next year with more joint observations
- As usual, data taken != usable
- Expected to have more joint data as a result of the joint proposal call



Recent view of ORM





- At the previous LST meeting in November, LST-4 mirror installation and AMC cabling was ongoing
- Now:
 - mirrors are installed, as well as AMC elements
- Very recent update: the camera was installed Tuesday last week!!!
- Still to be done:
 - drive validation, installation of some elements in the dish center







LST-4 camera installation: huge milestone!



CTAO LST COLLABORATION

- Quite some progress in the last months
- Azimuth locking system
- Mirrors installed: last one last week
- AMC cabling, elevation cable chain and ducts





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- Status is more or less unchanged in the last months
- Relevant actions are expected for summer 2025 (Camera Support System, mirrors installation)





Schedule for LST2-4

- LST4:
 - CSS installed June 2024
 - Mirrors installed November 2024
 - Camera installed May 2025
 - Drive validation July 2025
 - Safety Inspection November 2025
- LST3:
 - CSS installed September 2024
 - Mirrors installed May 2025
 - Camera installation September 2025
 - Drive validation October 2025
 - Safety Inspection November 2025

- LST2:
 - CSS installation Juliy 2025
 - Mirrors installation August 2025
 - Camera installation March 2026
 - Drive validation April 2026
 - Safety Inspection May 2026

Very likely some shift of the tasks



LST and CTAO

- At the moment, the operation of LST-1 and the construction of LST2-4 are performed by the LST collaboration
- In order to coordinate the handover to CTAO, the managements of LST and CTAO are working on a so-called Transition Plan
 - Defining technical aspects for the telescope acceptance
 - Discussing incentives for the LST team to deliver the telescopes soon (e.g. guaranteed time in early science phase, under discussion within CTAO)
 - Defining a Joint Commissioning Team
 - Discussing hiring people in La Palma to help LST to deliver the telescope and have enough CTAO personnel to receive and operate the telescopes under CTAO



Summary

- LST-1 under commissioning and being operated since several years now
 - Already providing important science results
- LST2-4 construction is going well, minor delays in the schedule, huge effort by the teams to stay on track
- Interaction with CTAO to help LST deliver the telescope and to train personnel that will operate the telescopes under CTAO