

Research Result Report

ICRR Inter-University Research Program 2023

Research Subject: Commissioning and upgrade of the onsite data center for CTA North in La Palma, Spain

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Summary of Research Result :

The next generation observatory for the very high energy gamma-rays will be the Cherenkov Telescope Array (CTA) covering energies from 20 GeV to 300 TeV with unprecedented sensitivity. It will be built on two sites: one in the Northern hemisphere (La Palma, Canary Islands, Spain), the other one in the Southern hemisphere (Paranal, Chile). Four Large Size Telescopes (LSTs) of 23 m diameter and 28 m focal length will be arranged at the center of both arrays to lower the energy threshold and to improve the sensitivity of CTA below 200 GeV. The first LST was inaugurated in Autumn 2018 and is now in the commissioning phase.

The onsite data center for CTA North has been procured by the University of Tokyo from the company Fujitsu. The delivery date was March 2018 in La Palma. I am responsible for this data center, i.e. the correct set-up, the coordination and management of the users and the commissioning of the IT center. The system consists of 2000 cores and 5.3PB disk space. This cutting edge technology allows us to process data directly onsite in a very short time. This new analysis system is allowing fast data analysis and rapid interpretation of the results leading to immediate follow-ups if needed and prompt alerts to the scientific community.

The construction of LST2-4 in La Palma is ongoing in FY2023-2024. I am preparing the IT center to connect these three new telescopes to the network and all necessary subsystems to control and steer the telescopes. The same holds for the construction of the Mid Size Telescopes (MSTs) in FY2023-2025. Each telescope will be equipped with 2 high-performance servers with 32 cores, 256 GB memory and 3TB disk space

each. After careful studies of our need, the tendering process with Fujitsu is now ongoing. These servers will be located in dedicated containers in order to be able to steer the telescopes in the so-called “local mode”. In case of problems with the network, telescopes still can be operated independent of the IT container. The Control and Management networks were prepared during FY2023 for future regular operations. Furthermore, a new file structure was implemented after thoroughly discussions with ACADA and the ICRR La Palma administrators.

Furthermore, the first ACADA-LST software integration tests were performed onsite on La Palma. We prepared a generic account for ACADA users, two dedicated hosts on the cluster and reserved several SLURM working nodes. The ACADA-REL1 and LST-1 integration has been **successful**: all main goals of the integration tests have been accomplished. All results are published in the “ACADA REL1 – LST1 Integration and Test-Report” (CTA-REP-ACA-303000-0006 2023-11-20). The figure below shows the deployment scheme used during the integration tests.

3.1.1 Deployment Overview

The following diagram shows the actual deployment used for the ACADA-LST software integration and tests:

