

Research Result Report

ICRR Inter-University Research Program 2024

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 FY2025-2027. Each telescope will be equipped with 2 high-performance servers with 32 cores, 256 GB memory and 3TB disk space each.

- FY2024 the servers for LST2-4 arrived on La Palma and are about to be installed and configured. One server, lst104, was completely set up from scratch running with the OS system ALMA Linux 9. An automatic set-up procedure was established in order to easily prepare the new servers. All subsystems are up and running on the new server to control the new telescope LST-4. 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 job submission system SLURM was re-configured for actual need. Since new analysis groups joined the IT cluster we had to ensure that data taking still has highest priority. The new priority scheme is the following:
 - Data taking is not running under SLURM, but through dedicated nodes.
 - RTA (Real time analysis) is using SLURM, but on reserved nodes.

◦ OSA (Onsite analysis pipeline) ◦ FOA (Fast Offline Analysis) for transients and flares. ◦ mcpprod (MAGIC-CTA-pipe data processing) ◦ MC (Monte Carlo production) ◦ ASWG (people who run their personal source analysis) • Further ACADA-LST software integration tests were performed onsite on La Palma. • Network configurations were updated in order to fulfill requirements for the integration of the new telescopes. • Local software repositories were updated to keep the OS System CentOS7 running. Since the official support of this OS system ended in FY2024, we made sure to have the latest repositories on our IT cluster. • Expired batteries of the UPS system were exchanged.
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