

Status and results of the prototype LST of CTA

ABSTRACT: The Large-Sized Telescopes (LSTs) of Cherenkov Telescope Array (CTA) are designed for gamma-ray studies focusing on low energy threshold, high flux sensitivity, rapid telescope repositioning speed and a large field of view. Once the CTA array is complete, the LSTs will be dominating the CTA performance between 20 GeV and 150 GeV. During most of the CTA Observatory construction phase, however, the LSTs will be dominating the array performance until several TeVs. In this presentation we report on the status of the LST-1 telescope inaugurated in La Palma, Canary islands, Spain in 2018. We show the progress of the telescope commissioning, compare the expectations with the achieved performance, and give a glance of the first physics results.

INTRO: LSTs will form the inner core of the CTA array to cover the energies between 20 GeV and 200 GeV and to provide rapid reaction to transient events. 4 LSTs are foreseen on each site, so far 4 LSTs in CTA North are funded, and no LSTs in CTA South. LST is an alt-azimuth telescope, the parabolic reflective surface is supported by a tubular structure made of carbon fiber and steel tubes. The total moving weight of the telescope (excluding the rail) is around 100 tons, the diameter of the mirror dish is 23m and the camera has a field of view of 4.5deg.

STATUS: The LST1 was built on La Palma between 2016 and 2018 as a CTA prototype telescope and was inaugurated in October 2018. Since then LST1 is in commissioning phase performed by the LST project members.

RESULTS: The performance is good, according to the expectations. The LST team is focused to verify various CTA requirements concerning safety, physics performance and reliability. A few technical issues have been found in LST1 and are currently addressed. No show stoppers identified.

During technical runs, several known gamma-ray sources have been detected with the LST1. Among them the Crab nebula and pulsar, AGNs Mrk421, Mrk501, 1ES1959+650, PG1553+113 and 1ES0647+250. The most important LST characteristics such as the energy threshold and the rapid slewing have been verified. The flux sensitivity of the single LST1 is, as expected, lower than the one of existing stereoscopic systems of Cherenkov telescopes. This will change after addition of LST2-4.

OUTLOOK: The LST2-4 construction can start this year, most telescopes parts have been produced already. If all goes according to the planing, LST2-4 construction will be finished in 2024 and scientific data can be delivered shortly after.

