

Research Report

ICRR Inter-University Research Program 2019

Research Subject: CTA 大口径望遠鏡初号基の設置建設と初期運用

Installation and commissioning of the first Large Size Telescope of CTA in La Palma, Canary Islands, Spain

Principal Investigator:

Mazin, Daniel

Participating Researchers: Daniel Mazin, Masahiro Teshima, Daniela Hadasch, Koji Noda, Juan Cortina, Carlos Diaz, Thomas Schweizer, Holger Wetteskind, Carlos Delgado, Riccardo Rando, Takayuki Saito

Summary of Research Result :



Figure 1: Completed LST1 in La Palma in October 2018.

The purpose of the project is to commission the first Large Size Telescope (LST, see Figure 1) of the CTA project in La Palma, Canary Islands, Spain. In FY2019 the goal was to advance in the commissioning in a way first scientific data can be taken. The commissioning of the LST1 began in November 2018, which is intensive collaborative work of engineers and physicists of the entire LST project under my supervision.

Status of the commissioning: Several commissioning goals have been achieved in FY2019. In particular, experts optimized and fine tuned their corresponding subsystems in a way the telescope can be operated without experts on site. However,

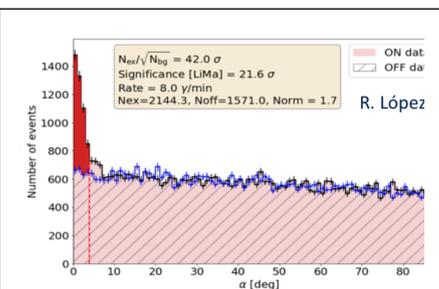


Figure 2: Detection of the Crab Nebula with LST1 during the

some remote help from experts is still needed, typically in 20% of the time. This is mainly due a delay in delivery of the central telescope control software. Nevertheless, it has been possible to switch from operation by experts to routine observations by operators. In fact, starting January 2020 the LST1 telescope can be operated every night if the weather allows.

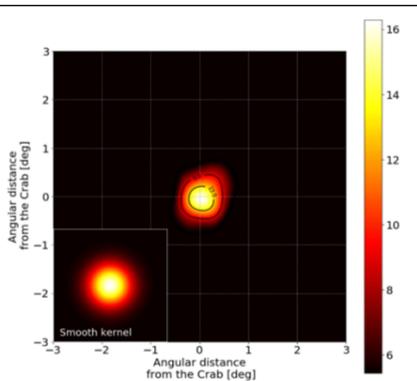


Figure 3: Gamma-ray image of the Crab nebula as measured with the LST1 telescope during the first observation campaign.

Crab nebula campaigns: As a part of the telescope commissioning the Crab nebula, which is the standard candle of the gamma-ray astrophysics, is observed every month for a couple of nights. The very first campaign conducted in November 2019 revealed a clear signal from the Crab nebula at the expected position, see Figures 2 and 3. The result underlines readiness of the LST1 to conduct regular observations of gamma-ray sources and allows finetuning data analysis tools.

LST Critical Design Review: Another major milestone of the FY2019 was the Critical Design Review (CDR) of the LST project conducted by

the CTA observatory. More than 700 documents have been submitted in August 2019 for the review of about 25 external reviewers. The CDR revealed that the LST design is robust and construction of other LSTs can continue but some improvements are needed concerning the documentation and safety standards. It is expected to close the CDR in FY2021.

Storm in February 2020: On 2020 February 22/23 2020 a heavy dust storm hit La Palma reaching wind speeds over 160km/h for several hours. As a result, the camera shutter has been damaged beyond repair. A temporary shutter has been placed (Figure 4). The telescope did not suffer any other damages. The cause



Figure 4: Temporary LST1 camera shutter.

of the damage of the camera shutter has been traced to a loose metal plate on the camera access platform. A non-conformance report has been issued and this has been addressed for LST1 and futures LSTs.

COVID-19: The pandemic related to COVID-19 is affecting the project starting early March 2019. The observations have been suspended due to restrictions of travel. Some limited telescope commissioning continues from remote.