

The Science Alert Generation system of the Cherenkov Telescope Array Observatory.

Friday 16 July 2021 12:36 (12 minutes)

The Cherenkov Telescope Array (CTA), with tens of telescopes located in both the northern and southern hemispheres, will be the largest ground-based gamma-ray observatory with an energy coverage from 20 GeV to 300 TeV. The large effective area and field-of-view, coupled with the fast slewing capability and unprecedented sensitivity, make CTA a crucial instrument for the future of ground-based gamma-ray astronomy. To maximise the scientific return, the array will send alerts on transients and variable phenomena (e.g. gamma-ray burst). Rapid and effective communication to the community requires a reliable and automated system to detect and issue candidate science alerts, accomplished by the Science Alert Generation (SAG) pipeline.

SAG is part of the Array Control and Data Acquisition (ACADA) working group. The SAG working group develops the pipelines performing data reconstruction, data quality monitoring, science monitoring and real-time alert issuing during observations to the Transients Handling functionality of ACADA.

SAG is the system that performs the first real-time scientific analysis after the data acquisition. The system performs analysis on multiple time scales (from seconds to hours). Alerts must be issued 20 seconds from the data taking and with sensitivity at least half of the CTA nominal sensitivity. These challenging requirements must be fulfilled managing trigger rates of tens of kHz from the arrays. Dedicated and highly optimised software and hardware architecture must thus be designed and tested. In this work, we present the general architecture of the ACADA-SAG system alongside a use case of the science alert management's general workflow.

Keywords

gamma-ray astrophysics; transient; cherenkov telescope; real-time analysis

Collaboration

CTA

other Collaboration

Subcategory

Experimental Methods & Instrumentation

Primary authors: BULGARELLI, Andrea (INAF/OAS Bologna); VUILLAUME, Thomas (LAPP, CNRS); Dr AUBERT, Pierre (LAPP, CNRS); Mr BARONCELLI, Leonardo (INAF/OAS Bologna); Dr CAROFF, Sami (LAPP); DE CESARE, Giovanni (INAF/OAS Bologna); DIPIANO, Ambra (INAF/OAS Bologna); Dr FIORETTI, Valentina (INAF/OAS Bologna); GARCIA, Enrique (LAPP, CNRS); Dr MAURIN, Gilles (LAPP, CNRS); PARMIGGIANI, Nicolò (INAF/OAS Bologna); Mr OYA, Igor (CTA Project Office); HOISCHEN, Clemens (Potsdam University); FOR THE CTA CONSORTIUM

Presenter: BULGARELLI, Andrea (INAF/OAS Bologna)

Session Classification: Discussion

Track Classification: Scientific Field: MM | Multi-Messenger