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Absolute optical efficiency and optical point spread function measurements with muons for Large-Sized Cherenkov Telescope

The Cherenkov Telescope Array Observatory is a state-of-art ground-based gamma-ray observatory that is currently in construction phase. The four Large-Sized Telescopes form the core of the Northern observatory, each with a dish diameter of 23 m, designed to cover the low-energy range with a threshold starting at 20 GeV. The first Large-Sized Telescope (LST-1), is already operating and collecting data at the La Palma site.

Continuous calibration and monitoring of the absolute optical efficiency and optical point spread function for each telescope are crucial for achieving the observatory's physics goals. Muons produce a short signal, lasting about 1-2 ns, which forms a sharp ring image on the camera. Additionally, muons with energy above 15 GeV, under optimal atmosphere transparency and instrument conditions, can produce up to 2000 photoelectrons in the camera. This makes them an ideal in-situ calibration source during data taking.

This work will introduces the muon ring analysis and describes the algorithms for measuring absolute optical efficiency and optical point spread function. To validate the algorithms, we demonstrate a comparison between simulated and LST-1 data.

Collaboration(s)

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