

Cross-calibration and combined analysis of the CTA-LST prototype and the MAGIC telescopes

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The Cherenkov Telescope Array (CTA) will be the next generation gamma-ray observatory, which will consist of three kinds of telescopes of different sizes. Among those, the Large Size Telescope (LST) will be the most sensitive in the low energy range starting from 20 GeV. The prototype LST (LST-1) proposed for CTA was inaugurated in October 2018 in the northern hemisphere site, located in La Palma (Spain), and is currently in its commissioning phase.

MAGIC is a system of two gamma-ray Cherenkov telescopes of the current generation, located approximately 100 m away from LST-1, that have been operating in stereoscopic mode since 2009. Since MAGIC and LST-1 can observe the same air shower events initiated by gamma rays, we can compare the brightness of the showers, estimated energies, and other parameters event by event, which can be used to cross-calibrate the telescopes. Ultimately, by performing combined analyses of the events triggering the three telescopes, we can reconstruct the shower geometry more accurately, leading to better energy and angular resolutions, and a better discrimination of the background showers initiated by cosmic rays.

For that purpose, as a part of the commissioning of LST-1, we performed joint observations of established gamma-ray sources with MAGIC and LST-1. Also, we have been developing Monte Carlo simulations, and an analysis pipeline for such joint observations which finds event coincidence in the offline analysis based on their timestamps. In this talk, we present the results of the inter-telescope cross-calibration, and the expected performance of joint observations.

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