

The XY Scanner - A Versatile Method of the Absolute End-to-End Calibration of Fluorescence Detectors

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One of the crucial detector systems of the Pierre Auger Observatory is the fluorescence detector composed of 27 large-aperture wide-angle Schmidt telescopes.

In the past, these telescopes were absolutely calibrated by illuminating the whole aperture with a uniform large-diameter light source.

This absolute calibration was performed roughly once every three years, while a relative calibration was performed on a nightly basis.

In this contribution, a new technique for an absolute end-to-end calibration of the fluorescence telescopes is presented.

For this technique, a portable calibrated light source mounted on a rail system is moved across the aperture of each telescope, instead of illuminating the whole aperture at once.

A dedicated setup for the absolute calibration of the light source has been built, which uses a combination of NIST traceable photodiodes to measure the mean intensity and a PMT for pulse-to-pulse stability tracking.

As a result of these complementary measurements, the pulse-to-pulse light source intensity can be known to the 3.5% uncertainty level.

The analysis of the readout of the PMT camera at each position of the light source together with the knowledge of the light source emission provides an absolute end-to-end calibration of the telescope.

We will give a brief overview of this novel calibration method and its current status, as well as preliminary results from the measurement campaigns performed so far.

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Collaboration

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Subcategory

Experimental Methods & Instrumentation

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