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Absolute energy calibration of the Telescope Array fluorescence detector with an electron linear accelerator

The Electron Light Source (ELS) is a new light source for the absolute energy calibration of cosmic ray Fluorescence Detector (FD) telescopes. The ELS is a compact electron linear accelerator with a typical output of 10^9 electrons per pulse at 40MeV. We fire the electron beam vertically into the air 100 m in front of the telescope. The electron beam excites the gases of the atmosphere in the same way as the charged particles of the cosmic ray induced extensive air shower. The gases give off the same light with the same wavelength dependence. The light passes through a small amount of atmosphere and is collected by the same mirror and camera with their wavelength dependence. In this way we can use the electron beam from ELS to make an end-to-end calibration of the telescope. In September 2010, we began operation of the ELS and the FD telescopes observed the fluorescence photons from the air shower which was generated by the electron beam. In this report, we will present the status of the ELS.

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