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THE ARCADE RAMAN LIDAR SYSTEM FOR THE CHERENKOV TELESCOPE ARRAY

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The Cherenkov Telescope Array (CTA) is the next generation of ground-based very high energy gamma-ray instruments; the facility will be organized in two arrays, one for each hemisphere. The atmospheric calibration of the CTA telescopes is a critical task. The atmosphere affects the measured Cherenkov yield in several ways: the air-shower
development itself, the variation of the Cherenkov angle with altitude, the loss of photons due to scattering and
absorption of Cherenkov light out of the camera field-of-view and the scattering of photons into the camera. In this scenario, aerosols are the most variable atmospheric component of the atmosphere in time and space and therefore need a continuous monitoring. Lidars are among the most used instruments in atmospheric physics to measure the aerosol attenuation profiles of light. The ARCADE Lidar system is a very compact and portable Raman Lidar system that has been built within the FIRB 2010 grant and is currently taking data in Lamar, Colorado. The ARCADE Lidar is proposed to operate at the CTA sites with the goal of making a first survey of the aerosol conditions of the selected site and to use it as a calibrated benchmark for the other Lidars that will be installed on site. It is proposed for CTA that the ARCADE Lidar will be first upgraded in Italy and then tested in parallel to a Lidar of the EARLINET network in L'Aquila. Upgrades include the addition of the water vapour Raman channel to the receiver and the use of new and better performing electronics. It is proposed that the upgraded system will be installed at both CTA sites, starting from the first selected site in 2016.

Collaboration

CTA

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