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The ARCADE project

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In cosmic rays experiments based on the measurement of UV light, the knowledge and constant monitoring of the atmospheric transmission through aerosols is fundamental, due to the large time variation. The corresponding correction to EAS energy can range from a few percent to more than 40%, depending on aerosol attenuation conditions, distance of the shower and energy. The Atmospheric Research for Climate and Astroparticle DEtection (ARCADE) project is a 3 years project funded by MIUR that is presently in its final year. The target of the project is the study the aerosol attenuation of UV light in atmosphere using multiple instruments and techniques, as those commonly used in the cosmic rays community : elastic Lidar, Raman Lidar, side-scattering measurements using a distant UV laser source. Measurements campaigns are presently performed on the same air mass at the same time, in Southeastern Colorado (Lamar), a semi-desertic site as those typically hosting cosmic rays experiments. For each instrument, multiple analysis techniques will be tested: the aim is a better comprehension of the systematics and limits of applicability of each method. The system is composed by a Lidar (elastic+Raman), fully designed and built within this project, and by the Atmospheric Monitoring Telescope (AMT), a telescope for the detection of UV light owned by the Colorado School of Mines. A full simulation of the reponse of the AMT to laser signals have been developed. The setup of the two instruments is described in detail here. Both systems have been installed in June-July 2014 on site in Colorado and are presently taking the first data.

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