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The use of aerosol data in Auger Fluorescence Detector analysis

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The Pierre Auger Observatory's Fluorescence Detector (FD) consists of 27 optical telescopes arranged in four sites around the perimeter of the 3000 square kilometre Surface Detector (SD). Cosmic ray extensive air showers are viewed via the nitrogen fluorescence light they induce in the atmosphere. Careful treatment of light attenuation processes must be made, especially given that some showers are viewed at distances in excess of 30 km. Of particular importance is the attenuation due to scattering by aerosol particles, a challenging topic given that aerosol concentrations can vary on time-scales of hours. At the Auger Observatory, the vertical distribution of aerosols is measured hourly with a series of bi-static lidar systems (consisting of central laser facilities and each of the FD sites), and three times per night with a Raman lidar system. In this contribution we describe the use of aerosol profiles in the analysis of air shower data, in particular in the estimation of the cosmic ray primary energy, and the depth of shower maximum, Xmax. We also demonstrate how statistical and systematic uncertainties in the aerosol concentrations propagate through to a contribution to energy and Xmax uncertainties.

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