

XXVIII International Workshop on Deep-Inelastic Scattering and Related Subjects



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Particle Physics with the Pierre Auger Observatory

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The Pierre Auger Observatory is the world largest extensive air shower detector. Based on two detection techniques, namely fluorescence telescopes for the observation of the longitudinal development and water Cherenkov detectors for particles at ground, this experiment can be used not only as a cosmic ray observatory, but also to study the basic properties of hadronic interactions leading the development of air showers initiated by these primary cosmic rays. We will show that by using careful data selection it is possible to extract the proton-air inelastic cross-section at energies much higher than that accessible at man-made accelerators. Taking advantage of both detection techniques we will demonstrate that it is also possible to test hadronic interaction models using correlations between different air shower observables, like shower maximum and muons at ground and their fluctuations, to reduce the uncertainty due to the unknown beam of cosmic rays. Thanks to the low energy extension of the Pierre Auger Observatory, the muon deficit in air shower simulations can be addressed over almost 3 decades at the highest energies for instance.

Primary author: PERLIN, Matias (ITeDA (CONICET-CNEA-UNSAM))

Co-author: THE PIERRE AUGER COLLABORATION

Presenter: PERLIN, Matias (ITeDA (CONICET-CNEA-UNSAM))

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