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Measurement of the proton-air cross section with the Pierre Auger Observatory

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Authorship: The Pierre Auger Collaboration.

Using the tail of the distribution of the depth of shower maxima observed with the Pierre Auger Observatory, we derive an estimate of the proton-air cross section for particle production at center-of-mass energies of 57 TeV. Air showers observed with the fluorescence detector and at least one station of the surface array are analyzed in the energy range from 10^{18} to $10^{18.5}$ eV. Systematic uncertainties of the cross section estimate arising from the limited knowledge of the primary mass composition, the need of using shower simulations, and the selection of showers are studied in detail.

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