

Measurement of the proton-proton cross section at ultra-high energies with the Pierre Auger Observatory [10'+5']

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The energies of cosmic rays significantly exceed the range of the existing human-made particle accelerators. The analysis of the air shower data makes it possible to infer the particle production cross sections - one of the most fundamental properties of soft QCD interactions at the highest energies. The depth at which the number of particles in a shower reaches its maximum is linked to the depth of the first interaction in the atmosphere, which is determined by the cross section of the particle initiating the shower in the air. In this contribution, we discuss the estimation of the proton-proton cross section from the depth of shower maxima observed with the Pierre Auger Observatory. The results are compared with standard extrapolations from low-energy accelerator data and are in good agreement. The systematic uncertainties of the analysis and the integrity of the underlying assumptions are evaluated and summarized. The interplay of the production cross section with mass composition and the possibility of the corresponding simultaneous measurement of both quantities is outlined.

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