

# Constraints of hadronic interactions in extensive air showers with the Pierre Auger Observatory

Thursday, 2 June 2016 16:55 (0:20)

## Collaboration

Pierre Auger

## Abstract content

The Pierre Auger Observatory allows the study of ultra-high energy cosmic rays around and above 100 eV center-of-mass energy, inaccessible to accelerator experiments. A single cosmic ray initiate a chain reaction of billions interactions called extensive air showers. These interactions rely on extrapolations and in kinematic regions beyond those tested at accelerators.

We report the constrains on the post LHC-tuned hadronic model by the number of muons at the ground, the muon production depth and also the measurement of the proton-air cross section for particle production at a center-of-mass energy per nucleon of 39 and 57 TeV at Auger. The measurements are based on the longitudinal, lateral, and temporal distribution of particles in air showers recorded by the observatory and are sensitive to primary mass composition and to properties of the hadronic interactions in the shower.

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**Session Classification :** Parallel Session B2