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Measurements of the mass composition of UHECRs with the Pierre Auger Observatory

Wednesday 12 October 2016 09:00 (25 minutes)

As a hybrid cosmic ray detector, the Pierre Auger Observatory can measure the longitudinal air shower development with the fluorescence detector, and the lateral distribution of particles reaching the ground with the surface detector. We report on the measurements of the first two moments of the Xmax distributions measured as a function of energy with the fluorescence detector and convert them to \<\lnA\> and sigma(lnA). This conversion depends on the adopted hadronic interaction model. To obtain almost model-independent estimation of dispersion of primary masses sigma(lnA) near the 'ankle'we use the correlation between Xmax and the signal in the water-Cherenkov stations at 1000 m from the shower core S(1000). The correlation analysis is robust with respect to uncertainties in hadronic models and to experimental systematic uncertainties. The observed correlation between Xmax and S(1000) differs significantly from expectations for pure primary compositions and is well described by a mixed composition with sigma(lnA) >1.0.

Presentation type

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