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Measurement of the depth of maximum of air-shower profiles at the Pierre Auger Observatory and its composition implications

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Air-showers measured by the Pierre Auger Observatory were analyzed in order to extract the depth of maximum (X_{\max}). The results allow the analysis of the X_{\max} distributions as a function of energy ($> 10^{17.8}$ eV). The X_{\max} distributions, its mean and standard deviation are analyzed with the help of shower simulations with the aim to interpret the mass composition. The mean and standard deviation were used to derive and its variance as a function of energy. The fraction of four components (p, He, N and Fe) were fit to the X_{\max} distributions. Regardless of the hadronic model used the data is better described by a mix of light, intermediate and heavy primaries. Also in spite of the hadronic models, a decrease of the proton flux with energy is observed as well as no significant contribution of iron nuclei is derived in the entire energy range studied.

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