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Mass composition analysis of ultra high energy cosmic rays using the code CONEX

Experiments like the Pierre Auger observatory, the Telescope Array and soon the space telescope JEM-EUSO are investigating ultra-high-energy cosmic rays (UHECRs) in order to determine their identity and their mysterious origin. These experiments are mainly based on indirect and simultaneous measurements of parameters such as the primary energy E_0 and the slant depth of the shower maximum X_{\max} . The mass composition of such particles is the keystone of the information needed to solve this relevant problem. Only air-shower simulation can be used to convert (E_0, X_{\max}) into a primary mass. In this work, we have performed Monte Carlo simulations of air showers initiated by UHECRs of 10^{18} to 10^{21} eV with the CONEX program in combination with different up-to-date hadronic interaction models. We focused on the slant depth of the shower maximum and the charged particle number N_{\max} as these parameters and their fluctuations are very sensitive to the primary particle mass (identity) and energy. The obtained results are compared to the most recent data from the current experiments.

Related session

UHECR

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