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Cosmic ray physics with the KASCADE-Grande observatory

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The existence of a knee at a few PeV in the all-particle cosmic ray energy spectrum has been well established by several experiments but its physical origin has eluded researches for a long time. It is believed that keys to disentangle the mystery could be found in the spectrum and the composition of cosmic rays between 1 PeV and 1 EeV. A first detailed look into the elemental chemical abundances of cosmic rays in this energy regime was provided by both the KASCADE and the KASCADE-Grande experiments. Their measurements opened the door to a wealth of new data on the subject, which led to the discovery of new structures in the all-particle energy spectrum and the confirmation of knee-like features in the spectra of individual mass groups, as well as the observation of an unexpected ankle-like structure at around 100 PeV in the flux of the light component of cosmic rays. In this talk, I will review these early findings, then I will present an update on the spectrum and composition analyses currently performed with KASCADE-Grande and finally I will provide a short summary of further cosmic ray studies that have been carried out with the air-shower data of the observatory.

Presentation type

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