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Auger-TA energy spectrum working group report

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The energy spectrum of ultra-high energy cosmic rays is the most emblematic observable for describing these particles. Beyond a few tens of EeV, the Pierre Auger Observatory and the Telescope Array, currently being exploited, provide the largest exposures ever accumulated in the Northern and the Southern hemispheres to measure independently a suppression of the intensity, in a complementary way in terms of the coverage of the sky. However, the comparison of the spectra shows differences that are not reducible to an overall uncertainty on the calibration of the energy scale used to reconstruct the extensive air showers. In line with the previous editions of the UHECR workshops, a working group common to both experiments examined these differences by focusing this time on quantification of these differences in the region of the sky commonly observed, where the spectra should be in agreement within uncertainties when directional-exposure effects are accounting for. These differences are compared with the systematic uncertainties of each experiment. We have also revisited the methods of determining cosmic ray energies and deriving the energy spectrum. We present the SD spectrum from energy calibration based on the constant intensity cut (CIC) method, SD spectrum from the Monte-Carlo based attenuation correction, and the hybrid spectrum, where the energies are determined from the longitudinal profile seen by the fluorescence detector.

Auteurs principaux: ABUZAYYAD, Tareq; DELIGNY, Olivier; Dr IKEDA, Daisuke (Earthquake Research Institute, The University of Tokyo); IVANOV, Dmitri (University of Utah); LHENRY-YVON, Isabelle (IPN Orsay); MARIS, Ioana (Universitaet und Forschungszentrum Karlsruhe); Mlle DANIELA, Mockler (Karlsruhe Institute of Technology, Institut für Kernphysik, Karlsruhe, Germany); NONAKA, Toshiyuki (University of Tokyo); Dr ROTH, Markus (Karlsruhe Institute of Technology, Institut für Kernphysik, Karlsruhe, Germany); Dr SALAMIDA, Francesco (Universit' a dell'Aquila, L'Aquila, Italy); Prof. THOMSON, Gordon (University of Utah); Prof. TSUNESADA, Yoshiki (Osaka City University); Dr VALINO, Ines (Universidad de Santiago de Compostela, Santiago de Compostela, Spain); VERZI, Valerio (INFN Roma "Tor Vergata")

Orateur: IVANOV, Dmitri (University of Utah)

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