30th International Cosmic Ray Conference



## Measurement of the cosmic ray energy spectrum above $10^{18}\ {\rm eV}$ with the Pierre Auger Observatory

F. SCHÜSSLER<sup>1</sup> FOR THE PIERRE AUGER COLLABORATION <sup>1</sup>Karlsruhe Institute of Technology, Karlsruhe, Germany

## fabian.schuessler@kit.edu

Abstract: The flux of high energy cosmic rays above  $10^{18}$  eV has been measured with the Pierre Auger Observatory using an unprecedented number of events. Here we present the energy spectrum derived using two data analysis methods. Above  $3 \times 10^{18}$  eV air showers measured with the array of water-Cherenkov detectors and an energy-independent aperture, calibrated by energy measurements made using fluorescence telescopes, are used to obtain a measurement of the energy spectrum. Using air showers detected with the fluorescence telescopes and at least one water-Cherenkov detector (so called hybrid events) a spectrum is derived for energies above  $10^{18}$  eV. The two spectra are found to be consistent and a combined spectrum is derived. The impact of systematic uncertainties, and in particular the influence of the energy resolution, on the spectral shape is addressed.

Introduction	The combined energy spectrum
• ankle	• combined spectrum
• suppression	• energy and flux systematics
• models (reference to Giorgio)	• ankle + GZK fit
Surface detector data	Conclusions
• energy calibration (reference to Claudio)	Acknowledgements
• CIC	References

- aperture
- spectrum
- unfolding

## Fluorescence detector data

- introduce hybrid events (FD + single SD)
- exposure from realMC
- mention cross-checks with CLF/SD (?)
- spectrum



Figure 1: Energy calibation of the surface detector data.



Figure 2: Energy spectrum derived from surface detector data calibrated with fluorescence measurements.



Figure 3: Comparison between data and MC.



Figure 4: Energy spectrum derived from hybrid data.



Figure 5: The combined energy spectrum.