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Energy spectrum estimation and mass composition inferences from Xmax measurements of cosmic rays detected at the Pierre Auger Observatory and at the Telescope Array: an inter-collaborative look at the differences at the highest energies

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Ultra-high energy cosmic rays are observed through the giant air showers they produce in the atmosphere. With the construction and operation of the new generation of cosmic-ray experiments—the Pierre Auger Observatory in the Southern hemisphere and the Telescope Array in the Northern one—the study of these particles, the most energetic ever detected, has experienced a jump in statistics as well as in the data quality over the last decade, allowing for a much better sensitivity in measuring their energy spectrum and the in inferring their mass composition. Still, some differences persist, in particular in the energy spectrum at the highest energies. These spectral differences can be best addressed by focusing on the common field of view of the experiments. The inter-collaborative efforts to characterize the differences and to highlight the convergences of the various observations will be reviewed in this contribution.

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