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Highlights from the Pierre Auger Observatory

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The Pierre Auger Observatory in the west of Argentina close to Malargüe was built to explore the origin and production of ultra-high energy cosmic rays. Comprised of 1660 water-Cherenkov detectors in an area of more than 3000 km^2 it is the largest observatory of its kind. Besides measuring the shower footprint with these surface detectors, 24 fluorescence telescopes at four sites are able to observe the showers directly as they move through the air producing fluorescence light during clear moonless nights. Including three additional fluorescence telescopes overlooking a more dense array consisting of 61 water-Cherenkov detectors the energy range from 10^{16} beyond 10^{20} eV is probed. Phase I of the observatory covers more than 17 years of operation (January 2004 to October 2021). The data collected during phase I shows a trend from a lighter composition at lower energies becoming heavier at higher energies. The anisotropy for cosmic rays at energies above $8 \times 10^{18}\text{ eV}$ that can be described by a dipole indicates an extragalactic origin of ultra-high energy cosmic rays. These and a plethora of further results from the Pierre Auger Observatory provide major advances in the understanding of the ultra-high energy cosmic ray phenomena and lay the foundation for second-phase studies with the upgraded AugerPrime detector.

Summary

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Session Classification: Poster session leading into social dinner buffet