

Recent results from the Pierre Auger Observatory

Monday 5 September 2022 15:00 (30 minutes)

Ultra-high-energy cosmic rays (UHECRs) are mostly protons and heavier nuclei arriving on Earth from space and producing particle cascades in the atmosphere, "extensive air showers". As of today, the most precise and high-statistics data set of the rare (≤ 1 particle per square km per year above 10 EeV) UHECR events is obtained by the Pierre Auger Observatory, a large area (~3000 square km) hybrid detector in Argentina. The Auger Observatory determines the arrival directions and energies of the primary UHECR particles and provides constraints for their masses.

In this talk, I will present and discuss the recent results, including the detailed measurements of the cosmic-ray energy spectrum features, the study of the anisotropies in the UHECR arrival directions at large and intermediate angular scales, the multi-messenger searches, and the inferred cosmic-ray mass composition. Finally, the progress of the current upgrade of the Observatory, "AugerPrime" which is aimed at improving the sensitivity to the mass composition of ultra-high-energy cosmic rays, will be presented.

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Session Classification: Astronomy, Astrophysics and Cosmology