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Highlights from the Pierre Auger Observatory

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The Pierre Auger Observatory is the world's largest scientific facility dedicated to studying ultra-high-energy cosmic rays (UHECRs). In the past nearly twenty years of activity, the Pierre Auger Collaboration has investigated the origin and nature of the most energetic particles ever observed by humankind. The detection of UHECRs, with such scarce fluxes, is only possible indirectly through the measurement of the extensive air showers that originated upon their entrance into the Earth's atmosphere. While inferring the primary mass composition from air showers is an essential but hard endeavour, the study of these showers provides an opportunity to investigate fundamental particle physics properties at energies unattainable by terrestrial accelerators. In this talk, I shall present the Observatory, its major scientific discoveries on UHECR and the current understanding of high-energy hadronic interactions that rule the shower development. Finally, I will present the Observatory upgrade programme and the expected outcomes for the coming years.

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