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The Pierre Auger Observatory: review of latest results and perspectives

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The Pierre Auger Observatory is the world's largest operating ultra high energy cosmic rays (UHECRs) detection system. It combines a surface array to measure secondary particles at ground level together with a fluorescence detector to measure the development of air showers in the atmosphere above the array. The detector allows a detailed measurement of energy spectrum, the mass composition and arrival directions of primary cosmic rays in the energy range above 10^{17} eV. The data collected at the Observatory over the last decade show the suppression of the cosmic ray flux at energies above 4×10^{19} eV. However, it is still unknown if this suppression is caused by the propagation of cosmic rays or rather by energy limitation of their sources. The other puzzle is the origin of UHECRs. Some clues can be drawn from studying the distribution of their arrival directions. The recently observed dipole anisotropy has an orientation which indicates an extragalactic origin of UHECRs. The surface detector array is also sensitive to ultra high energy neutrinos of all flavours and photons. The recent neutrino and photon limits provided by the Observatory can constrain models of the cosmogenic neutrino production and the exotic scenarios of the UHECRs origin, such as the decay of super heavy particles. In this talk the recent results on the energy spectrum, mass composition and arrival directions of cosmic rays measurements and the future perspectives will be presented.

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