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Study of the origins of ultra-high energy cosmic rays with the Pierre Auger Observatory

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The persisting unknown origin of ultra-high energy cosmic rays is constantly investigated at the Pierre Auger Observatory on all angular scales.

Recent studies on the large angular scale have discovered the existence of anisotropy with a 5.2 \sigma level of significance in the arrival directions of events with energies higher than 8 EeV. This anisotropy can be described by a dipole with an amplitude of 6.5% toward right ascension of 100 degrees and declination of -24 degrees.

On an intermediate angular scale, sky models with extragalactic gamma-rays emitters such as Active Galactic Nuclei (AGN) and Starburst galaxies have been constructed using Fermi-LAT observations and compared with the highest energy events of the Pierre Auger Observatory. An excess in the arrival directions has been highlighted from the positions of strong and nearby sources with a significance of 4.0 \sigma for starburst galaxies and 2.7 \sigma for AGNs. All types of galaxies from the Swift-BAT and 2MASS surveys have been investigated for comparison.

This presentation aims to explain how these results have been obtained and the conclusions that can be drawn from them.

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