

Anisotropy studies of the arrival directions of cosmic rays at the highest energies with the Pierre Auger Observatory

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The distribution of arrival directions of high-energy cosmic rays carries major clues to understanding their origin. The Pierre Auger Observatory, the largest cosmic-ray observatory in the world, collected an unprecedentedly large data set over 17 years of operation. In this work, we describe anisotropy-related results obtained by using such events. These are the large-scale searches in the arrival direction of events detected with energies above 4 EeV and the analysis of arrival directions of the highest-energy events exceeding 32 EeV. A remarkable dipolar modulation in right ascension for energies above 8 EeV is observed, as previously reported, with a statistical significance of 6.6σ as well as evidence of anisotropy at intermediate angular scale with $\sim 15^\circ$ Gaussian spread at 4σ significance level for cosmic-ray energies above ~ 40 EeV.

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