

Large-scale and multipolar anisotropies of cosmic rays detected at the Pierre Auger Observatory with energies above 4 EeV

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More than half a century after the discovery of ultra-high energy cosmic rays (UHECRs), their origin is still an open question. The study of anisotropies in the arrival directions of such particles is an essential ingredient to solve this puzzle. We update our previous analysis of large-scale anisotropies observed by the Pierre Auger Observatory using the latest data collected before the AugerPrime upgrade. By selecting events with zenith angles up to 80° , implying a sky coverage of 85%, and energies above 4 EeV, for which the surface detector of the Observatory is fully efficient, we evaluate the dipolar and quadrupolar amplitudes through a combined Fourier analysis of the event count rate in right ascension and azimuth. The analysis is performed in three energy bins with boundaries at 4, 8, 16 and 32 EeV and two additional cumulative bins with energies above 8 and 32 EeV. The most significant signal is a dipolar modulation in right ascension for energies above 8 EeV, as previously reported, with statistical significance above 5σ . Additionally, we report the measurements of the angular power spectrum for the same energy bins. The updated results with the latest data will be presented at the conference.

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