

Large-scale cosmic-ray anisotropy studies at the Pierre Auger Observatory at EeV energies (presented by Diego Harari)

Monday, 9 September 2013 16:20 (20 minutes)

“The study of the large-scale distribution of arrival directions of cosmic rays at EeV energies can provide a significant tool for shedding light on the energy at which the transition from a Galactic to an extragalactic origin takes place. The Pierre Auger Observatory includes two differently graded Extensive Air Showers arrays. One (covering 3000 km² with a 1500 m grid) detects showers from cosmic rays with energy above 0.5 EeV, being fully efficient above 3 EeV. The other (25 km² with a 750 m grid, fully efficient above 0.3 EeV) allows one to observe cosmic rays down to energies of about 0.05 EeV. Two different data analyses have been pursued in the search for large-scale anisotropies. The first is the classical first harmonic analysis in right ascension from which amplitude and phase of a dipolar anisotropy can be determined. The second consists in a spherical harmonic analysis that allows one to extract information on dipolar and quadrupolar components of the anisotropy as a function of both declination and right ascension. After discussing the methods and showing all the systematic and stability checks done on data, we present the results in terms of amplitude and direction of the anisotropy vs energy. Finally, we discuss the implications of our findings with respect to the origin of EeV cosmic rays.”

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Session Classification: High Energy Astrophysics I

Track Classification: High-Energy Astrophysics (includes all cosmic ray physics)