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Patterns in ultra-high energy cosmic ray arrival directions: A possible footprint of large scale cosmic structures

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Abstract content

When combining the public available data of cosmic ray arrival directions with energies above 4×10^{19} eV (HiRes energy scale), a broad maximum around 25 degrees was recently found in the cumulative two-point autocorrelation function. This has been intriguingly interpreted as the first imprint of the filamentary pattern of large scale structures (LSS) of matter in the near universe. We analyze this hypothesis in light of the clustering properties expected from the PSCz astronomical catalogue of galaxies. While inconsistent with a purely isotropic distribution, the signature is consistent within 2 sigma with the distribution drawn from the catalogue. No evidence for a significant cross-correlation of the observed events with known overdensities in the LSS is found, which may be due to the role of the galactic and extragalactic magnetic fields, and is however consistent with the limited statistics. The larger statistics to be collected by the Pierre Auger Observatory is needed to answer definitely the question.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 479-482

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