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Observation of the Anisotropy of 10 TeV Primary Cosmic Ray Nuclei Flux with the Super-Kamiokande-I Detector

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Abstract content

The relative sidereal variation in the arrival direction of primary cosmic ray nuclei of median energy 10 TeV was measured using downward, through-going muons detected with the Super-Kamiokande-I detector. The projection of the anisotropy map onto the right ascension axis has a first harmonic amplitude of (6.64 +/- 0.98 (stat.) +/- 0.55 (syst.)) x 10^-4 and a phase at maximum at (33.2^o +/- 8.2^o (stat.) +/- 5.1^o (syst.)) right ascension. A sky map in equatorial coordinates indicates an excess region in the constellation of Taurus and a deficit region toward Virgo. The excess region is centered at (alpha_T,delta_T) = (75^o +/- 7^o, -5^o +/- 9^o) with a half opening angle chi_T = (39 +/- 7)^o; the excess flux is (0.104 +/- 0.020)% above the isotropic expectation. The corresponding parameters for the deficit region are (alpha_V, delta_V) = (205^o +/- 7^o, 5^o +/- 10^o), chi_V = (54 +/- 7)^o, and (-0.094 +/- 0.014)%. The data do not allow us to rule out a pure dipole form for the anisotropy (allowed at 13% confidence level); they are better described by the excess and deficit cones described above. We explored the implications under the assumption that the true anisotropy is not distorted too much by the analysis filter so that it is well-described by the observed excess and deficit cones.

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

Super-Kamiokande 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. 1 (SH), pages 605-608

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