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Variations of Small-scale Cosmic Ray Anisotropies with Time and Energy

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The arrival directions of TeV cosmic rays on the sky display an anisotropy at the 0.1 percent level. This anisotropy contains a dipole and higher order multipoles. Small-scale anisotropies should contain important information about the properties of the turbulent magnetic fields in the interstellar medium. These anisotropies have been predicted to vary on a time-scale of a decade at TeV energies. To date, no time variation has been detected. Whether experiments can detect such time variations or not depends on their energy resolutions (△⊠/⊠). Finite energy resolutions can result in substantial changes of the anisotropy at small scales. Compared to previous works on this topic, we consider here the effect of the energy resolution on the detectability of time variations. We find that the amplitude of the difference between two instants in time will be smaller than in calculations where the energy resolution is not taken into account. We also study in detail the energy dependence of the small-scale anisotropies. We find that the amplitudes of the observed small-scale anisotropy structures are larger with a better energy resolution.

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