Local Turbulence and the Dipole Anisotropy of Galactic Cosmic Rays

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What is this contribution about?

We investigate the interplay of Galactic cosmic ray (CR) diffusion on local and global scales. The local realization of magnetic turbulence introduces local anisotropies even in the absence of a large scale constant magnetic field.

Why is it relevant / interesting?

Local anisotropic diffusion is a key to understand the amplitude and phase of the dipole anisotropy of Galactic CRs.

What have we done?

We introduce a new method to estimate the imprint of local turbulence on the local diffusion tensor via test-particle simulations in synthetic magnetic turbulence.

What is the result?

We verify that low rigidity CRs experience strong anisotropic diffusion on local scales. The hierarchy between CR diffusion parallel and perpendicular to the (effective) local magnetic field stabilizes the orientation of the CR dipole anisotropy in the TeV-PeV energy range and can explain the phase flip and amplitude scaling in the data.

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