Abstract Submitted
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On Cosmic Ray Propagation[1] MIKHAIL MEDVEDEV, University of Kansas — Cosmic ray propagation is diffusive because of pitch angle scattering by waves. We demonstrate that if the high-amplitude magnetic turbulence with $\delta B/B \sim 1$ is present on top of the mean field gradient, the diffusion becomes asymmetric. As an example, we solve this diffusion problem in one dimension analytically with a Markov chain analysis. The cosmic ray density markedly differs from the standard diffusion prediction. The equation for the continuous limit is also derived, which shows limitations of the convection-diffusion equation. We also explore how the difference of the diffusion coefficient for positively and negatively charged species may affect their distribution throughout the system (e.g., galaxy, heliosphere). The result is mostly relevant to low energy particles. The implications of the results are discussed. The results are mostly relevant to fairly low-energy cosmic rays. However, they are general enough to be applicable to any particle transport, not just cosmic rays.

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