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Relativistic charged particle diffusion in turbulent fields: synthetic vs dynamically-generated fields

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The transport of high-energy cosmic rays in the Galaxy (energy about 10^{17} eV for protons) can be approached by means of numerical simulations, where relativistic charged test-particles propagate in a prescribed turbulent magnetic field. Thanks to the improvement in the computing capabilities, it is nowadays possible to investigate the particle propagation by using direct computations of the electromagnetic field performed through magnetohydrodynamic (MHD) simulations.

Here, by comparing the results obtained by adopting a synthetic model of turbulence or the fields produced through MHD simulations, we are able to analyze several important features, such as the rigidity dependence of the diffusion coefficient with and without a background magnetic field, the role of compressible fluctuations as well as the effects produced by intermittency.

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