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On Cosmic Ray transport in the magnetized Interstellar Medium: a bias towards microphysics.

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Under the effect of magnetic turbulence Cosmic Rays (CRs) adopt a random walk during their journey from their sources to the Earth. The talk addresses the interplay between the turbulence and Cosmic Rays. At first we will examine the effect of turbulence over Cosmic Ray transport through the derivation of diffusion coefficients. We will discuss the impact of the turbulence injected at large scales. Then we will discuss the effect of Cosmic rays over turbulence through the triggering of different plasma instabilities. These effects are likely important for the propagation of CRs with energies below a few hundred of GeV. But we will see that in sources self-generated turbulence is mandatory to explain CR acceleration. Finally we will discuss how to handle in the same framework CR transport and turbulence generation, this is now possible mainly because of some recent progresses in some numerical modeling combining kinetic and magnetohydrodynamics. In each these three steps we will discuss some connection to the study of CR anisotropy.

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