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Interstellar Magnetic Fields and Turbulence

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Magnetic fields and turbulence fill the interstellar medium and play an active role in a broad range of astrophysical processes over different ranges of spatial scales. I will first talk about the properties of interstellar magnetic fields and turbulence as revealed by a variety of observables. Based on the observational facts and the advanced theories of MHD turbulence, I will further talk about the effects of the dynamics of turbulent magnetic fields on the magnetic field amplification and cosmic ray (CR) diffusion in supernova remnants, magnetic field and density structure, and CR diffusion in molecular clouds, magnetic fields and CR anisotropy in the local heliosphere..... In brief, the modern understanding of MHD turbulence, in combination with diverse observations, brings us new physical insights into many astrophysical problems, in particular, those related to CRs.

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