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Non-linear Cosmic Ray propagation close to the acceleration site

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Recent advances on gamma-ray observations from SuperNova Remnants and Molecular Clouds offer the possibility to study in detail the properties of the propagation of escaping Cosmic Rays (CR). However, a complete theory for CR transport outside the acceleration site has not been developed yet. Two physical processes are thought to be relevant to regulate the diffusion: the growth of waves caused by streaming instability, and possible wave damping mechanisms that reduce the growth of the turbulence. Only a few attempts have been made so far to incorporate these mechanisms in the theory. In this talk I present recent advances in this subject. In particular, I show results obtained by solving the coupled equations for the diffusion of CRs and the evolution of waves. I discuss the importance of streaming instabilities and wave damping in different ISM phases and for different CR energies.

Collaboration

– not specified –

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