Astrophysics Seminars

Tuesday

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12:30 P.M.

Rm 184 NSH

Energy transfer in compressible magnetohydrodynamic turbulence

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Compressibility, magnetic fields and turbulence are all thought to be important factors to varying degrees in many astrophysical processes and terrestrial experiments. However, our understanding of their joint effect even in it's simplest description, i.e. compressible magnetohydrodynamic turbulence, is still scarce. One step towards a more comprehensive picture is a better understanding of the governing energy dynamics, e.g. looking at the interplay between kinetic and magnetic energy via different mediators such as advection, magnetic tension or magnetic pressure. Here, we present an extension of established shell-to-shell energy transfer analysis methods to the compressible MHD regime. We apply this analysis to numerical simulations in the subsonic and supersonic regime. This allows us to illustrate how varying degrees of compressibility influence the energy dynamics within and between kinetic and magnetic energy reservoirs. For example, we show that compression acts against a magnetic energy cascade (scale-local magnetic to magnetic energy transfer). Moreover, we present how magnetic tension becomes overall less important with increasing sonic Mach number.

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