Contribution ID: **55** Type: **not specified**

As a matter of dynamical range –scale-dependent energy dynamics in magnetized turbulence

Tuesday 16 August 2022 11:25 (25 minutes)

Magnetized turbulence is ubiquitous in many astrophysical and terrestrial plasmas but no universal theory exists. Even the detailed energy dynamics in magnetohydrodynamic turbulence are still not well understood. We present a suite of ICM-like, subsonic, super-Alfvénic, high plasma-beta MHD turbulence simulation that only vary in their dynamical range, i.e., in their separation between the large-scale forcing and dissipation scales. From a practical point of view, we show how numerical dissipation can be estimated using an energy transfer analysis framework and that implicit large eddy simulations match direct numerical simulations. From a theoretical point of view, we use the same framework to demonstrate that –contrary to hydrodynamic turbulence –the cross-scale energy fluxes are not constant in MHD turbulence. This applies both to different mediators (such as cascade processes or magnetic tension) for a given dynamical range as well as to a dependence on the dynamical range itself. We do not observe any indication of convergence even at the highest resolution simulation at 2048^3 cells. This raises the question on whether an asymptotic regime in MHD turbulence exists, and, if yes, what it looks like.

Authors: O'SHEA, Brian; GRETE, Philipp (University of Hamburg); BECKWITH, Kris

Presenter: GRETE, Philipp (University of Hamburg)

Session Classification: Tuesday morning: Turbulence