Dissipation range of solar wind turbulence

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Solar wind is an excellent laboratory of a weakly collisional astrophysical plasma ($\ell_{m.f.p.} \sim 1$ AU), accessible to *in-situ* measurements with various space missions. It is well established that at MHD scales, magnetic fluctuations have a power spectral density, which follows the Kolmogorov scaling $\sim k^{-5/3}$. The inertial range stops at the vicinity of ion characteristic sales (e.g., the ion Larmor radius is $\rho_i \sim 10^2$ km at 1 AU), where turbulence properties are strongly debated.

Here, we focus on fluctuations at scales smaller than ρ_i, the so-called *kinetic plasma turbulence*. At such small scales, one expects to observe the dissipation range of the electromagnetic cascade. Using high resolution magnetic field measurements at 0.3 and 1 AU, we could show that (i) between ion and electron scales, another general power-law is observed $\sim k^{-2.8}$ and (ii) magnetic spectrum has a curvature at electron scales, which is a signature of dissipation. The complete spectrum at kinetic scales can be compared with a function $\sim k^{-8/3} \exp(-ck\rho_e)$, where the constant $c \in [1, 2]$ and ρ_e is the electron Larmor radius. Parker Solar Probe data closer to the Sun (at 0.1-0.17 AU) show a similar dissipation range spectrum with an exponential cut-off at electron scales, indicating the generality of the phenomenon. We discuss the nature of turbulent fluctuations within the dissipation range.