



Turbulence Physics around Kolmogorov Scale: Investigation around 5 turbulence enigma

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Turbulent flows are characterized by a self-similar (power law) energy spectrum, a signature of fluid motion at all scales, while they produce a dissipation that is independent of viscosity. This organization hides 5 enigma that I will try to explain and solve in this talk: 1) what produces the turbulent dissipation?; 2) and 3) how are the largest and the smaller scale in this spectrum selected? 4) how is the exponent of the power-law selected? 5) is this exponent unique?

I will use recent measurements of velocity obtained by very high-resolution laser velocimetry to show that all these enigma are interlinked, and that their explanation relies on the existence of extreme events of energy

"cascade", which are the signature of quasi-singularities of the Navier-Stokes equations existing below the Kolmogorov scale.

References

B. Dubrulle, Beyond Kolmogorov, JFM Perspectives 867 (2019) 1-52