High resolution simulations of random fields and implications on stochastic modelling of turbulence

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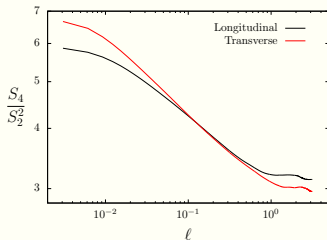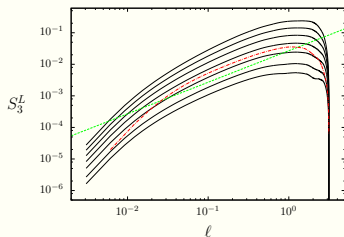**Laboratoire de Physique, ENS-Lyon**

In a nutshell, we propose a numerical study of the following 3d homogeneous and isotropic random field:

$$\boldsymbol{u}^{\epsilon}(\boldsymbol{x}) = \frac{1}{c_{\epsilon}} \int_{\mathbb{R}^3} \varphi_L(\boldsymbol{x}-\boldsymbol{y}) \frac{\boldsymbol{x}-\boldsymbol{y}}{|\boldsymbol{x}-\boldsymbol{y}|_{\epsilon}^{5/2-H}} \wedge \mathrm{e}^{\gamma X^{\epsilon}(\boldsymbol{y})} \mathrm{d}\boldsymbol{W}(\boldsymbol{y})$$

Realistic model for turbulence

- Scaling

- Further properties: correct vorticity alignments and asymmetrical RQ-Plane
- Fixing of the parameters H and γ through constraints coming from the Navier-Stokes equations