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The role of helicity on the turbulent energy flux FEDERICO TOSCHI, Technische Universiteit Eindhoven (NL), LUCA BIFERALE, University of Tor Vergata (IT), STEFANO MUSACCHIO, CNRS, Laboratoire J.A. Dieudonne UMR 6621 (FR) — Three-dimensional turbulence is characterized by two inviscid constants of motion, kinetic energy and helicity. Helicity (i.e. the correlation between velocity and vorticity) is a key quantity in fluid turbulence, and has not a definite sign. This mere fact have since long been associated with the different phenomenology of 3d vs. 2d turbulence, which in contrast has two positive defined conserved quantities, energy and enstrophy (the square vorticity). In this study we investigate the role of helicity on the turbulent cascade process by decomposing the velocity field on the eigenmodes of the curl operator which have definite-sign helicity. We present numerical results on the statistical properties of the energy flux and velocity field in turbulent flows in which interactions between modes are selected according to their helicity. Minimal bibliography: P. D. Ditlevsen and P. Giuliani (2001) "Cascades in helical turbulence" PRE, 63(3), 036304. Q. Chen, S. Chen, and G.L. Eyink (2003) "The joint cascade of energy and helicity in three-dimensional turbulence" Physics of fluids, 15(2), 361. R. Benzi, L. Biferale, R. M. Kerr, and E. Trovatore (1996) "Helical shell models for three- dimensional turbulence" Phys. Rev. E 53, 3541. F. Waleffe (1992) "The nature of triad interactions in homogeneous turbulence" Phys. Fluids A, 4(2), 350.

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