Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Transition from Direct to Inverse Cascade in Three-Dimensional Turbulence[1] GANAPATI SAHOO, Department of Physics and Department of Mathematics and Statitsics, University of Helsinki, Finland, ALEXANDROS ALEXAKIS, Laboratoire de Physique Statistique, Ecole Normale Superieure, CNRS, Universite Pierre et Marie Curie, Universite Paris Diderot, Paris, France, LUCA BIFERALE, Department of Physics and INFN, University of Rome Tor Vergata, Italy — We study a model system [1] where the triadic interactions in Navier-Stokes equations are enhanced or suppressed in a controlled manner without affecting neither the total number of degrees of freedom nor the ideal invariants and without breaking any of the symmetries of original equations. Our numerical simulations are based on the helical decomposition of velocity Fourier modes. We introduced a parameter (0 1) that controls the relative weight among homochiral and heterochiral triads in the nonlinear evolution. We show that by using this weighting protocol the turbulent evolution displays a sharp transition, for a critical value of the control parameter, from forward to backward energy transfer but still keeping the dynamics fully three dimensional, isotropic, and parity invariant. [1] G Sahoo, A Alexakis and L Biferale, Phys. Rev. Lett 118, 164501 (2017).

[1]AtMath Collaboration of University of Helsinki and ERC Grant No. 339032 'NewTurb'

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Date submitted: 27 Jul 2017 Electronic form version 1.4