

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Dual cascade of kinetic and magnetic energy in MHD turbulence¹

HUSSEIN ALUIE, Los Alamos National Laboratory — Using scale-locality of the energy cascade in MHD turbulence, which we have rigorously shown to hold in [1], we prove that the kinetic and magnetic energy budgets statistically decouple beyond a “conversion” range. Over the ensuing part of the inertial range, mean kinetic and magnetic energies cascade to smaller scales independently. In other words, we show that magnetic-line stretching acts as a *large-scale* forcing of the magnetic field which vanishes, on average, deep in the inertial range. We present numerical support from 1024^3 direct numerical simulations. We draw analogies to such a phenomenon from compressible turbulence and geophysical flows and discuss its possible implications on MHD turbulence simulations.

[1] Aluie, H., Eyink, G. L., Phys. Rev. Lett., 104, 8, 081101 (2010)

¹I am grateful to G. L. Eyink for extensive and valuable discussions in the early stage of this work.

Hussein Aluie
Los Alamos National Laboratory

Date submitted: 02 Sep 2010

Electronic form version 1.4