Anomalous scalings and dynamics of magnetic helicity Igor Rogachevskii gary@menix.bgu.ac.il http://www.bgu.ac.il/~gary
Nathan Kleeorin nat@menix.bgu.ac.il Department of Mechanical Engineering, The Ben-Gurion University of the Negev,

Received 8 June 1998 abstract It is demonstrated that the two-point correlation function of the magnetic helicity in the case of zero mean magnetic field has anomalous scalings for both, compressible and incompressible turbulent helical fluid flow. The magnetic helicity in the limit of very high electrical conductivity is conserved. This implies that the two-point correlation function of the conserved property does not necessarily have normal scaling. The reason for the anomalous scalings of the magnetic helicity correlation function is that the magnetic field in the equation for the two-point correlation function of the magnetic helicity plays a role of a pumping with anomalous scalings. It is shown also that when magnetic fluctuations with zero mean magnetic field are generated the magnetic helicity is very small even if the hydrodynamic helicity is large. Astrophysical applications of the obtained results are discussed.