



The inertial range of solar wind MHD turbulence

L. Sorriso-Valvo (1), V. Carbone (2), R. Marino (2), R. Bruno (3), A. Noullez (4)

(1) LICRYL - INFN/CNR, Cosenza - Italy, (2) Dipartimento di Fisica, Università della Calabria, Cosenza - Italy, (3) IFSI - INAF, Roma, Italy, (4) Observatoire de la Cote d'Azur, Nice, France

In hydrodynamic turbulence, an important exact law linearly relates the kinetic energy flux through the scales with the scale itself. This law should be used to exactly define the inertial range of a turbulent flow, and is often referred to in literature as the "4/5" law. The analogous of such law is obtained here for the magnetized fluids in the magnetohydrodynamic regime. Solar wind data measured by the spacecraft Ulysses have been used to show that the above exact law is satisfied, within some periods, in the solar wind turbulence with great accuracy and over an extended inertial range. This is the first clear evidence of a magnetohydrodynamic turbulent cascade occurring in solar wind plasma, and carry with it many important informations about the plasma state, involving for example compressive and anisotropic effects, Alfvénic decorrelations, and so on. Moreover, the MHD pseudo-energy transfer rate in the solar wind turbulence can be measured directly from the data, and the inertial range can be unambiguously identified.