Scaling and intermittency of the solar wind turbulence on MHD scales

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The solar wind magnetic Reynolds number has been estimated to be as high as 10^5. This makes the solar wind an effective turbulence laboratory for collisional plasma, spanning many temporal and spatial scales of interest. The last two decades have seen a rapid progress in the solar wind studies, due to many space missions providing in situ measurements, with ever increasing temporal resolution, and with multi-point spatial measurements. Quantifying solar wind fluctuations has direct implications for our understanding of MHD turbulence. Here we focus on quantification of three aspects of MHD turbulence: its anisotropy, intermittency and the role of compressive fluctuations. We review the phenomenological models of anisotropic MHD turbulence and discuss scaling properties of power spectra derived from in situ fluctuations of solar wind velocity and of magnetic field. Intermittency, considered as departure of scaling exponents of the higher order moments from mono-fractal values, can be quantified via structure functions and by examining distribution function of fluctuations on different scales. We show that this scaling can be strongly affected by the presence of long-lived coherent structures, for different quantities. Differences in the intermittent scaling of the magnetic field magnitude and density fluctuations suggest that the solar wind plasma cannot be treated as incompressible. We discuss different models for the compressible fluctuations in the inertial range of MHD fluctuations.