Two spectra of solar turbulence

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Abstract

We analyze the turbulent processes in the solar photosphere using observations obtained at the 70-cm vacuum tower telescope (VTT) at Izaña (Tenerife, Spain). We show that such processes in the solar photosphere have two distinct spectra of turbulence. The first one is the well-known Kolmogorov spectrum, which describes plasmas with a zero mean magnetic field. The second represents the Kraichnan spectrum with a nonzero mean magnetic field. The transition from one spectrum type to another is found to occur at a scale of 3 Mm. This scale is consistent with the typical size of mesogranular structures, which indicates a transition to large-scale self-organizing magnetic structures.