



Spectrum of kinetic plasma turbulence at 0.3-0.9 AU from the Sun

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We investigate the spectral properties of the turbulence in the solar wind which is a weakly collisional astrophysical plasma, accessible by in-situ observations. Using the Helios search coil magnetometer measurements in the fast solar wind, in the inner heliosphere, we focus on properties of the turbulent magnetic fluctuations at scales smaller than the ion characteristic scales, the so-called kinetic plasma turbulence. At such small scales, we show that the magnetic power spectra between 0.3 and 0.9 AU from the Sun have a generic shape $\sim f^{-8/3} \exp(-f/f_d)$ where the dissipation frequency f_d is correlated with the Doppler shifted frequency f_{pe} of the electron Larmor radius. This behavior is statistically significant: all the observed kinetic spectra are well described by this model, with $f_d = f_{pe}/1.8$. These results provide important constraints on the dissipation mechanism in nearly collisionless space plasmas.