Solar Wind Turbulence at Kinetic Scales in the inner Heliosphere

Olga Alexandrova, Vamsee Jagarlamudi, Milan Maksimovic, Petr Hellinger, Yuri Shprits, and Andre Mangeney

1Observatoire de Paris, LESIA, Meudon, France (olga.alexandrova@obspm.fr)
2Institute of Atmospheric Physics, CAS, Prague, Czech Republic
3GFZ German Research Centre for Geosciences, University of Potsdam, Germany

We study magnetic fluctuations at sub-ion scales and down to sub-electron scales using Helios/SCM measurements in the inner Heliosphere and Cluster/STAFF data at the Earth's orbit. Using these data we test the generality of the kinetic spectrum and we show that it follows the $-k^{8/3}\exp(-k\lambda_d)$ law at different radial distances from the Sun (k being a wavenumber). We show as well that the dissipation scale $\lambda_d$ correlates well with the electron Larmor radius $\rho_e$ at 0.3 AU and at 1 AU. Then, in the time domain, at 1 AU, using the wavelet transform, we study the nature of magnetic fluctuations, which form the kinetic spectrum. It appears, that the spectrum is dominated by non-linear coherent structures in the form of magnetic vortices with the smallest resolved scale of the order of $\rho_e$. Finally, we compare our results with measurements of the Parker Solar Probe/FIELDS and, hopefully, of the Solar Orbiter/RPW in the inner Heliosphere.