RADIAL EVOLUTION OF SOLAR WIND TURBULENCE

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Abstract:

The first radial alignment between Parker Solar Probe and Solar Orbiter spacecraft is used to investigate the evolution of solar wind turbulence in the inner heliosphere. Assuming ballistic propagation, two 1.5 hr intervals are tentatively identified as providing measurements of the same plasma parcels traveling from 0.1 to 1 au. Using magnetic field measurements from both spacecraft, the properties of turbulence in the two intervals are assessed. Magnetic spectral density, flatness, and high-order moment scaling laws are calculated. The Hilbert–Huang transform is additionally used to mitigate short sample and poor stationarity effects. Results show that the plasma evolves from a highly Alfvénic, less-developed turbulence state near the Sun, to fully developed and intermittent turbulence at 1 au. These observations provide strong evidence for the radial evolution of solar wind turbulence.

Acknowledgment: —

References:

Telloni D., L. Sorriso-Valvo, L. D. Woodham, O. Panasenco, et al., Evolution of Solar Wind Turbulence from 0.1 to 1 au during the First Parker Solar Probe – Solar Orbiter Radial Alignment, Astrophysical Journal Letters, 912, L21 (2021).

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