

Analysis of Comet Tails for Turbulence in the Solar Wind

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The heliospheric imager on the STEREO spacecrafts (HI-1) shows the solar wind to have gusts of plasma with short periodicity. It is not well understood if these periodicities are from the driving force of the solar wind or from turbulent processing in the heliosphere. In-situ data suggests the presence of turbulent processes but cannot be explicitly determined without the ability to track specific wind currents for long periods of time. Sungrazing comets that pass through HI-1 have their ion tails carried by the solar wind and are subject to any processing of the wind. With better background subtraction techniques we tracked perturbations in the ion tails of comet 96P/Machholz, ISON (C/2012 S1) and 2P/Encke for multiple hours. We analyzed these test particles for turbulence with the structure function, a statistical test of particle memory. The structure function revealed evidence of confinement in motion which occurs in turbulent processes. With continued tracking the turbulence could be quantified and used in models of space weather.