SHORT-WAVELENGTH SOLAR WIND TURBULENCE: THE ROLE OF WHISTLER FLUCTUATIONS

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The inertial range of solar wind turbulence corresponds to magnetic power spectra which scale as $f^{-\alpha}$ with $\alpha \cong 5/3$. Many observations show, however, that at observed frequencies of about 0.2 Hz, there is a "breakpoint" such that power spectra at higher frequencies follow a steeper power-law dependence with $\alpha > 5/3$. This short-wavelength, high-frequency regime is often called the "dissipation range", and the constituent modes have been attributed to kinetic Alfven modes which propagate at strongly oblique directions relative to the background magnetic field. But if kinetic Alfven waves are present, they should be dissipative, and should not contribute to a power-law spectrum. Whistler fluctuations represent an alternative hypothesis to describe short-wavelength turbulence in the solar wind and, indeed, in any collisionless, magnetized, homogeneous plasma. If $\beta_p < 1$, the right-hand polarized magnetosonic mode at quasi-parallel propagation is lightly damped; its cascade from the inertial range through the breakpoint is the driving source for the cascade of whistler turbulence. Recent particle-in-cell simulations have shown that the whistler cascade yields steep power-law power spectra consistent with observations [Saito et al., 2008]. Our presentation will summarize the conclusions of the simulations, linear theory, and a simple turbulence model; using these predictions the whistler turbulence hypothesis can be tested via observations.

Saito, S., S. P. Gary, H. Li, and Y. Narita (2008), Whistler turbulence: Particle-in-cell simulations, *Phys. Plasmas, 15,* 102305.

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