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Using Field-Particle Correlations to Diagnose the Collisionless Damping of Plasma Turbulence[1] GREGORY HOWES, University of Iowa, KRISTROPHER KLEIN, University of Michigan — Plasma turbulence occurs ubiquitously throughout the heliosphere, yet our understanding of how turbulence governs energy transport and plasma heating remains incomplete, constituting a grand challenge problem in heliophysics. In weakly collisional heliospheric plasmas, such as the solar corona and solar wind, damping of the turbulent fluctuations occurs due to collisionless interactions between the electromagnetic fields and the individual plasma particles. A particular challenge in diagnosing this energy transfer is that spacecraft measurements are typically limited to a single point in space. Here we present an innovative field-particle correlation technique that can be used with single-point measurements to estimate the energization of the plasma particles due to the damping of the electromagnetic fields, providing vital new information about this how energy transfer is distributed as a function of particle velocity. This technique has the promise to transform our ability to diagnose the kinetic plasma physical mechanisms responsible for not only the damping of turbulence, but also the energy conversion in both collisionless magnetic reconnection and particle acceleration.

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