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Predicting the Velocity-Space Signatures of Particle Energization in Turbulence and Instabilities using Linear Kinetic Theory[1] COLLIN BROWN, GREG HOWES, University of Iowa, KRISTOPHER KLEIN, University of Arizona — Illuminating the kinetic mechanisms of particle energization is the key to understanding how kinetic turbulence, collisionless magnetic reconnection, particle acceleration, and instabilities impact the evolution of important heliospheric environments. With the increasing availability of both high cadence, high phase-space resolution spacecraft data and massively parallel nonlinear kinetic simulations of weakly collisional heliospheric plasmas, it is critical to develop tools to examine the kinetic physics of particle energization. The field-particle correlation technique is an innovative new method that can be used to characterize and distinguish different mechanisms of particle energization underlying these important plasma processes. Here we use linear gyrokinetic and linear Vlasov-Maxwell theory to produce analytical predictions for the velocity-space signatures of collisionless damping mechanisms as well as the energy transfer from particles to fields in kinetic instabilities.

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