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Numerical Support for Applying Field-Particle Correlations to Space and Laboratory Plasmas KRISTOPHER KLEIN, Univ of Michigan - Ann Arbor, GREGORY HOWES, University of Iowa, FRANCESCO VALENTINI, Universita della Calabria — Determining the mechanisms that transfer energy between electromagnetic fields and plasma particles, eventually leading to heating, is an important task in the study of a wide variety of plasma systems. Many different mechanisms have been proposed to mediate the energy transfer, which can be broadly classified as resonant, non-resonant, and intermittent. Each mechanism will preferentially energize particles with different velocities; such distinct features make the identification of energy transfer mechanisms possible assuming the velocity-space structure of the phase-space energy density transfer can be measured. Based upon the structure of the field-particle interaction term in the Vlasov equation, we construct a correlation using field and particle distribution timeseries from a single point in space which tracks the phase-space energy density transfer. We present such field-particle correlations calculated using data from a variety of turbulent kinetic simulations with the aim of eventual application of these correlations to space and laboratory plasma observations. Even in the presence of strong turbulence, we show that field-particle correlations calculated from a single-point data set can be used to determine the mechanisms responsible for the energy transfer.

Kristopher Klein
Univ of Michigan - Ann Arbor

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