Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Diagnosing entropy production and dissipation in fully kinetic plasmas[1] JAMES JUNO, JASON TENBARGE, University of Maryland College Park, AMMAR HAKIM, Princeton Plasma Physics Lab, WILLIAM DORLAND, University of Maryland College Park, PETR CAGAS, Virginia Tech University — Many plasma systems, from the core of a tokamak to the outer heliosphere, are weakly collisional and thus most accurately described by kinetic theory. The typical approach to solving the kinetic equation has been the particle-in-cell algorithm, which, while a powerful tool, introduces counting noise into the particle distribution function. The counting noise is particularly problematic when attempting to study grand challenge problems such as entropy production from phenomena like shocks and turbulence. In this poster, we present studies of entropy production and dissipation processes present in simple turbulence and shock calculations using the continuum Vlasov-Maxwell solver in the Gkeyll framework. Particular emphasis is placed on a novel diagnostic, the field-particle correlation, which is especially efficient at separating the secular energy transfer into its constituent components, for example, cyclotron damping, Landau damping, or transit-time damping, when applied to a noise-free distribution function.

[1]National Science Foundation SHINE award No. AGS-1622306 and the UMD DOE grant DE-FG02-93ER54197

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Date submitted: 14 Jul 2017 Electronic form version 1.4