Abstract Submitted
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Onsager Regression in phase-space resolved ion fluctuations.[1] FRED SKIFF, University of Iowa — Onsager regression is the hypothesis that there is no difference between a fluctuation and a linear excitation. It implies that there is a connection between certain correlation functions and the linear response function. We explore this connection by comparing phase-space resolved correlation functions for ion fluctuations to linear response functions for the ion response. The data come from two-point correlation functions measured in a singly ionized Argon discharge plasma using laser-induced fluorescence. The experiments are performed in a plasma cylinder of density 10^9 cm^{-3} and a uniform magnetic field of 1kG. The LIF laser is aligned parallel to the magnetic field and two periscope detection systems are aligned to view points on the beam separated by a variable distance along the magnetic field. LIF measurements of fluctuations are not able to directly view the presence of particle discreteness because optical pumping and collisions make it improbable that there will be even one detected photon per metastable ion. Thus, all the cross-correlation results have to do with collective effects (modes). Nevertheless, there is a kinetic "free-streaming" part that is a significant part of the fluctuations. Although it is not at all clear that a linear theory should apply to these fluctuations because nonlinear correlations are evident in the bicoherence, and there should be trapped particle effects, we find that the kinetic component also can be described by an impulse response function

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