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Measurements of the two-point correlation function in the ion phase-space FRED SKIFF, AHMED DIALLO, ILKER UZUN, University of Iowa — We report measurements of the ion two-point correlation function in a magnetized plasma cylinder. Using a single frequency laser and two movable light-collection systems we measure the space, time, and particle velocity dependence of the two-point correlation function on the axis of a weakly- collisional magnetized plasma in a plasma cylinder where the main source of fluctuations is dissipative drift instability. Due to convection of waves out of the plasma volume, the collective fluctuations remain at low amplitude. In addition to the well known drift instability, we observe other collective effects in the two-point correlation that are anomalous. A kinetic component to the fluctuations, which exhibits a particle velocity dependent phase velocity, suggests plasma nonlinearity at low amplitude. Very quiet plasma discharges are made using a customized inductively coupled plasma source that operates continuously at low power (5W). Singly ionized Argon plasmas are produced with Te≈2eV and Ti≈0.1eV at a density near $10^9\ cm^{-3}$. Each particle species exhibits a nearly Maxwellian velocity distribution function and the drift instabilities are at a relative density fluctuation of near 10%. The plasma discharge is stabilized and large data sets are taken to obtain 58 db of dynamic range on the correlation measurement.

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