Abstract Submitted
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A Numerical Study of Turbulence in the Swarthmore Spheromak Experiment[1] JASON TENBARGE, Princeton University, JAMES JUNO, University of Maryland, MANJIT KAUR, General Atomic, MICHAEL BROWN, Swarthmore College, DAVID SCHAFFNER, Bryn Mawr College — The Swarthmore Spheromak eXperiment (SSX) provides an excellent opportunity to examine the nature of the turbulence that pervades the universe in a controlled, laboratory environment. Plasma in SSX arises during the helicity injection process of a coaxial plasma gun in a process originally developed in the formation of spheromaks and field-reversed configurations. Since the plasma is not confined by a background magnetic field, the internal fields evolve self-consistently and are allowed to be dynamic and turbulent. Global magnetohydrodynamics (MHD) and Hall MHD simulations of SSX have been performed using the HiFi simulation code, providing insights into the global evolution and relaxation of the turbulent plasma. However, SSX, like many plasmas in the universe, is in a moderate to weakly collisional regime, necessitating a kinetic approach to fully characterize the plasma. Therefore, we present a study of the turbulence in SSX using a combination of HiFi global simulations and the fully kinetic Eulerian Vlasov-Maxwell component of the Gkeyll simulation framework. In this study, we leverage the pristine phase space description provided by Gkeyll to characterize some of the kinetic properties of the SSX plasma.

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