Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Flow topology and Lagrangian conditional statistics in dissipative drift-wave turbulence BENJAMIN KADOCH, Aix-Marseille University, IUSTI, France, DIEGO DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, WOUTER J.T. BOS, LMFA, CNRS, Ecole Centrale de Lyon, France, KAI SCHNEIDER, M2P2 & CMI, Aix-Marseille University, France — Lagrangian statistics in drift-wave turbulence, modeled by the Hasegawa-Wakatani system and its modified version, are investigated. The later shows the emergence of pronounced zonal flows. Different values of the adiabaticity parameter are considered. The main goal is to characterize the role of coherent structures (vortices and zonal flows) on the Lagrangian statistics of particles. Computationally intensive simulations following ensembles of test particles over hundreds of eddy turnover times are considered in statistically stationary turbulent flows. The flow topology is characterized using the Lagrangian Okubo-Weiss criterion [Kadoch et al, Phys. Rev. E **83** (2011)], and the flow is thus split into topologically different domains. In elliptic and hyperbolic regions, the probability density functions (pdfs) of the residence time have self-similar algebraic decaying tails. However, in the intermediate regions the pdfs do exhibit exponentially decaying tails. Topologically conditioned pdfs of the Lagrangian velocity and acceleration are also computed. The differences between the classical Hasegawa-Wakatani system and its modified version are assessed.

Diego del-Castillo-Negrete
Oak Ridge National Laboratory

Date submitted: 24 Jul 2015 Electronic form version 1.4