Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Lagrangian intermittency and time–correlations in two–dimensional turbulence[1] KAI SCHNEIDER, M2P2-CNRS & CMI, Aix-Marseille University, Marseille, France, WOUTER BOS, LMFA-CNRS, Ecole Centrale de Lyon, University of Lyon, Ecully, France, BENJAMIN KADOCH, SALAH NEFFAA, M2P2-CNRS & CMI, Aix-Marseille University, Marseille, France — The statistical properties of Lagrangian particle transport are investigated in dissipative drift-wave turbulence considering the Hasegawa-Wakatani model. This model allows to study the change in dynamics for different turbulent flow regimes by varying the adiabaticity parameter c. The hydrodynamic limit is obtained for $c = 0$, while the geostrophic limit is recovered for $c \gg 1$. For c of order unity the quasi-adiabatic regime, relevant for fusion plasmas in Tokamaks, is obtained. By means of direct numerical simulation we consider four values for c and show that the Lagrangian dynamics is only intermittent in the hydrodynamic regime, while the other regimes are not. This is illustrated by considering the probability density function (PDF) of velocity increments, autocorrelation functions of velocity and acceleration and structure functions. In both, quasi-adiabatic and quasi-geostrophic regimes the PDFs of acceleration exhibit exponential tails. This behaviour is due to the pressure term in the acceleration and not a signature of intermittency. Furthermore the long time correlation of the modulus of acceleration is found for all regimes which hence does not imply intermittency either.

[1]We thankfully acknowledge financial support from ANR, project M2TFP.

Kai Schneider
M2P2-CNRS & CMI, Aix-Marseille University, Marseille, France

Date submitted: 22 Jul 2009 Electronic form version 1.4