Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

At what spatio-temporal scales can inertial waves be found in rotating turbulence? PIERRE-PHILIPPE CORTET, ANTOINE CAMPAGNE, Laboratoire FAST, CNRS, Université Paris-Sud, France, BASILE GALLET, Laboratoire SPHYNX, Service de Physique de l'État Condensé, DSM, CEA Saclay, CNRS, 91191 Gif-sur-Yvette, France, FRÉDÉRIC MOISY, Laboratoire FAST, CNRS, Université Paris-Sud, France — We present a spatio-temporal analysis of a statistically stationary rotating turbulence experiments aiming to extract a statistical signature of inertial waves and to determine at what scales and frequencies these waves can be detected. This analysis is performed from two-point correlations of temporal Fourier transform of the velocity fields time series obtained from stereoscopic PIV measurements in the rotating frame. From this data, it is possible to quantify the degree of anisotropy of turbulence due to global rotation both as a function of angular frequency ω and spatial scale normal to the rotation axis $r_\perp$. This frequency and scale dependent anisotropy is found compatible with the dispersion relation of inertial waves, provided that a weak non-linearity condition is satisfied in terms of a properly defined Rossby number dependant on the spatio-temporal scale (ω,$r_\perp$).

Jean-Pierre Hulin
Laboratoire FAST, CNRS, Université Paris-Sud, France

Date submitted: 23 Jul 2014 Electronic form version 1.4