Abstract Submitted
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Identification of nonlinear coupling in wave turbulence at the surface of water[1] ANTOINE CAMPAGNE, ROUMAISSA HASSAINI, IVAN REDOR, QUENTIN AUBOURG, JOL SOMMERIA, NICOLAS MORDANT, Laboratoire LEGI, Universit Grenoble Alpes — The Weak Turbulence Theory is a theory, in the limit of vanishing nonlinearity, that derive analytically statistical features of wave turbulence. The stationary spectrum for the surface elevation in the case of gravity waves, is predicted to $E(k) \propto k^{-5/2}$. This spectral exponent -5/2 remains elusive in all experiments. in which the measured exponent is systematically lower than the prediction. Furthermore in the experiments the weaker the nonlinearity the further the spectral exponent is from the prediction. In order to investigate the reason for this observation we developed an experiment in the CORIOLIS facility in Grenoble. It is a 13m-diameter circular pool filled with water with a 70 cm depth. We generate wave turbulence by using two wedge wavemakers. Surface elevation measurements are performed by a stereoscopic optical technique and by capacitive probes. The nonlinear coupling at work in this system are analyzed by computing 3- and 4-wave correlations of the Fourier wave amplitudes in frequency. Theory predicts that coupling should occur through 4-wave resonant interaction. In our data, strong 3-wave correlations are observed in addition to the 4-wave correlation. Most our observations are consistent with field observation in the Black Sea (Leckler et al 2015).

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