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Do inertial wave interactions control the rate of energy dissipation of rotating turbulence? PIERRE-PHILIPPE CORTET, ANTOINE CAMPAGNE, NATHANAEL MACHICOANE, Laboratoire FAST, CNRS, Universite Paris-Sud, Orsay, France, BASILE GALLET, Laboratoire SPHYNX, Service de Physique de l'Etat Condense, CEA Saclay, CNR, Gif-sur-Yvette, France, FREDERIC MOISY, Laboratoire FAST, CNRS, Universite Paris-Sud, Orsay, France — The scaling law of the energy dissipation rate, $\epsilon \propto U^3/L$ (with U and L the characteristic velocity and lengthscale), is one of the most robust features of fully developed turbulence. How this scaling is affected by a background rotation is still a controversial issue with importance for geo and astrophysical flows. At asymptotically small Rossby numbers $Ro = U/\Omega L$, i.e. in the weakly nonlinear limit, wave-turbulence arguments suggest that ϵ should be reduced by a factor Ro. Such scaling has however never been evidenced directly, neither experimentally nor numerically. We report here direct measurements of the injected power, and therefore of ϵ, in an experiment where a propeller is rotating at a constant rate in a large volume of fluid rotating at Ω. In co-rotation, we find a transition between the wave-turbulence scaling at small Ro and the classical Kolmogorov law at large Ro. The transition between these two regimes is characterized from experiments varying the propeller and tank dimensions. In counter-rotation, the scenario is much richer with the observation of an additional peak of dissipation, similar to the one found in Taylor-Couette experiments.

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