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Using Liquid Helium to Observe Rotating and Superfluid Turbulence GREGORY BEWLEY, Yale University and University of Maryland, DANIEL P. LATHROP, IREAP, IPST & Department of Physics, University of Maryland, College Park, K.R. SREENIVASAN, International Centre for Theoretical Physics, Trieste, Italy — We report on observations of grid generated turbulence in rotation and in a superfluid. We use cryogenic liquid helium, because it has a small viscosity, allowing high Reynolds numbers and rotation rates simultaneously, and because it becomes a superfluid when it is cooled. We generate decaying turbulence by pulling a square grid of bars through the fluid. In these experiments, the mesh Reynolds number is up to 500,000, and the rotation rate, Ω, is up to 2 Hz. This condition corresponds to a Taylor-scale Reynolds number of about 425 and an inverse Rossby number, $\Omega L/U$, of about 10 (where Ω is the system rotation rate, L is the width of the channel, and U is the RMS velocity of the fluid.) The large scales of the flow are observed using PIV, and a novel technique to trace the fluid motions using micron sized solid hydrogen particles. We find that the rotating flow is dominated by standing inertial waves, whose characteristics are determined by the geometry of the boundary.

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