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Long-range ordering of turbulent stresses in the 2D inverse energy cascade YANG LIAO, NICHOLAS OUELLETTE, Yale University, OUELLETTE LAB TEAM — We report measurements of the spatial structure of the turbulent stress that couples motion on different length scales in a quasi-two-dimensional laboratory flow. We show that the range of scales over which we find net energy transfer to large scales—the inverse energy cascade—is associated with the appearance of long-range, system-spanning spatial order of the turbulent stress. Although the overall degree of order fluctuates in time, the form of the approach to ordering does not. Our results provide an unexpected example of turbulence-induced ordering, and suggest new pathways for modeling turbulence using geometric alignment.

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