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Escape from turbulence in shear flows ALBERTO DE LOZAR, BJOERN HOF, Max Planck Institute for Dynamics and Self-Organization, Goettingen, Germany, DIRK JAN KUIK, JERRY WESTERWEEL, Laboratory for Aero- and Hydrodynamics, Delft University of Technology, Delft, The Netherlands — The collapse of turbulence, observable in shear flows at low Reynolds numbers, raises the question if turbulence is generically of transient nature or becomes sustained at some critical point. Recent data have lead to conflicting views with the majority of studies supporting the model of turbulence turning into an attracting state. We have performed lifetime measurements of turbulence in pipe flow spanning eight orders of magnitude in time, drastically extending all previous investigations. We show that no critical point exists in this regime and that in contrast to the prevailing view the turbulent state remains transient. Our experiments also strengthen the picture that the turbulent dynamics quickly erase any memory of the initial perturbation. The behavior found here identifies turbulence in pipe flow as a type-II super-transient, which had been conjectured as a potential description of turbulence two decades ago.

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