ICTS Special Colloquium

Title: The route to turbulence

Speaker: Dwight Barkley, University of Warwick, UK

Date: Thursday, February 20, 2020

Time: 2:30 pm

Venue: Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract: Explaining the route to turbulence has been a long and tortuous journey. After years of missteps, controversies, and uncertainties, we are at last converging on a unified and fascinating picture of transition in flows such as pipes, channels, and ducts. Classically, subcritical transition (such as in a pipe), was thought to imply a discontinuous route to turbulence. We now know that this is not the case -- subcritical shear flows may, and often do, exhibit continuous (second-order) transition. I will discuss recent developments in experiments, simulations, and theory that have established a deep connection between transition in subcritical shear flows and a class of non-equilibrium statistical phase transitions known as directed percolation. From this we understand how to define precise critical points for systems without linear instabilities and how to characterize the onset of turbulence in terms of non-trivial, but universal power laws. I will discuss the physics responsible for the complex turbulent structures ubiquitously observed near transition and end with thoughts on outstanding open questions.