

Title: Transition to turbulence in pipe flow

Abstract: Flows through pipes undergo a sudden transition from laminar to turbulent motion as the fluid velocity increases. Understanding this transition has occupied engineers, physicists and mathematicians alike since Reynolds' groundbreaking experiments in the nineteenth century. In this talk, I will review the recent progress on this problem from three distinct perspectives: (i) hydrodynamic stability, (ii) phase transitions and (iii) dynamical systems. Similarities to other wall-bounded flows and outstanding open points will be discussed. Special attention will be paid to the mechanisms of turbulence relaminarization, which remain poorly understood. I will discuss how the relaminarization process can be understood in the context of extreme (rare) events by applying information-theoretical measures to massive statistical ensembles of direct numerical simulations.

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