PHYSICS COLLOQUIUM:
The Life and Death of Turbulence

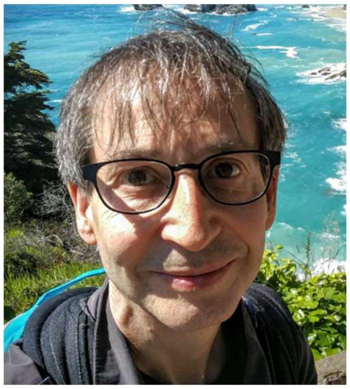
Nigel Goldenfield
Chancellor's Distinguished Professor of Physics
UCSD

Date:
10/28/2022

Time:
10:30 AM-11:50 AM

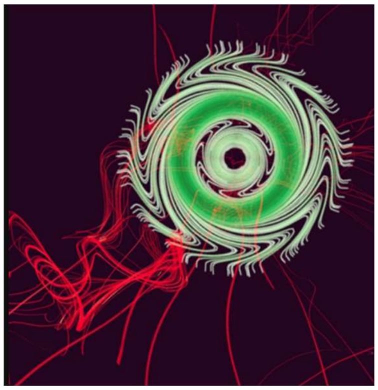
Link:
https://ucmerced.zoom.us/j/81859793693?pwd=Qi9manlnWmJkR3V1WWFFL1A1SkNsQT09&from=addon

About The Speaker:



Nigel holds the Chancellor's Distinguished Professorship in Physics and joined UCSD in Fall 2021 after being at the University of Illinois at Urbana-Champaign from 1985-2021. Nigel's research spans condensed matter theory, the theory of living systems, hydrodynamics and non-equilibrium statistical physics.

Nigel received his Ph.D. from the University of Cambridge (U.K.) in 1982, and for the years 1982-1985 was a postdoctoral fellow at the Institute for Theoretical Physics, University of California at Santa Barbara. In 1996, Nigel co-founded NumeriX, a company that specializes in high-performance software for the derivatives marketplace. He has served on the editorial boards of several journals, including The Philosophical Transactions of the Royal Society and Physical Biology. Selected honours include: Alfred P. Sloan Foundation Fellow, University Scholar of the University of Illinois, the Xerox Award for research, the A. Nordsieck award for excellence in graduate teaching and the American Physical Society's Leo P. Kadanoff Prize. Nigel is a Fellow of the American Physical Society, a Fellow of the American Academy of Arts and Sciences and a Member of the US National Academy of Sciences.



Abstract:

Turbulence is the last great unsolved problem of classical physics. But there is no consensus on what it would mean to actually solve this problem. In this colloquium, I propose that turbulence is most fruitfully regarded as a problem in non-equilibrium statistical mechanics, and will show that this perspective explains turbulent drag behavior measured over 80 years, and makes predictions that have been experimentally tested in 2D turbulent soap films. I will also explain how this perspective is useful in understanding the laminar-turbulence transition, establishing it as a non-equilibrium phase transition whose critical behavior has been predicted and tested experimentally. This work connects transitional turbulence with statistical mechanics and renormalization group theory, high energy hadron scattering, the statistics of extreme events, and even population biology.

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