

KAVLI INSTITUTE FOR THEORETICAL PHYSICS

Presents

The Sixty-Fifth KITP Public Lecture

Sponsored by Friends of KITP

Nigel Goldenfeld

Beyond Chaos: The Continuing Enigma of Turbulence

Turbulence is the last great unsolved problem of classical physics. This seemingly random, unpredictable motion of fluids is pervasive and completely familiar to us all. Turbulence governs the speed at which rivers flow and the air drag as you drive your car; it is the bane of air travelers. Turbulence can kill, by causing arteries and aneurisms to burst. Turbulence makes stars twinkle. Its random but structured patterns have inspired artists and scientists alike. And yet, despite a century of scientific investigation, our understanding is primarily based upon a mere handful of early seminal insights. In this talk, I'll try to explain why this problem is so difficult — much harder than chaos — and what it would mean to solve it. Finally, I'll discuss recent dramatic advances in both experiment and theory that account for the way in which fluids start to become turbulent as their flow speed is increased, making precise mathematical contact with transitional behavior in other fields such as ecology and even neuroscience.

About the Speaker

NIGEL GOLDENFELD holds a Swanlund Endowed Chair and is a Center for Advanced Study Professor in Physics at the University of Illinois at Urbana-Champaign (UIUC), and a member of its Institute for Condensed Matter Theory. He is the Director of the NASA Astrobiology Institute for Universal Biology at UIUC, and leads the Biocomplexity Group at UIUC's Institute for Genomic Biology. Nigel received his Ph.D. from the University of Cambridge in 1982 where he studied with Sir Sam Edwards. During the years 1982-1985, he was a postdoctoral fellow in (what was then called) the ITP at UCSB. Among his many awards, Prof. Goldenfeld 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. His research interests are extraordinarily broad, addressing pattern formation in physics and biology, high temperature superconductivity and phase transitions in condensed-matter physics, the enigma of turbulence, the evolution of the genetic code, and the quantitative study of financial markets. One of the great biologists of the 20th century, Carl Woese, has said of his collaboration with Goldenfeld that it was "the most productive of my scientific career."

Wednesday, February 1, 2017
8:00 PM (reserved seats held until 7:50 PM)

Kavli Institute for Theoretical Physics, Main Seminar Room



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at:

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Reserved seats are held
until 7:50 PM

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accommodate a disability, call the
KITP at the number above.*

LOT 10 PARKING

From the roundabout at Hwy 217, turn right onto Mesa Rd, merge into the left lane, and turn left at the first light into Lot 10 parking structure. **PARK, BUY a \$4 permit** from the dispenser (near the elevator and stairs), and **DISPLAY PERMIT** on dashboard. The KITP is right next door in Kohn Hall.

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