Chaos, Black Holes and Quantum Mechanics

Chaos is a ubiquitous property of physical systems — it makes their future behavior extremely difficult to predict. The weather is a familiar example. Chaos underlies thermal behavior — substances at high temperature feel “hot” because of the rapid chaotic motion of their constituent molecules. Hawking discovered that quantum black holes have a temperature so it is natural to suspect that they display some kind of chaotic behavior. In this talk, we will discuss recent insights into how chaos appears in the physics of quantum black holes, and the implications of these insights for many-body physics, and for quantum gravity.

About the Speaker

Stephen Shenker was a postdoc at KITP in 1980-81, was subsequently on the faculty of the University of Chicago and Rutgers University, and is currently the Richard Herschel Weiland Professor at Stanford University. He is a theoretical physicist who has worked on problems ranging from the theory of phase transitions to the non-perturbative formulation of quantum gravity. He is a recipient of a MacArthur Fellowship and the Onsager Prize, and is a member of the American Academy of Arts and Sciences and the National Academy of Sciences. From 1998 to 2009 he was the Director of the Stanford Institute for Theoretical Physics.