

Distinguished Bhaumik Lecture and Physics & Astronomy Colloquium

Quantum Chaos and Quantum Gravity

Stephen Shenker

(Stanford University)

Thursday, April 3rd 2025, 4PM

PAB 1-434

Refreshments will be served at 3:30PM on the PAB 3rd floor patio.

Undergraduates welcome!

Prof. Shenker has been a leader in theoretical particle physics and string theory for many decades. He has won numerous honors including a MacArthur Fellowship, an Onsager Prize, membership in the National Academy of Sciences, and recently the 2023 Dirac Medal.

I will discuss some aspects of quantum chaos that are present in the physics of black holes. In particular I will discuss how sensitive dependence on initial conditions, Lyapunov behavior, is realized in these systems and go on to describe a universal bound on the size of the quantum Lyapunov exponent that black holes saturate. I will then turn to the behavior of the individual energy levels of quantum black holes. In quantum chaotic systems these energies should behave like the eigenvalues of a random matrix, and I will discuss aspects of a gravitational explanation for this behavior.

