USC Viterbi
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*Ming Hsieh Department of Electrical and Computer Engineering*

Ming Hsieh Institute **Seminar Series**

# Quantum Science & Technology

## Extending the Reach of Quantum Computers via Noise Tailoring

Irfan Siddiqi
Professor of Physics and Department Chair
University of California Berkeley

Date: Thursday, September 14, 2023
Time: 2:00pm – 3:30pm
In-person: EEB 248

**Abstract:** Noise processes limit the coherence of quantum processors, and therefore limit the number of quantum logical gate operations that can be performed in a single computation. Common error types include coherent errors where the purity of a quantum state is preserved but the phase is scrambled, and stochastic errors where information is lost to an inaccessible environment, resulting a statistical mixture. Though somewhat counterintuitive, coherent errors are typically more pernicious and accumulate faster during a quantum computation. By tailoring coherent errors into stochastic ones, we extend the circuit depth of quantum chemistry and nuclear physics simulations that can be performed on current superconducting quantum processing units.

**Biography:** Irfan Siddiqi is a Professor of Physics and Department Chair at the University of California, Berkeley. He is also a Professor of Electrical Engineering & Computer Science, and holds a faculty scientist position at Lawrence Berkeley National Laboratory (LBNL). Siddiqi is currently the director of the Quantum Nanoelectronics Laboratory at UC Berkeley and the Advanced Quantum Testbed at LBNL. Siddiqi is known for contributions to the fields of superconducting quantum circuits, including dispersive single-shot readout of superconducting quantum bits, quantum feedback, observation of single quantum trajectories, and near-quantum limited microwave frequency amplification. He was awarded the American Physical Society George E. Valley Jr. Prize in 2006 "for the development of the Josephson bifurcation amplifier for ultra-sensitive measurements at the quantum limit" and the 2021 John F. Keithley Award for Advances in Measurement Science. Siddiqi is a fellow of the American Physical Society and a recipient of the UC Berkeley Distinguished Teaching Award in 2016, the institution's highest honor for teaching and commitment to pedagogy.

Hosted by: Quntao Zhang, Wade Hsu, Mengjie Yu, Jonathan Habif & Eli Levenson-Falk