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

Seminar

Building an Environmental Engineering Toolkit with Superconducting Circuits

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Abstract: Many interesting systems, such as lasers and topological insulators, are dominated by both quantum effects and strong dissipation. Such systems can be characterized as sets of coherent quantum objects that interact with an uncontrolled quantum environment: an open quantum system. Such open quantum systems are a subject of intense theoretical research, but experimental tools have remained lacking. In this talk I cover some of my lab's work aimed at building experimental tools to customize quantum environments and so study open quantum systems effects. I will discuss how we can use noisy classical control, engineered quantum dissipation, and quantum weak measurement feedback in order to emulate desired environmental dynamics. I will also show how such techniques can be used in practical quantum computing and quantum simulation applications, suppressing errors and ensuring high-fidelity operation.

Biography: I received my bachelor's from Harvard in 2008 and then my PhD from UC Berkeley in 2013, where I worked in Irfan Siddiqi's Quantum Nanoelectronics Lab, conducting research on quasiparticles in superconducting circuits. I then worked as a postdoc at Stanford with Aharon Kapitulnik, researching unconventional superconductors and designing precision measurement experiments. In 2017 I began my appointment at USC in the Physics & Astronomy Department. I received Young Investigator awards from the AFOSR in 2018 and the ONR in 2021, and was named a Cottrell Scholar in 2021.