

**Northwestern Quantum Week Opening Science Workshop:
Superconducting Qubits for Quantum Computing**

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Andrew Houck

Andrew Houck — the valedictorian of Princeton’s Class of 2000 — has been on Princeton’s faculty since 2008. His research focuses on the intersection of quantum mechanics and computer science. He has played a leading role in developing one of the most promising approaches to building a quantum computer, a machine capable of solving problems that are impossible on classical devices. He served as the inaugural co-director of the Princeton Quantum Initiative and director of the Co-Design Center for Quantum - one of five Department of Energy research centers - as part of the National Quantum Initiative. Houck is a recipient of the Presidential Early Career Award for Scientists and Engineers and is a Fellow of the American Physical Society. A 2013 recipient of Princeton’s President’s Award for Distinguished Teaching, Houck has also been a leader in educational initiatives, spearheading the creation of the University’s first-year engineering curriculum.

Superconducting Circuits from Materials to Mathematics

Abstract: Superconducting circuits provide a useful toolbox for science at the intersection of many different fields – materials, devices, physics, computer science, and mathematics. I will describe how our work with this platform spans these fields, drawing insight from many sources to advance the state of the art. In particular, I will show how materials science can lead to insight into improved qubit coherence; how lattices of qubits and cavities can draw on graph theory to realize flat bands; and how these lattices can provide the basis for interesting quantum simulations.