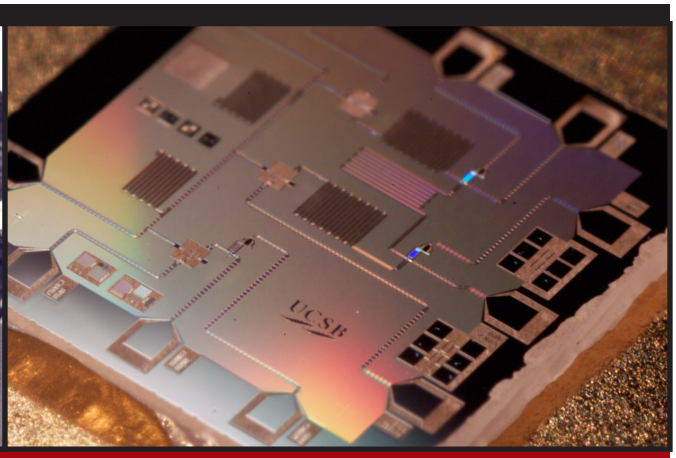
3:30 pm • Friday February 15, 2013 • 2241 Chamberlin Hall • Coffee at 4:30 pm

John Martinis

University of California, Santa Barbara



Superconducting Quantum Computing

Department of Physics Colloquium

WISCONSIN

Recent developments of surface codes now place superconducting quantum computing at an important crossroad, where “proof of concept” experiments involving small numbers of qubits can be transitioned to more challenging and systematic approaches that could actually lead to building a quantum computer. Although the integrated circuit nature of these qubits helps with the design of a complex architecture and control system, it also presents a serious challenge for coherence since the quantum wavefunctions are in contact with a variety of materials defects. I will review both logic gate design and recent developments in coherence in superconducting qubits, and argue that state-of-the-art devices are now near the fault tolerant threshold. Future progress looks promising for fidelity ten times better than threshold, as needed for scalable quantum error correction and computation.

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