Prof. David Schuster
University of Chicago

Modular Superconducting Quantum Computing

Superconducting circuits have emerged as a competitive platform for realizing a practical quantum computer, satisfying the challenges of controllability, long coherence and strong interactions between individual systems that are at the heart of coherent quantum computation. In this talk, I will explain some of the engineering challenges the field faces and how address these based on fundamental insight from quantum optics. In particular, I will show how we can realize a random access quantum architecture using a parametric interaction between superconducting qubits and multi-mode resonators for local operations. Moreover, we can entangle distant modules, to realize a quantum network of processors. Finally, I will describe progress towards autonomous quantum error correction and designing qubits protected from relaxation by matrix-elements rather than environmental engineering.