

# The Challenge of Gregarious Qubits

Irfan Siddiqi

Lawrence Berkeley National Laboratory

[irfan\\_siddiqi@berkeley.edu](mailto:irfan_siddiqi@berkeley.edu)

Superconducting qubits offer many attractive features for a quantum information processor: highly flexible connectivity and gate sets, established top-down fabrication pathways, and advanced tools for high-fidelity measurement. Such design freedom does come at an expense, which is natively strong coupling to the electromagnetic environment which contains many modes that naturally occur in the solid state, defects, and radiative channels. Achieving long-lived coherence in a high speed circuit is an optimization task which requires improving bulk materials, surfaces, and interfaces simultaneously with advanced circuit design to minimize any unnecessary information loss via radiation. I will highlight the design principles and practices we utilize in our current generation of quantum processors.

