



UC Berkeley

CAPABILITIES

Quantum Control Theory

Open loop control, pulse design for quantum memory/gates
Adaptive (learning) and optimal control theory, including numerical optimization

Measurement-based control, measurement-based quantum feedback control

Autonomous control and reservoir engineering

Many applications to flux qubits, transmon qubits, cavity-QED, spin qubits

Modeling and simulation

Modeling and simulation of open quantum systems, including SC qubits & cavity-QED

Numerical optimal control methods

Convex optimization, maximum entropy methods, compressed sensing

Quantum Monte Carlo simulation methods, esp. gr. state of many-bosons in double well

Quantum information theory

Quantum simulation with unitary/non-unitary dynamics and controls

Measurement theory; weak, continuous, multi-variable, adaptive measurements

Hamiltonian parameter estimation and optimal experiment design

Quantum tomography, state and process estimation, state discrimination/distinguishability

Macroscopic quantum states, characterization, bounds on evolution

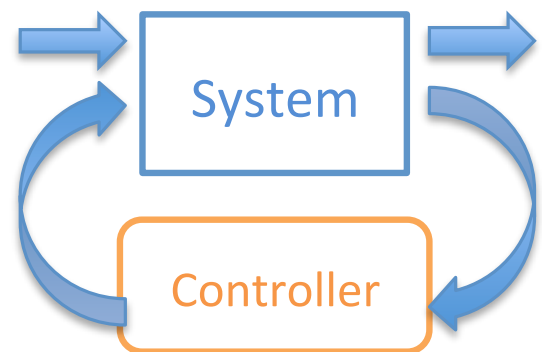
Quantum fluctuations, quantum phase transitions, qu. Fisher information, qu. metrology

We seek an experimental group implementing quantum annealing (QA) with needs for

- design of advanced annealing protocols taking advantage of quantum feedback control and reservoir engineering to ensure error mitigation and robustness
- advanced measurement design including weak, multi-spin and collective measurements
- design of new QA protocols

RESEARCH INTERESTS

- Measurement-based quantum feedback control: state stabilization, noise reduction, robust quantum annealing, obtain deterministic strategies with ASLO (average state locally optimality) protocols
- Remote entanglement generation
- Reservoir engineering: engineer dissipative dynamics for autonomous evolution to steady state
- Alternative quantum annealing algorithms
- Smart measurements for estimation of quantum states and fluctuations



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