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*Advances and challenges in Markovian quantum state stabilization under resource constraints.*

Dissipative quantum control techniques are attracting increasing attention in quantum information processing. I will focus on the task of designing Markovian dynamics which admits a desired pure entangled state as its unique stable steady state, subject to specified quasi-locality constraints. While the problem is well understood in a setting where purely dissipative dynamics suffice, and stabilizable pure states may be identified with unique ground states of frustration-free quasi-local Hamiltonians, a characterization of the general case where Hamiltonian and dissipative control must be simultaneously employed has been lacking. I will provide necessary and sufficient conditions filling this gap, by showing how quasi-local stabilizability of a pure state is determined by the existence of a quasi-local Hamiltonian that leaves the state invariant, while having no other eigenstates in a certain subspace determined by the dissipative component. It follows that unique ground states of frustrated quasi-local Hamiltonians need not be stabilizable using quasi-local resources alone. I will illustrate this through an example involving W-states on qubits under a nearest-neighbor constraint, and discuss alternative stabilization strategies, when quasi-local stabilization is not feasible. (Received February 14, 2018)