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Optimal control in presence of decoherence and measurement imperfections: Pure state preparation problem

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Quantum control is a key component in the mathematical toolbox for designing fault-tolerant quantum processors. It becomes important to find optimal control protocols for realistic experimental conditions. In this talk, I focus on quantum feedback control for preparing pure states as ideal resources for quantum computation and communication. I discuss how the optimal protocols under experimental imperfections can be different from the ones found under theoretical simplifications. The problem of our study is motivated by superconducting circuit QED proposals for quantum computation.