

Feedback control of multi-qubit systems

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In this presentation, we study the global stabilization of general equilibrium states of multi-qubit systems. This is a very important task in the quantum information theory, generally considered to be a hard one by physicists.

Indeed, no quantum measurement can give full information on the state of a quantum system; hence any quantum feedback control problem is necessarily one with partial observations, and can generally be converted into a completely observed control problem for an appropriate quantum filter as in classical stochastic control theory.

Here, we develop methods, using a combination of geometric control and classical probabilistic techniques, for global feedback stabilization of the quantum filters corresponding to the above angular momentum systems. Finally, we also prove the global robustness of the feedback strategy with respect to the uncertainties in the initial state of the filter.