Stabilization of an infinite-dimensional quantum stochastic system

Ram Abhinav Somaraju (Vrije Universiteit Brussel)

November 9, 2012

In this paper we study the semi-global (approximate) state feedback stabilization of an infinite dimensional quantum stochastic system towards a target state. A discrete-time Markov chain on an infinite-dimensional Hilbert space is used to model the dynamics of a quantum optical cavity. We can choose an (unbounded) strict Lyapunov function that is minimized at each time-step in order to prove (weak-$*$) convergence of probability measures to a final state that is concentrated on the target state with (a pre-specified) probability that may be made arbitrarily close to 1. The feedback parameters and the Lyapunov function are chosen so that the stochastic flow that describes the Markov process may be shown to be tight (concentrated on a compact set with probability arbitrarily close to 1). We then use Prohorov's theorem and properties of the Lyapunov function to prove the desired convergence result.

The relevant paper can be found at: `http://arxiv.org/abs/1103.1732`