

Quantum Trajectories: Purification and Invariant Measures

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Quantum trajectories model quantum systems repeatedly (indirectly) measured. The resulting evolution is a Markov process. In this talk I will discuss their purification property. Proved in 2005 by Kummerer and Maassen, it shows that, in absence of so called dark subspaces, the system state has a tendency to get closer and closer to a pure state along a quantum trajectories. I will revisit this result. I will explain how it is related to the stability of filters that led me and some collaborators to a proof of uniqueness of invariant measure. I will briefly mention the relationship to error correcting codes. I will then list a few new equivalent criteria for the absence of dark subspaces related to minima of polynomials, singular values and Lyapunov exponents. I will conclude with some interesting conjectures dealing with the likeliness of purification and zeros of some random functions.

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