Asymptotic behaviour and feedback stabilisation of quantum trajectories beyond QND measurements

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In this talk, we investigate the behaviour of quantum trajectories subjected to generic measurements. The Hilbert space supporting such trajectories can be decomposed into a direct sum of minimal invariant enclosures of the associated quantum channel [2]. Under an identifiability assumption on the minimal invariant states within each subspace, we show that the support of a quantum trajectory tends to shrink and eventually becomes confined to a single minimal subspace [1]. This convergence occurs at exponential speed in expectation. In the second part of the talk, we introduce a feedback control strategy that enables convergence towards a desired subspace, also at exponential speed. Throughout, the analysis will rely on Lyapunov methods.

Références

[1] Nina H Amini, Maël Bompais, and Clément Pellegrini. Exponential selection and feedback stabilization of invariant subspaces of quantum trajectories. *SIAM Journal on Control and Optimization*, 62(5) :2834–2857, 2024.

[2] Bernhard Baumgartner and Heide Narnhofer. The structures of state space concerning quantum dynamical semigroups. *Reviews in Mathematical Physics*, 24(02) :1250001, 2012.

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