New Results for Quantum Control Problems

Controllability of Quantum Ensembles

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Abstract: The problem of controlling quantum ensembles and not only individual quantum systems is omnipresent in applications. For instance, in liquid NMR spectroscopy, the non-interacting spin systems (molecules) in the test tube constitute such a quantum ensembles. Due to inhomogeneities of the involved magnetic fields, open loop strategies that are robust under perturbations are crucial for controlling these ensemble. The same applies to saturation and contrast problems in NMR imaging.

After a short introduction on bilinear control systems, in the first part of talk we will present controllability and accessibility results for finite quantum ensembles. In the second part, we concentrate on recent results for infinite ensembles.