



Departmental PhD Thesis Exam

Wednesday, August 28th, 2024 at 2:00 p.m. (sharp)
via Zoom / BA6183

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Supervisor : Israel Michael Sigal

Thesis title : Approach to Equilibrium in Markovian Open Quantum Systems



Abstract

Open quantum systems arise from quantum systems interacting with quantum environments after the latter's degrees of freedom are "integrated" out. No extra assumptions, besides the standard self-adjointness assumptions, are required. This class of systems is the bedrock of quantum non-equilibrium statistical mechanics and quantum information theory. The dynamics of such systems are usually studied under an additional assumption that they are Markovian. In that case, they are governed by the von Neumann-Lindblad equation.

In this thesis, we study the evolution of Markovian open quantum systems. We show that, under certain conditions (including quantum detailed balance condition), the evolution converges to the space of stationary states, which, under additional assumptions, is spanned by a single – equilibrium – state. The latter property is known as the return to equilibrium. Our approach could be treated as spectral analysis on non-commutative spaces.