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Balance in Quantum Dynamical Systems

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Using a study of the connection between entanglement and quantum detailed balance as motivation, we introduce the concept of balance between two quantum dynamical systems. The definition of a quantum dynamical system used is a von Neumann algebra with a faithful normal state, and a state preserving unital completely positive map. It is showed how balance can be used to find relaxed versions of properties related to equilibrium, such as quantum detailed balance conditions, and that it provides a mathematical framework within which the question of transfer of properties between systems in balance can be investigated. Promising recent research with regard to the latter using Wasserstein distances is briefly discussed. The role of functional analysis and specifically Tomita-Takesaki theory in establishing this framework is also discussed.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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