Different indicators for Markovian and non-Markovian dynamics

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The Markovianity/non-Markovianity of two different systems will be discussed by means of the quantum speed limit time and quantum Fisher information. The first system is described by a central mass particle that interacts locally with its surrounding particles, while the second and third systems consist of a single qubit that interacts with a non-detuning Lorentzian cavity and with a thermal reservoir, respectively. For the first model, the large distance between the central particle and the surrounding particles is a guarantee of a fixed quantum speed limit, while the driving time plays the central role in the fixed behavior of the quantum speed limit time. Due to the stable behavior of the quantum speed limit time and the quantum Fisher information, the exchange of information between the systems and their surroundings is limited. The distance between the central mass particle and its surrounding particles plays the main role in predicating the Markovianity/non-Markovianity. For the second system, driving time is an important parameter that controls the Markovianity/non-Markovianity behavior. Finally, the third system proves that non-Markovian dynamics may increase the speed and sensitivity of the open system.

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