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(I) Markovian master equation for correlated initial states

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The dynamics of a quantum system in contact with some external surroundings (a 'reservoir') is complex. The total system-reservoir evolution is governed by the (global) Schrödinger equation, but the reduced system dynamical equations are not of that form. If the reservoir is vast and has a short correlation time (little memory), then a markovian approximation is known to be valid. The approximate system dynamics is the solution of the famous markovian master equation. The derivation of the master equation is based on initial states in which the system and the reservoir are uncorrelated (of product form). In many situations, however, such initial conditions are not reasonable. In this talk, we address the case of (classically or quantum) correlated initial states and ask: Is the markovian approximation still valid? In this talk, we show that the answer is YES for a standard class of open system models, where a small system is coupled to a reservoir (quantum field) of thermal oscillators.

The talk is based on the work https://arxiv.org/abs/2107.02515

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