Controlling Matter Phases beyond Markov

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Abstract

Controlling phase transitions in quantum systems via coupling to reservoirs has been mostly studied for idealized memory-less environments under the so-called Markov approximation. Yet, most quantum materials and experiments in the solid state, atomic, molecular and optical physics are coupled to reservoirs with finite memory times. Here, using the spectral theory of non-Markovian dissipative phase transitions developed in the companion paper (Debecker, Martin, and Damanet Phys. Rev. A **110**, 042201 (2024)), we show that memory effects can be leveraged to reshape matter phase boundaries, but also reveal the existence of dissipative phase transitions genuinely triggered by non-Markovian effects. (1) B. Debecker, J. Martin, and F. Damanet, Controlling Matter Phases beyond Markov, Phys. Rev. Lett. **133**, 042201 (2024).

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