
Thermodynamic meaning and power of non-Markovianity

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Abstract

We establish a connection between non-Markovian memory effects and thermodynamical quantities such as work. We show how memory effects can be interpreted as revivals of work that can be extracted from a quantum system. We prove that non-Markovianity may allow an increase in the extractable work even when the entropy of the system is increasing. Our results have important implications both in quantum thermodynamics and in quantum information theory. In the former context they shed light on the problem of understanding concepts such as work in a non-Markovian open system scenario. In the latter context they lead to interesting consequences for quantum state merging protocols in presence of noise.

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