

Probing dynamical signatures in continuously monitored systems: beyond measurement-induced phase transitions (Q)

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In the recent years, the quantum simulation community has developed great interest in the interplay between coherent and dissipative dynamics. A prominent example is the case of measurement-induced phase transitions (MIPTs) which have been found in a wide range of systems, from discrete circuit models to cold atoms. MIPTs are typically characterized by the distinct behavior of non-linear quantities in the density operator — such as the entanglement entropy that varies from an area-law to a volume-law—but remain hard to detect experimentally for moderate system sizes. While a big focus on these systems has been on detecting the transition point, the role of the dissipative and coherent interplay in the system dynamics has remained unclear. In this work, we study the role that dissipation has on early and longer time dynamical observables and how it competes with the coherent evolution, in both interacting and non-interacting cold atomic systems. We find that these quantities exhibit distinct behavior that allow to probe the different phases in the transition and exhibit interesting signatures beyond the focus on MIPTs.

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