

OpenQMBP2023: New perspectives in the out-of-equilibrium dynamics of open many-body quantum systems



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Quantum-Darwinism-encoding transitions

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Quantum Darwinism (QD) is a theory of how classical objectivity emerges from quantum mechanics. Its key idea is that the environment has objective knowledge of a qubit only if small fractions of the former are correlated with the latter (like in a GHZ state). However generic unitary dynamics in a many-body system scrambles and encodes information, instead of broadcasting it. Are the two distinct behaviours as dynamical phases separated by sharp transitions? We introduce solvable models exhibiting such Quantum-Darwinism-encoding transitions (QDETs). The models are defined as a unitary circuit on an expanding tree, whose root is entangled with a reference bit. The order parameter is the knowledge of a small fraction of the leaves (the environment) about the reference. Relation with the measurement-induced transitions will be discussed.

Based on joint work with Benoît Ferté (arXiv: 2305.03694 and in progress).

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