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Dissipative processes for quantum simulation and computation[1]

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Dissipative processes and decoherence have traditionally been seen as the main obstacles to build a scalable quantum computer. However, if the dissipation can be engineered to include many-body processes, it can be turned into a resource allowing for robust quantum computation and quantum simulation: the result of the quantum computation or simulation arises as the steady-state of a many-body master equation. As a novel application of those ideas, we will also discuss the quantum Metropolis algorithm, which is the first quantum algorithm that allows to simulate static properties of quantum many-body systems.

[1]joint work with Ignacio Cirac and Michael Wolf