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Rapid thermalisation of quantum dissipative many-body systems

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Quantum systems typically reach thermal equilibrium when in weak contact with a large external bath. Understanding the speed of this thermalisation is a challenging problem, especially in the context of quantum many-body systems where direct calculations are intractable. The usual way of bounding the speed of this process is by estimating the spectral gap of the dissipative generator, but this does not always yield a reasonable estimate for the thermalisation time. When the system satisfies instead a modified logarithmic Sobolev inequality (MLSI), the thermalisation time is at most logarithmic in the system size, yielding wide-ranging applications to the study of many-body in and out-of-equilibrium quantum systems, such as stability against local perturbations (in the generator), efficient preparation of Gibbs states (the equilibria of these processes), etc.

In this talk, I will present an overview on a strategy to prove that a system satisfies a MLSI provided that correlations decay sufficiently fast between spatially separated regions on the Gibbs state of a local, commuting Hamiltonian. This will allow us to conclude that any Davies or Schmidt dissipative generator converging to a 2-local, commuting Hamiltonian at high-enough temperature thermalises in a time logarithmic in the system size.

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