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## Non-stationary quantum many-body dynamics through dissipation


**Abstract**: Here we discuss simple criteria under which dissipation prevents a quantum many-body system from relaxing to stationarity by constructing equally-spaced purely imaginary eigenvalues of the quantum generator of time evolution (quantum Liouvillian). We focus on the Markovian quantum master equation framework, though the symmetry based principles are more widely applicable. In this framework, we prove that the criteria we give are both sufficient and (for finite-size systems, or certain bounded generators) necessary for such limit cycles to exists. The approach also allows us to construct the corresponding eigenmodes. We give a simple example based on the Fermi-Hubbard model, and its two SU(2) symmetries, which in addition to non-stationarity allows for off-diagonal long-range order, dissipation enhanced \eta-paired superconductivity, and other physically relevant properties. We later also extend to cases when the purely imaginary eigenvalues are not equally spaced, allowing for the possibility of relaxation to stationarity.


Reference:


Berislav Buca, Joseph Tindall, Dieter Jaksch. Complex coherent quantum many-body dynamics through dissipation,arXiv:1804.06744 (2018).