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Universal non-equilibrium quantum dynamics in imaginary time
CLAUDIA DE GRANDI, Yale University, ANATOLI POLKOVNIKOV, ANDERS SANDVIK, Boston University — We propose a method to study the dynamical response of a quantum systems by evolving it with an imaginary-time dependent Hamiltonian. The leading non-adiabatic response of the system driven to a quantum-critical point is universal and characterized by the same exponents in real and imaginary time. For a linear quench protocol, the fidelity susceptibility and the geometric tensor naturally emerge in the response functions. Beyond linear response we extend the finite-size scaling theory of quantum phase transitions to non-equilibrium setups. Imaginary-time dynamics is also amenable to quantum Monte Carlo simulations, which we apply here to quenches of the transverse-field Ising model to quantum critical points in one and two dimensions.

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