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Quantum fidelity in the thermodynamic limit[1] MAREK RAMS, BOGDAN DAMSKI, Los Alamos National Laboratory — A quantum phase transition happens when dramatic changes in the ground state properties of a quantum system can be induced by a tiny variation of an external parameter (e.g., a magnetic field in spin systems). Quantum fidelity – the overlap between two ground states calculated at slightly different values of the external parameter – provides the most basic probe into the dramatic change of the wave-function. In this talk I will discuss quantum fidelity focusing on thermodynamic regime. I will present novel analytical results for quantum fidelity of the Ising chain, a paradigmatic model of quantum phase transitions, and discuss a theory extending these findings to systems characterized by other universality classes. In particular, I will show how quantum fidelity approaches a non-analytic limit, quantify how the Anderson catastrophe takes place in quantum critical systems, and discuss scaling properties of quantum fidelity when it cannot be approximated by the popular fidelity susceptibility approach. This approach provides a promising way of characterizing quantum phase transition in strongly correlated systems. The work is summarized in M.M. Rams, B. Damski, arXiv:1010:1048

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