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Fidelity in topological quantum phases of matter

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Quantum phase transitions that take place between two distinct topological phases remain an unexplored area for the applicability of the fidelity approach. Here, we apply this method to spin systems in two and three dimensions and show that the fidelity susceptibility can be used to determine the boundary between different topological phases particular to these models, while at the same time offering information about the critical exponent of the correlation length. The success of this approach relies on its independence on local order parameters or breaking symmetry mechanisms, with which non-topological phases are usually characterized. We also consider a topological insulator/superconducting phase transition in three dimensions and point out the relevant features of fidelity susceptibility at the boundary between these phases.

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