

Universal scaling for a quantum discontinuity critical point and an adiabatic time evolution

Sei Suzuki

Saitama Medical University

Quantum discontinuous transitions attract much attention as difficulties of quantum annealing. Here we study a quantum version of a discontinuity critical point (QDCP). We evaluate the critical exponents associated with a QDCP using the appropriate scaling relations. We then study a nearly adiabatic time evolution in the vicinity of a QDCP and propose the scaling relation for the defect density and the residual energy characterized by associated critical exponents. These predictions are numerically verified for the XXZ chain, establishing the existence of a Kibble-Zurek scaling for a dynamics across a QDCP.