Assessing nonequilibrium excitations in quantum annealers

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Currently, existing quantum annealers have proven themselves as viable technology for the first practical applications in the noisy-intermediate-scale-quantum era. However, to fully exploit their capabilities, a comprehensive characterization of their finite-time excitations is instrumental. In this talk, we will outline some of our recent efforts in comprehensibly assessing nonequilibrium excitations in existing hardware. As a main result, we will present a phase diagram for driven Ising chains, from which the scaling behavior of the excess work can be read off as a function of process duration and system size. We will elaborate that "fast" processes are well described by the Kibble-Zurek mechanism; "slow" process are governed by effective Landau-Zener dynamics; and "very slow" processes can be approximated with adiabatic perturbation theory.

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