

Adiabatic transport provides a powerful way to manipulate quantum states. By preparing a system in a readily initialized state and then slowly changing its Hamiltonian, one may achieve quantum states that would otherwise be inaccessible. Moreover, a judicious choice of final Hamiltonian whose ground state encodes the solution to a problem allows adiabatic transport to be used for universal quantum computation. However, the dephasing effects of the environment limit the quantum correlations that an open system can support and degrade the power of such adiabatic computation. We quantify this effect by allowing the system to evolve over a restricted set of quantum states, providing a link between physically inspired classical optimization algorithms and quantum adiabatic optimization. This perspective allows us to develop benchmarks to bound the quantum correlations harnessed by an adiabatic computation. We apply these to the D-Wave Vesuvius machine with revealing—though inconclusive—results.