QUANTUM INNOVATION 2021

CP-14-01

Improving adiabatic quantum computing with non-adiabatic methods

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Abstract

The speed of adiabatic processes, and thus adiabatic quantum computing is fundamentally limited by the adiabatic theorem. Counter-diabatic driving is a method that introduces additional time-dependent Hamiltonian terms in order to suppress diabatic transitions. However, these terms are highly non-local in many-body systems and thus not practical for near term applications. Recently, approximations for counter-diabatic terms have been introduces which offer a trade-off between complexity of the implementation and gain in ground-state fidelity. I will discuss the simplest approximations of single and two-body counter-diabatic terms.