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Algorithmic Cooling of a Quantum Simulator DVIR KAFRI, JACOB TAYLOR, Joint Quantum Institute: Department of Physics, University of Maryland, and National Institute of Standards and Technology — Adiabatic preparation is a common technique for obtaining the ground state of an unknown quantum mechanical system, by slowly varying the system Hamiltonian. A principle disadvantage is that its timing scales with the gap energy of the intermediate Hamiltonian, not with the final Hamiltonian. We present an alternative algorithm for cooling an arbitrary system of qubits, through interaction with a small number of "bath" qubits. We specify bounds for the algorithm parameters, and show that its timing scales only with the specified system's gap energy. We derive a Markov chain model for the algorithm's statistical performance, and compare the model's prediction to simulated results on a frustrated three-spin system. We further discuss possible experimental applications.

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