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Quantum Simulations of Classical Systems ROLANDO SOMMA, Los Alamos National Laboratory, GERARDO ORTIZ, Indiana University, CRISTIAN BATISTA, Los Alamos National Laboratory, EMANUEL KNILL, National Institute of Standards and Technology — Understanding the properties of classical systems on a lattice using numerical methods is, in general, a very hard problem. In this talk I will focus then on the quantum simulations of classical systems. That is, if we had a quantum computer, which properties could be obtained more efficiently on it than on a conventional one?. For this purpose, I will introduce a classical-to-quantum mapping that will allow us to understand classical and quantum annealing procedures as two independent paths on Quantum-Hamiltonian space. I present then the corresponding quantum algorithms to simulate classical systems and give convergence rates, determined by the adiabatic theorem, to assure successful simulation.

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