Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Geometric Non-Stoquasticity in Quantum Annealing WALTER VINCI, DANIEL LIDAR, Univ of Southern California — We argue that a correct description of quantum annealing implemented with flux-qubits must take into account geometric interactions that arise when the flux-qubit Hamiltonian changes during the anneal. In the effective quantum Ising Hamiltonian that describes a system of coupled flux-qubits, such interactions are represented by additional non-stoquastic terms. The realization of non-stoquastic Hamiltonians has important implications from a computational complexity perspective, since it is believed that in many cases quantum annealing with stoquastic Hamiltonians can be efficiently simulated with classical algorithms such as Quantum Monte Carlo. It is well-known that the direct implementation of non-stoquastic interactions with flux-qubits is particularly challenging. Our results may lead to an alternative approach to engineer controllable non-stoquastic interactions via geometric phases that can be exploited for computational purposes.

Walter Vinci
Univ of Southern California

Date submitted: 11 Nov 2016 Electronic form version 1.4