Day 3

Matthew R. C. Fitzpatrick, Simon Fraser University

Title: Numerically exact modelling of flux qubit chains subject to hybrid flux and charge noise

Abstract:

Quantum annealing has proven to be an effective approach to a variety of optimization problems. However, outside the formalism of adiabatic quantum computing, characterizing and predicting the performance of quantum annealing has proven to be a great challenge. Accurate modelling of environmental noise in quantum annealing is therefore of critical importance to the design of future architectures. One of the primary sources of noise in D-Wave devices is flux noise, which can be decomposed into 1/f-like and Ohmic-like components. For fast anneals on the order of tens of nanoseconds, charge noise also becomes appreciable.

In our current work, we develop a numerically efficient and exact method for simulating flux qubit chains that are subject to both flux and charge noise using the quasi-adiabatic path integral formalism and tensor networks. We study how decoherence and freezeout for small chains are affected by the various components of noise for fast anneals.

This work was done in collaboration with Mohammad Amin (D-Wave Systems), Jack Raymond (D-Wave Systems), and Malcolm Kennett (Simon Fraser University)