

Day 4

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Title: Quantum annealing with special drivers for circuit fault diagnosis

Abstract:

We present a very general construction for quantum annealing protocols to solve Circuit Fault Diagnosis (CFD) problems, that restricts the evolution to the space of valid diagnoses. This is accomplished by using special local drivers of weight 6, that induce a transition graph on the space of solution that is regular and instance independent for each given circuit topology. Analysis of small instances shows that the energy gap has a generic form, and that the minimum gap occurs in the last third of the evolution. The expected runtime has a mild scaling with the number of faults in the minimum fault diagnosis, which contrasts with the exponential scaling of brute force search that is one of the methods used for large scale ( $\sim 10^6$  wires) circuits.

This work was done in collaboration with Hannes Leipold.