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Distinguishing graphs with a quantum annealer using susceptibility measurements MATTHEW WITTMANN, Physics Department, University of California, Santa Cruz, ITAY HEN, Information Sciences Institute, University of Southern California, A.P. YOUNG, Physics Department, University of California, Santa Cruz — Recently it has been proposed [1] that the Graph Isomorphism (GI) problem could be solved using a quantum annealer. This is done by encoding the graphs into Ising Hamiltonians, identifying the vertices with spins and the edges with antiferromagnetic interactions. The idea is that measurements of simple observables during and at the end of the annealing process should distinguish non-isomorphic graphs. The first experimental study of the GI problem using D-Wave's quantum computer has been carried out by Vinci et al. [2], utilizing measurements taken at the end of the annealing process. Here, we will present preliminary evidence that measurements taken part way through the annealing process, now obtainable using state-of-the-art devices, may offer better distinguishing capabilities.

[1] I. Hen and A. P. Young, *Physical Review A* **86** (2012).

[2] W. Vinci et al., arXiv:1307.1114.

Matthew Wittmann
University of California, Santa Cruz

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