Day 3 (Poster D)

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Title: Domain-wall encoding versus one-hot encoding in quantum annealing

Abstract:
We study the performance of D-Wave flux qubit quantum annealers on an unweighted version of the quadratic assignment problem (equivalent to a colouring problem with n colors on a fully connected graph of n nodes), which has a simple highly symmetric structure and a high number of feasible solutions. We find that encoding the assignments as discrete variables using a recently proposed method called domain-wall encoding can out-perform the more traditional one-hot encoding at the largest sizes, and that this advantage can be large, giving around two orders of magnitude higher probability to find a feasible solution for the largest size we study ($n=8$). We further analyze the reasons why the performance is limited, including the role which dynamics versus thermal fluctuations play in limiting the performance, as well as examining methods to improve the performance, including optimal choices of annealing times.