

Title: Some classical results for hard optimization problems relevant for quantum information research.

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Abstract: I will very briefly review the cavity method - a tool developed in classical statistical mechanics to study spin glasses and hard optimization problems. Then I will show three examples of results obtained with the cavity method that are relevant for research in quantum information.

(A) Analysis of classical simulated annealing and adiabatic evolution in classical computationally hard problems.

(B) Ensemble of instances of constraint satisfaction problem having a unique satisfying assignment, that are easy to generate, and that are on average hard for known classical heuristic algorithms.

(C) Some results about the threshold behavior in adversary satisfiability problem that provides an upper bound on the threshold in the quantum satisfiability problem.