

Day 1 (Poster A)

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Title: Adiabatic reverse annealing does not overcome the hard phase in CDMA multiuser detection

Abstract:

Code-division multiple-access (CDMA) multiuser detection is a famous signal recovery problem formulated as a two-body Ising spin glass.

The estimation of the original signal is to find the ground state of the Hamiltonian.

In the CDMA multiuser detection, the first-order phase transition (FPT) happens in the hard phase where metastable minima exist other than the true estimator, which is close to the original signal.

In the hard phase, no polynomial algorithm does not exist at the moment.

To avoid or mitigate the FPT, we apply adiabatic reverse annealing (ARA) to the CDMA multiuser detection.

We evaluate the typical ARA performance of the CDMA multiuser detection by using the replica method.

Firstly, we consider the oracle cases where the candidate solution is randomly generated with a fixed fraction of the original signal in the candidate solution.

In the oracle cases, the ARA can avoid the FPT if we prepare for the proper candidate solution.

On the other hand, in practical cases, where the candidate solution is prepared by commonly used algorithms, the ARA can not avoid the FPT.

In our presentation, we discuss why the ARA does not intrinsically eliminate the FPT in practical cases from a statistical mechanical perspective.

This presentation contains the content of our recent paper [1].

[1] : <https://arxiv.org/abs/2004.11066>