



THE UNIVERSITY OF
CHICAGO

DEPARTMENT OF STATISTICS

PhD Dissertation Proposal Presentation

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“Energy minimization problem for Ferromagnetic Ising model with localized defect via a coupling method”

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Zoom Meeting

Abstract

In the fields of physics and chemistry, the quest to identify the configuration that minimizes the energy of a system is a common challenge. However, finding a global solution to this problem is often computationally expensive. To address this issue, the “embedding method” has emerged, presenting a novel approach that couples cost-effective methods for the global part and expensive but more accurate methods in local regions of interest to tackle the optimization problem effectively.

In this presentation, we focus on applying the above method to the Ferromagnetic Ising model with localized corruption. The Max-Cut SDP relaxation method is utilized to approximate the global energy minimization due to its ability to yield reasonable approximations in many optimization problems, and then locally we apply the more expensive moment constraints. We have developed a scalable algorithm capable of providing a confidence interval for the minimum energy. Additionally, we will share some numerical results and discuss our future plans.