Ising Model: A Monte Carlo Study

1 Plan

Our project is aimed at using Monte Carlo method to analyze the Ising model. First, we will use traditional Monte Carlo method (Metropolis algorithm) to solve the classical Ising model. Then we plan to take the quantum effect into account, i.e. using the quantum Monte Carlo method (worm algorithm) to compute the transverse Ising model.

1.1 Classical Ising Model

- Algorithm: Metropolis algorithm.
- Physical quantities to compute: magnetic moment, energy, heat capacity, magnetic susceptibility, critical temperature, critical exponents, etc.

1.2 Transverse Field Ising Model

- Algorithm: Worm algorithm.
- Physical quantities to compute: energy, critical field, correlation length, critical exponents, etc.

We also plan to compute the two models with different dimensionality, and compare the computational results with the theoretical prediction.

2 People

There are three people in our group: Yuanxing Duan (段元兴, 1800011366), xxx and Fangyu Xiong (熊方宇, 2001110203).