

Computational Physics II

Homework 1

Submission: November 4 (Monday), 2019

Para - Ferro transition: Ising model (10 points)

1. Write a program to solve for the two-dimensional Ising model (with the usual form for its hamiltonian for $h = 0$) with periodic boundary conditions. Use single spin-flip Metropolis algorithm for sampling. (*You can consider a system size, say, $L = 256$. Prepare the system at $T > T_c$ with randomly distributed up and down spins and then quench at $T(< T_c)$, say, $T = 0.5T_c$ and $0.75T_c$. Take $T_c = 2.27$ assuming $J = 1$ and $k_B = 1$.)*
 - (a) Plot the snapshots at least for 4 different times (in terms of Monte-Carlo steps) for $T = 0.5T_c$. The final one should be the equilibrium.
 - (b) Plot energy E and magnetization M as a function of time for the temperatures.
 - (c) Simulate the system at $T = 0.99T_c$ and plot the configurations (snapshots). What do you observe?