PH 354: hw 5, problem 7

Alankar Dutta

March 15, 2019

For $T < T_c$, .i.e. below critical temperature, all spins like to be aligned in the same direction. So depending on the initial steps of the MCMC random walkers, the system either attains a positive (all spins up) or a negative (all spins down) net Magnetization. However, both the configurations are physically identical as it is our choice of coordinates which denotes spin up or spin down. All that matters is the relative orientation of the individual spin of the atoms.
Above critical temperature, phase transition takes place and the system loses spontaneous magnetization. The spins of the atoms attain random relative orientation. The system becomes paramagnetic from ferromagnetic.