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Phys 343 project

Ising Model

Imagine having a lattice of spins, this lattice is very hard to describe in detail, as the spins interact with each other in a very complicated way. However, the human mind is limitless, and always finds a solution !

The techniques developed in the Mean Field Theory (MFT) - a branch of statistical mechanics- is able to simplify the study of this lattice, and explained in a very sophisticated way the transition between Ferromagnetsim and Paramagnetism using the Ising Model.

In this project, you shall discover the elegance and beauty of MFT through the selected reading on the Ising model. Summarise your understanding in the following points

1. Overview of the Ising model
2. Studying the spins in magnetic field without interactions
3. Studying the spins with interactions, symmetry breaking.
4. Applications to the Ising model

You should include the references in your project

- Richard J. Gonsalves ' Statistical Mechanics, Phase Transitions, and the Ising Model' (2008)
<http://www.physics.buffalo.edu/phy411-506-2008/chapter8/>
- David Tong: Lectures on Statistical Physics (2012)
<http://www.damtp.cam.ac.uk/user/tong/statphys.html>

Best Regards,

Dr Salwa Alsaleh