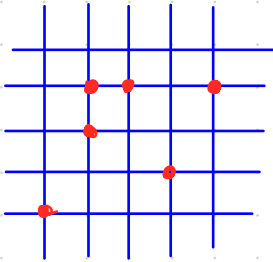


Session 11

Exercise 1 : Lattice gas and Ising model

The "lattice gas" is a model aimed at describing the liquid-gas transition.

It works in this way:



Each site can be filled or empty.

Particles attract each other so that 2 particles on neighboring sites contribute $-\epsilon$ to the energy.

Adding a particle to the system costs a chemical potential μ .

- a) Define the correct variables to model this system
- b) Write the Hamiltonian of the system
- c) Show that it is equivalent to the Ising model

Exercise 2: Ternary mixture

Now the gas/liquid is made of two different particles types, A and B (and a vacancy).

When they sit on nearest neighbors, they interact as

$-\epsilon_{AA}$ $-\epsilon_{AB}$ $-\epsilon_{BB}$ and have their

own chemical potentials μ_A and μ_B

Show that this system can be written as a spin-1 model