Spin models on random bipartite graphs

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Project description

In this project I will develop MPI software to run an Ising model simulation on a random bipartite graph.

- A bipartite graph is one where the vertices can be divided into two disjoint sets, A and B, such that every edge connects a vertex in A to one in B.
- Then each vertext is given a spin, up or down. And the spins interact only with the others that it's connected to by an edge.
- An investigation of the best way to partition a random graph into sub-domains to be handled on MPI cores will be carried out.
- The phase structure of these spin models will be studied in detail. The physical meaning will be analysed.

Outline of plan

- Write a general MPI code for the problem.
- Specialise the code to look at specific cases. Could be graphs with unique or unusual properties that would make for some interesting parallelisation or physics.
- Analyse performance aspects of the code.
- Physical meaning of the interactions and the results of the simulations will be studied