PIMC Second Meeting

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Simulated annealing

Work on the Ising spin glass to get a strategy down and then move onto the PIMCM

Adrian and Chris talked about how to deal with the temperature incrementation

* Of the population annealing algorithm (Matcha)

Adrian's GitHub username: agdelma

Read through Mathca's 2018 version of population annealing alogrithm (Saved in Summer PIMC folder)

Ising Model code notes

* To make problem, enforce that half of bonds are half and negative in J\_{ij}
  + Use randomly permutations to do that
  + C++ random shuffle in standard library
  + http://www.cplusplus.com/reference/algorithm/random\_shuffle/
* Be able to control J\_{ij} matrix from the command line
  + Provide seed as an argument
  + We want repeatability
  + Many potentially different calculations on the same J\_{ij}
  + First use j\_seed to build the J\_{ij} matrix and then re-seed to mc\_seed for the rest
    - Swap order of building initial configuration vs. building J\_{ij}
* Try to clean up the main function by moving some things to other classes / functions
  + J\_{ij} matrix class?
    - Variables: matrix itself, dimensions, ferromagnetic or not
    - Functions: populate (half and half or not?), normalize
  + Configuration class?
    - Variables: array itself, dimensions
    - Functions: populate, update?
* We want to find a parameter regime where the equilibration is measurably slow
* Try, for fixed J\_{ij} and beta, using different mc\_seeds to see if they're equilibrating to the same

energy state

Simple thing to implement now

* Build multiple Markov chains into my code
* Build J\_{ij} matrix, build several Markov chains from that matrix with different seeds
  + Start from either same state or a different state
  + Outermost loop: iterate over seeds

Conventionally, I have one for loop where I flip a spin each time. We usually say that for N spins, 1 sweep is N iterations of attempting to flip a spin

* Don’t have the actual number of attempted flipped spins be the parameter, have that parameter multiply by N

Run the code on 5 replicas and sample them after the same number of sweeps, plotting them against each other

Plan to meet next week, will be scheduling early next week.