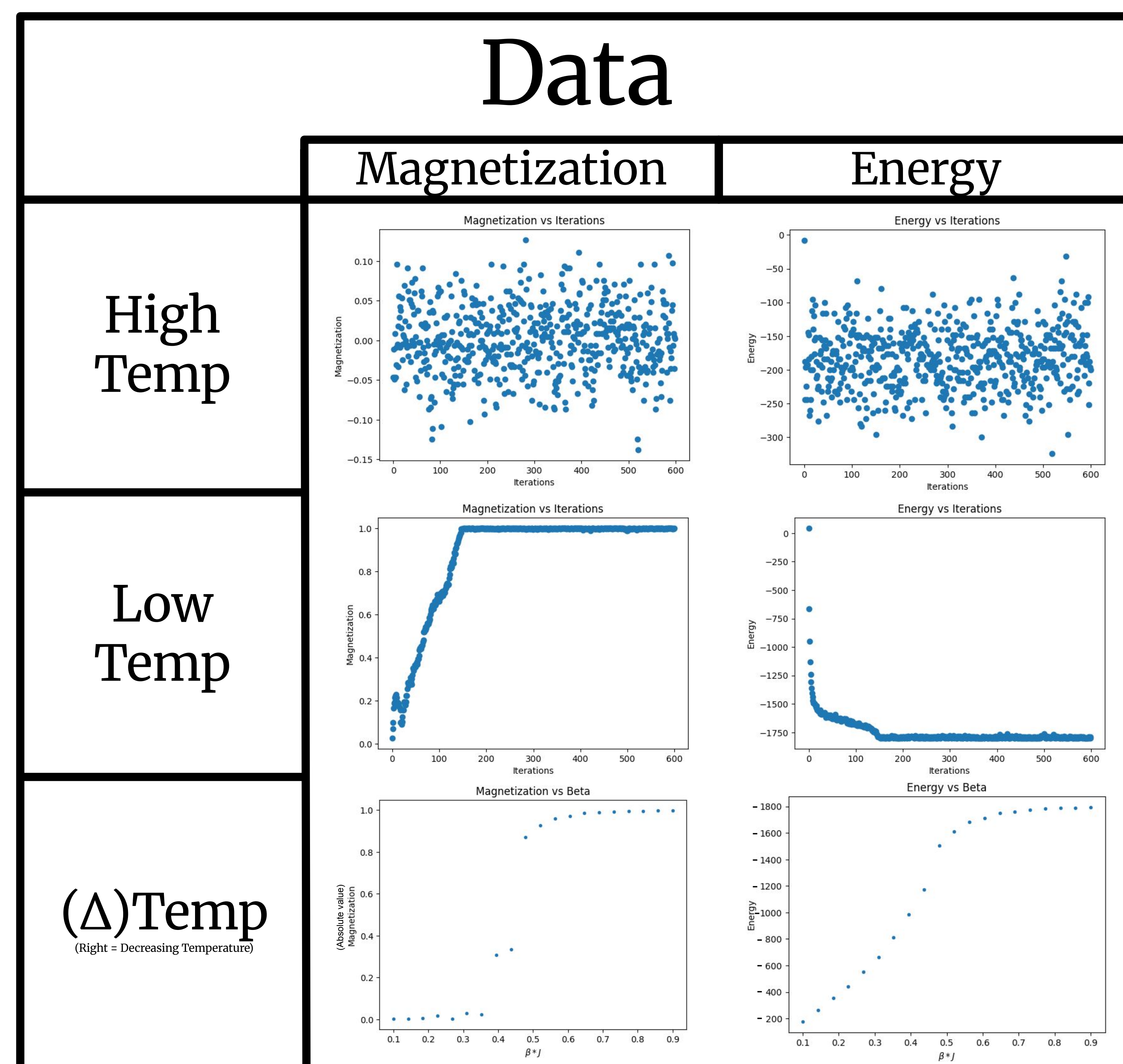


# The Ising On The Cake

Ben Bobell  
Emil Pellett  
Sebastian Kartadjoemena  
Nahom Sheferaw  
Will Kyle



The GOATs



## Overview

- The Ising Model represents ferromagnetism using spins (tiny magnets pointing up/down) on a metal lattice
- By altering the temperature, represented as  $\beta$  ( $1/T$ ), we can observe its effect on the model's magnetization and the energy
  - We predict that as the temperature decreases ( $\beta$  increases), the model will converge faster.
- We can observe this convergence using magnetization and energy vs.  $\beta \cdot J$  graphs.

## Methodology

- Create an Ising Model using Python
  - Hamiltonian Function
  - Monte Carlo Function
- Calculate the magnetization and energy of the model at different temperatures
  - $\beta$  range from 0.1-0.9
  - 20 Iterations
- Create graphs to represent how the magnetization and energy of the model change as the temperature decreases

## Conclusion

High temperature: Both magnetization and energy graphs don't converge

Low temperature: Both magnetization and energy graphs converge

As temperature decreases, the model reaches its steady state in less iterations

Additionally, it will have stronger magnetism and less energy

These facts confirm our hypothesis that as temperature decreases, the model will converge faster