

Ising Model: Critical Temperature Increases with Dimension

Physical Explanation: Higher dimensions = more neighbors = stronger cooperation

Critical Temperature (T_c) increases with dimension:

- 1D: $T_c = 0$ (no phase transition)
- 2D: $T_c \approx 2.269$ (Onsager exact solution)
- 3D: $T_c \approx 4.511$ (numerical calculation)
- 4D: $T_c \approx 6.68$ (mean field theory)

Why? Higher dimensions \rightarrow more neighbors \rightarrow stronger cooperation

- 1D Simulated
- 2D Simulated
- 2D $T_c \approx 2.269$
- 3D Simulated
- 3D $T_c \approx 4.511$
- 4D Simulated
- 4D $T_c \approx 6.680$

