

Lecture 12—Ideas of Statistical Mechanics Chapter 4, Monday February 4th

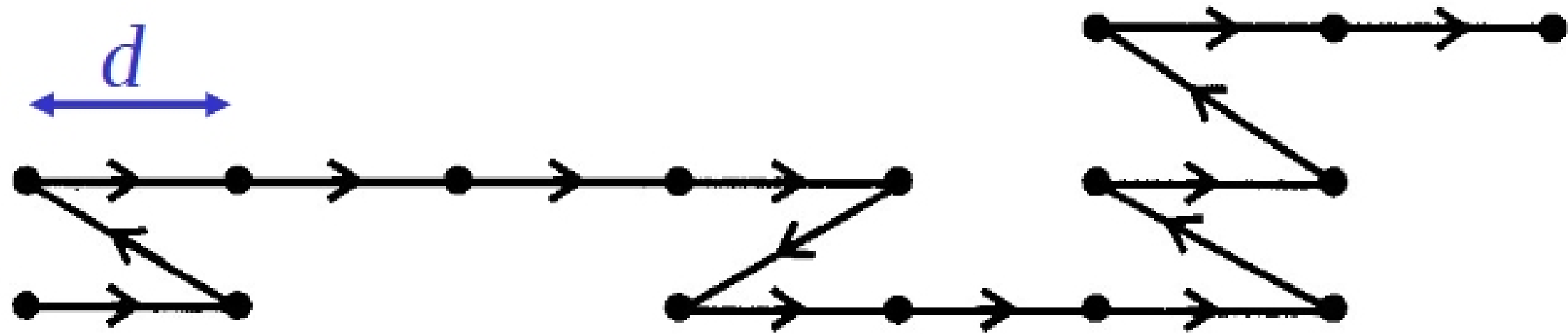
- Finish the model for a rubber band
- Demonstration
- Spins on a lattice

Reading: All of chapter 4 (pages 67 - 88)
*****Homework 4 due Thu. Feb. 7th*****
Assigned problems, Ch. 4: 2, 8, 10, 12, 14

Exam 1: Fri. Feb. 8th (in class), chapters 1-4

Review: Thu. 7th at 5:30pm, tentatively in

Rubber band model



n_+ = # of forward links; n_- = # of backward links

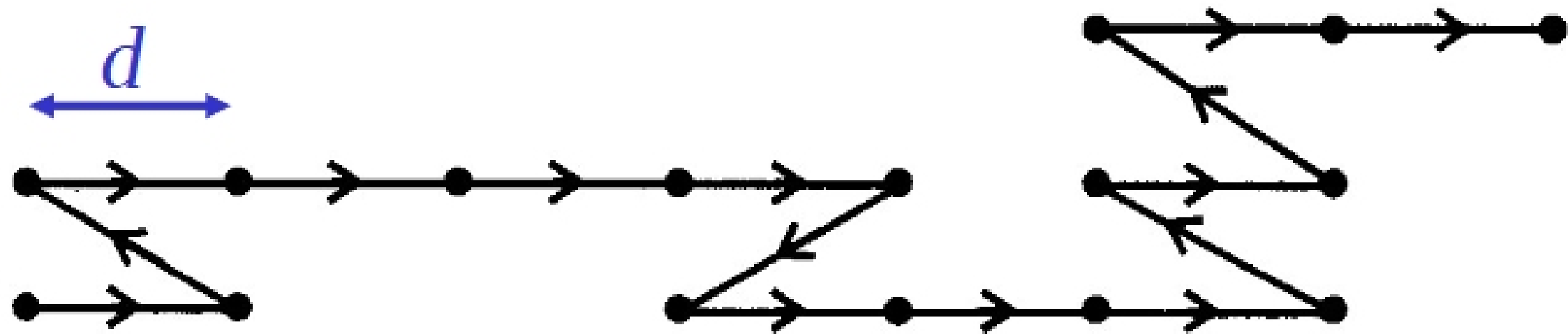
$N = n_+ + n_-$ = total # of links

Length $l = (n_+ - n_-)d = (2n_+ - N)d$

$$W(N, n_+) = \frac{N!}{n_+! n_-!} = \frac{N!}{n_+! (N - n_+)!}$$

Dimensionless length: $x = \frac{l}{Nd} = \frac{n_+}{N} - 1$

Rubber band model



$$W(N, n_+) = \frac{N!}{n_+! n_-!} = \frac{N!}{n_+! (N - n_+)!}$$

Sterling's approximation: $\ln(N!) = N \ln N - N$

$$\ln W = N \ln N - n_+ \ln n_+ - (N - n_+) \ln (N - n_+)$$

$$= - N \frac{n_+}{N} \ln \frac{n_+}{N} - \frac{n_+}{N} \ln \frac{n_+}{N} - \frac{n_+}{N} \ln \frac{n_+}{N}$$