Summary of lecture 2

• Einstein's model of a solid: each atom vibrates independently about an equilibrium position. The vibrations are assumed to be simple harmonic and of the same frequency.

• If there are N oscillators (N/3 atoms) of angular frequency ω then the total number of quantum states which lead to a solid whose internal energy is $U = \sum_i n_i \hbar\omega = n\hbar\omega$

is

$$g(n,N) = \frac{(N+n-1)!}{n!(N-1)!}$$

• The fundamental assumption of statistical mechanics is that **for a closed system in equilibrium all possible quantum states are equally likely**, i.e. the probability that the Einstein solid is in any particular quantum state is just

$$\frac{1}{g(n,N)}$$