Summary of lecture 11

- In Lecture 10 we derived the familiar results for a classical ideal gas:

$$U = \frac{3}{2} N k_B T \qquad C_V = \frac{3}{2} k_B T$$

- The entropy of a system can be written in a very neat way in terms of the probability to find the system in a particular quantum state:

$$S = -k \sum_i p_i \ln p_i$$

where

$$p_i = P(N_i, E_i) = \frac{\exp\left(\frac{N_i \mu - E_i}{k_B T}\right)}{\mathcal{Z}}$$

is just the Gibbs factor.

- And we derived expressions for the grand partition function of an ideal gas of bosons or fermions and showed that the two are equal in the classical limit.