Summary of lecture 14

• Density of States: tells us the number of single particle states per unit wavenumber or per unit energy, i.e. for a 3-D gas of spinless particles

$$\frac{dn}{dk} = \frac{k^2 V}{2\pi^2}$$
$$\frac{dn}{d\epsilon} = \frac{V m^{3/2}}{\sqrt{2}\pi^2 \hbar^3} \epsilon^{1/2}$$

The formula in terms of energy applies only in the case that the gas particles are moving non-relativistically.

• We calculated the Fermi energy for a 3-D electron gas:

$$\epsilon_F = \frac{\hbar^2}{2m} \left(3\pi^2 \frac{N}{V}\right)^{2/3}$$

• And the internal energy: $U = \frac{3}{5} N \epsilon_F$