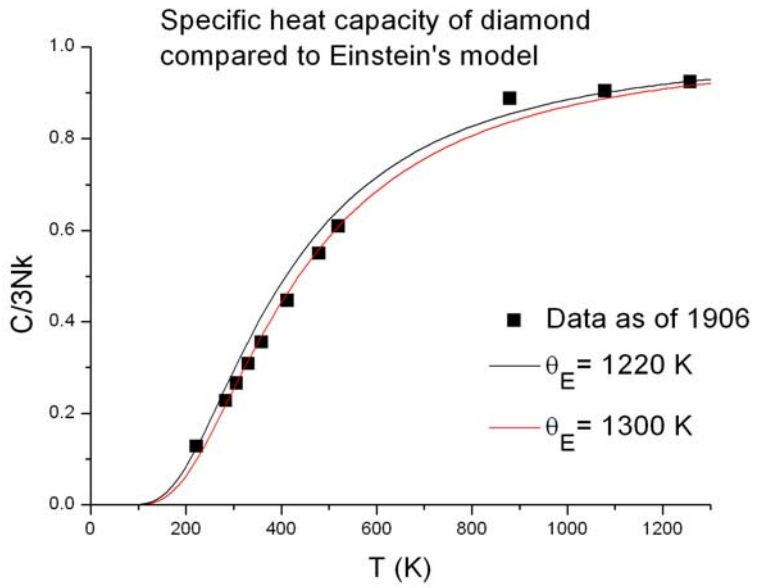
Summary of lecture 4

• Einstein's model of a solid:



$$C = Nk_B \frac{x^2 e^x}{(e^x - 1)^2}$$

$$x = \frac{\hbar\omega}{k_B T} \equiv \frac{\Theta_E}{T}$$

Agrees with classical expectation based on equipartition theorem at large T (C~Nk)

At low T, vanishing heat capacity predicted. It's a quantum effect (freezing out of entropy as system falls into ground state).

•Equilibrium for a closed system occurs when entropy is maximum

$$S \equiv k_B \ln g$$