Class of 07/01/2011

Note Title 05-01-2011

1) Oscillators

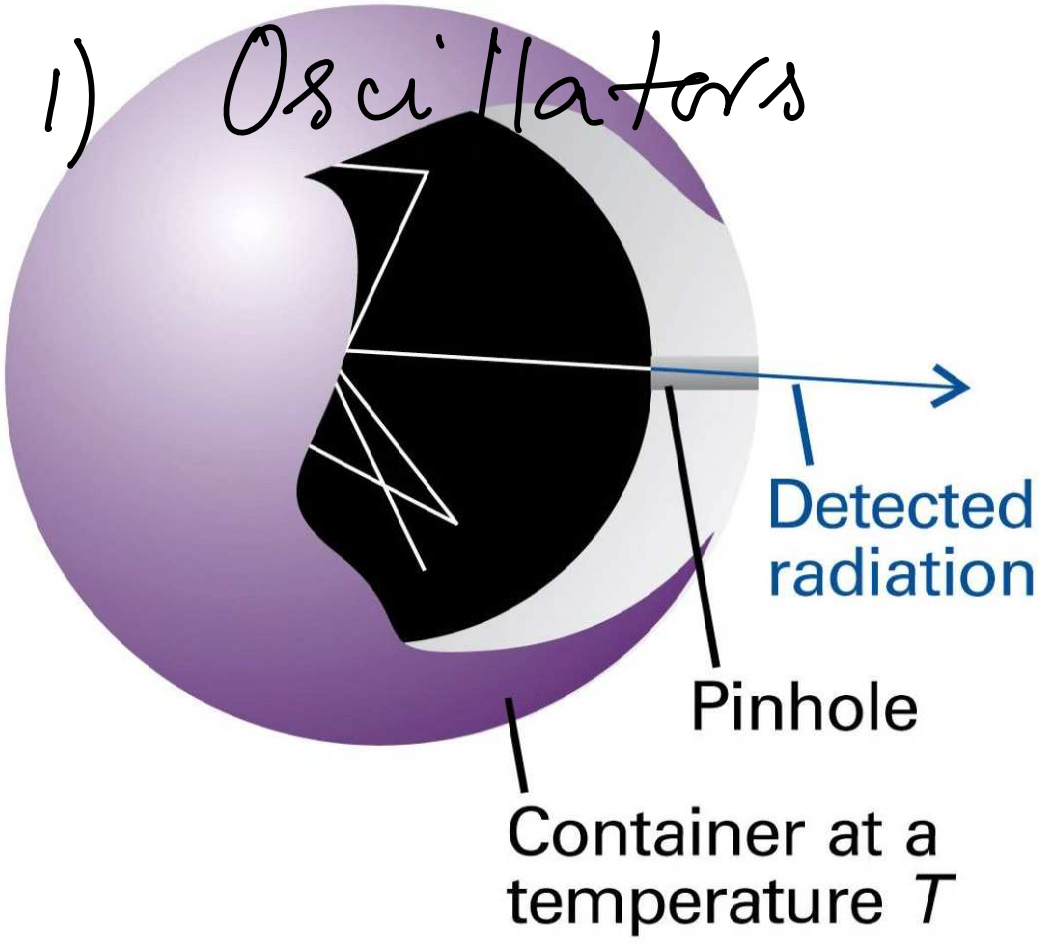
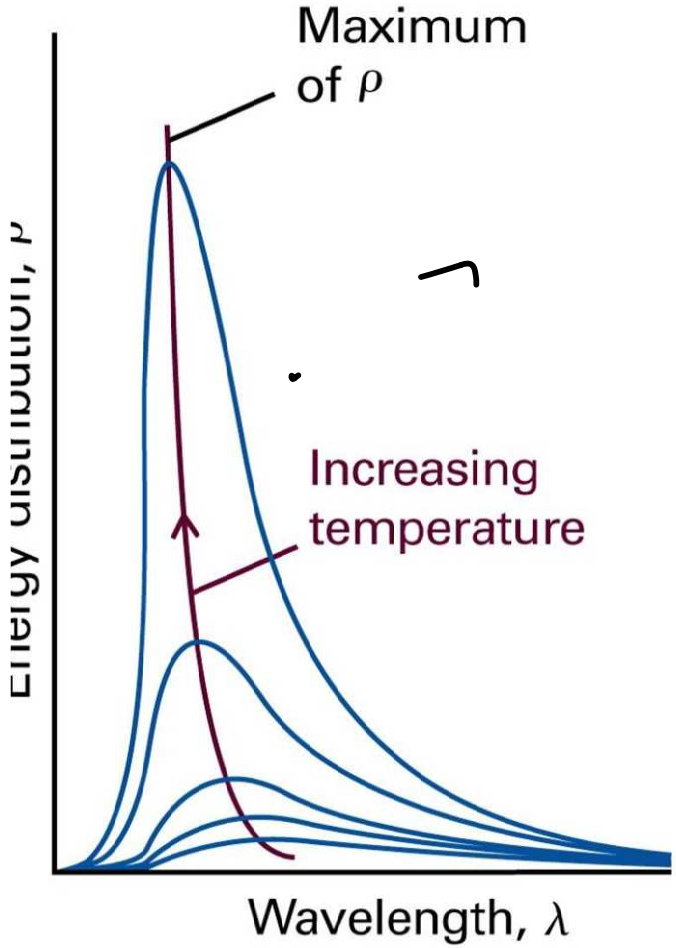


Figure 8-4
Atkins Physical Chemistry, Eighth Edition



ure 8-3
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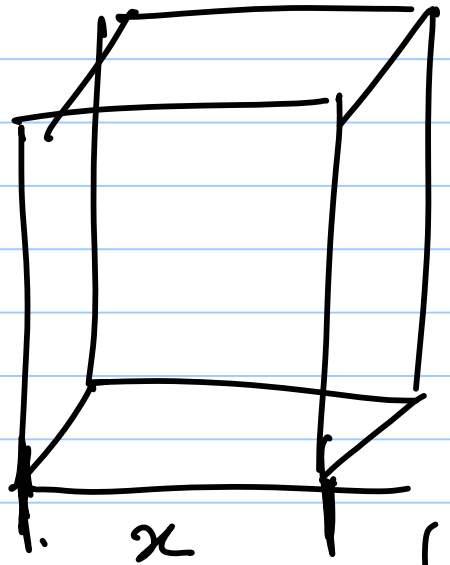
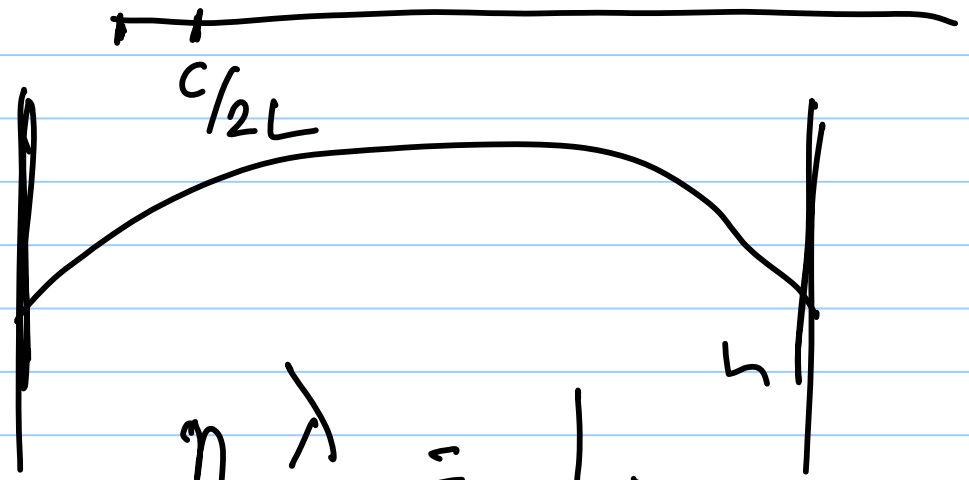
Note Title 07-01-2011

2) Modes





$$n\frac{\lambda}{2} = L$$

integer $\lambda = \frac{2L}{n}$

$n = 1, 2, 3, \cdots$

$$\nu = \left(\frac{nc}{2L}\right)$$

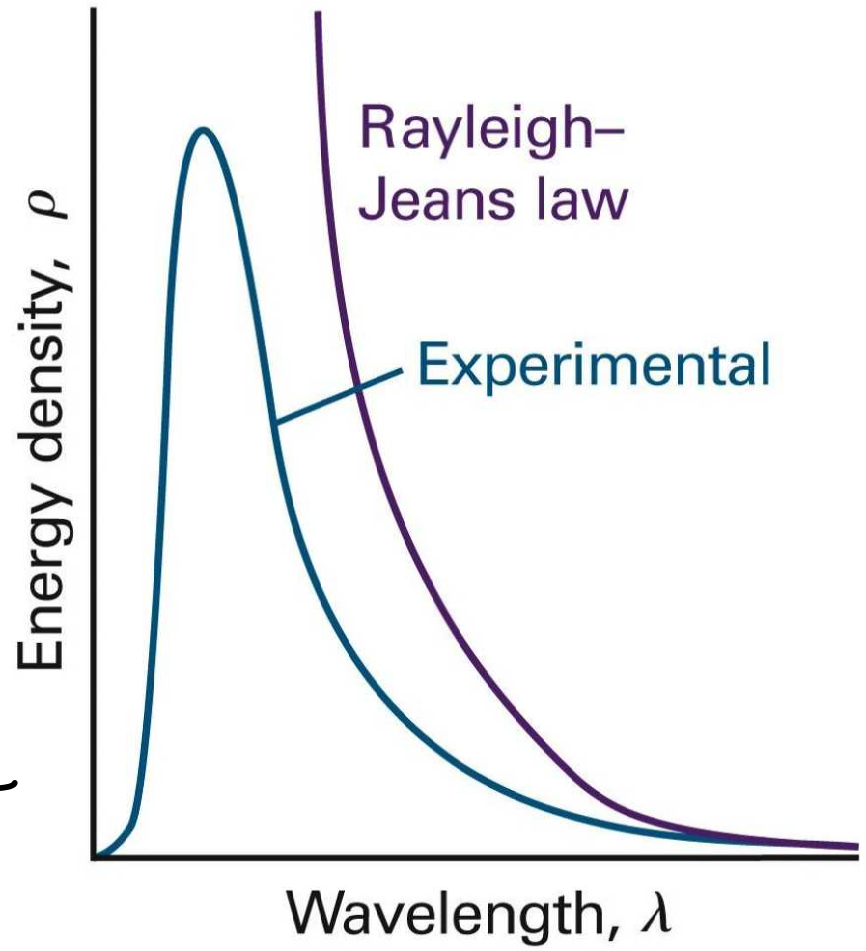


Figure 8-6
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1) Line - spectra
Lyman, Paschen, Brackett, Pfund

2) Photoelectric effect

Heat Capacity

$$U(T) = \frac{3}{2}RT$$

$C_v = 3/2\,R$

$U(T, V)$

$$\left(\frac{\partial U}{\partial T}\right)_V = C_v \quad \text{(heat capacity at constant volume)}$$

$$U(T) \propto \frac{h\nu}{e^{h\nu/kT} - 1} \times \text{Constant}$$

$$\left(\frac{\partial U}{\partial T}\right)_V = C_V$$

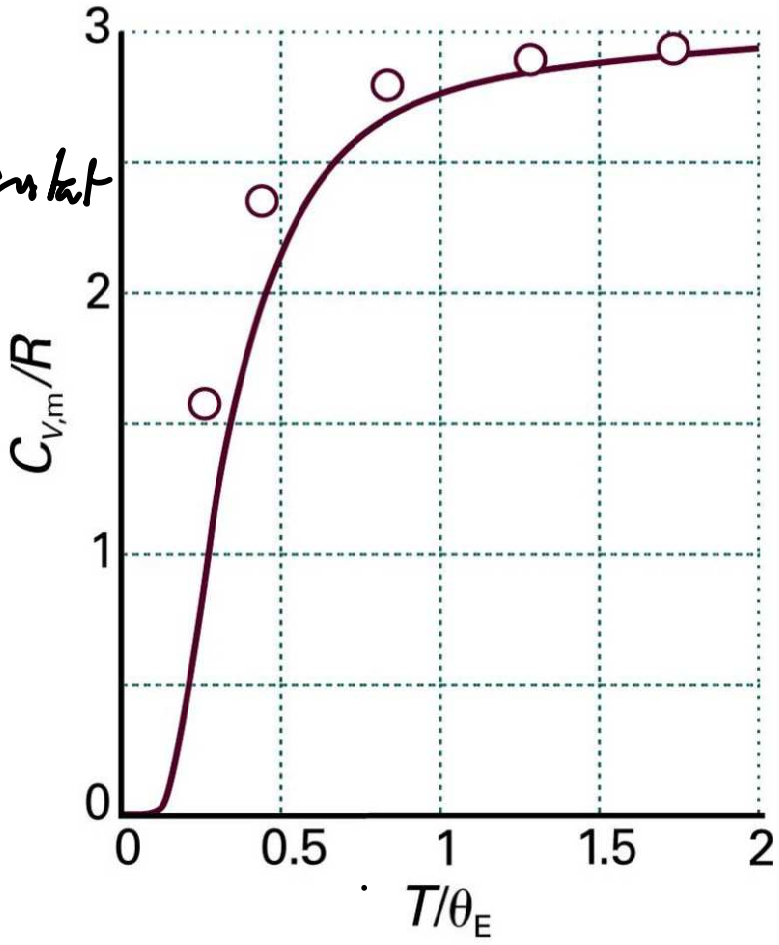

Figure 8-8
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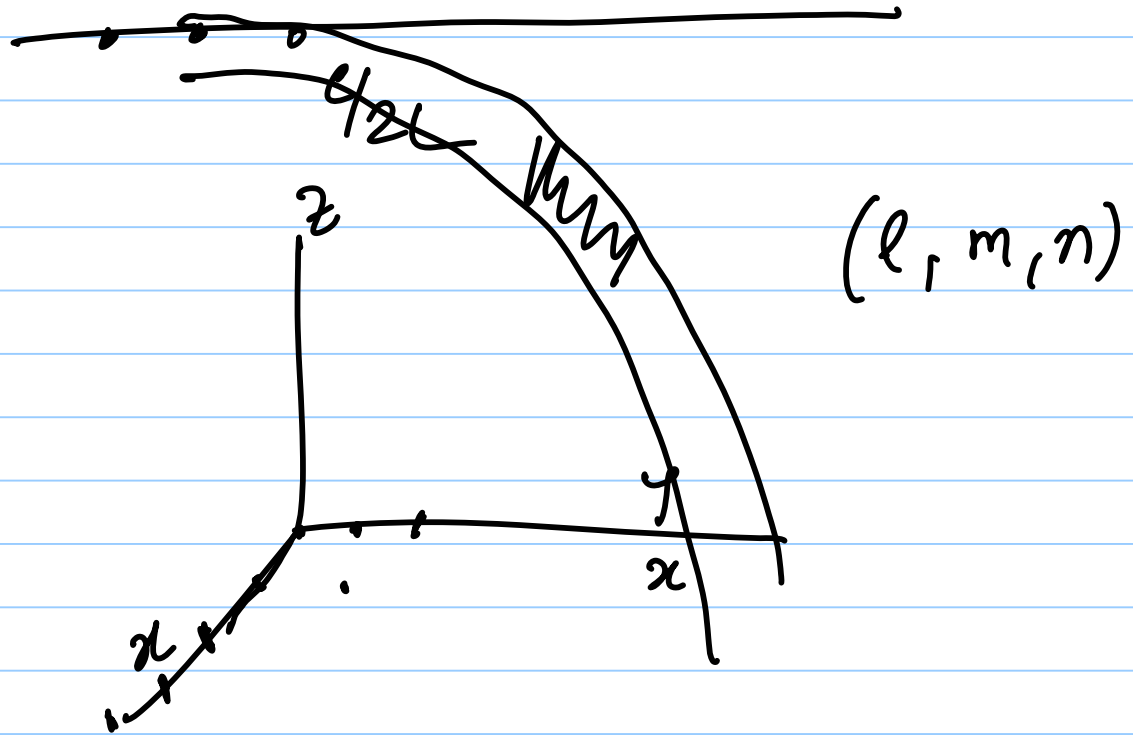

(l, m, n)

Note Title 07-01-2011

Energy density = Number of modes x average energy/mode

average energy/mode (Rayleigh-Jeans) = kT ← equipartition

ASSUME

Note Title 07-01-2011

$$\langle \varepsilon \rangle = \frac{\int e^{-\varepsilon/kT} \varepsilon \, d\varepsilon}{\int e^{-\varepsilon/kT} d\varepsilon}$$

$$\sqrt{\langle \varepsilon^2 \rangle - \langle \varepsilon \rangle^2}$$

prob

$$= kT$$

$$\langle \varepsilon^2 \rangle = \frac{\int e^{-\varepsilon/kT} \varepsilon^2 \, d\varepsilon}{\int e^{-\varepsilon/kT} d\varepsilon}$$

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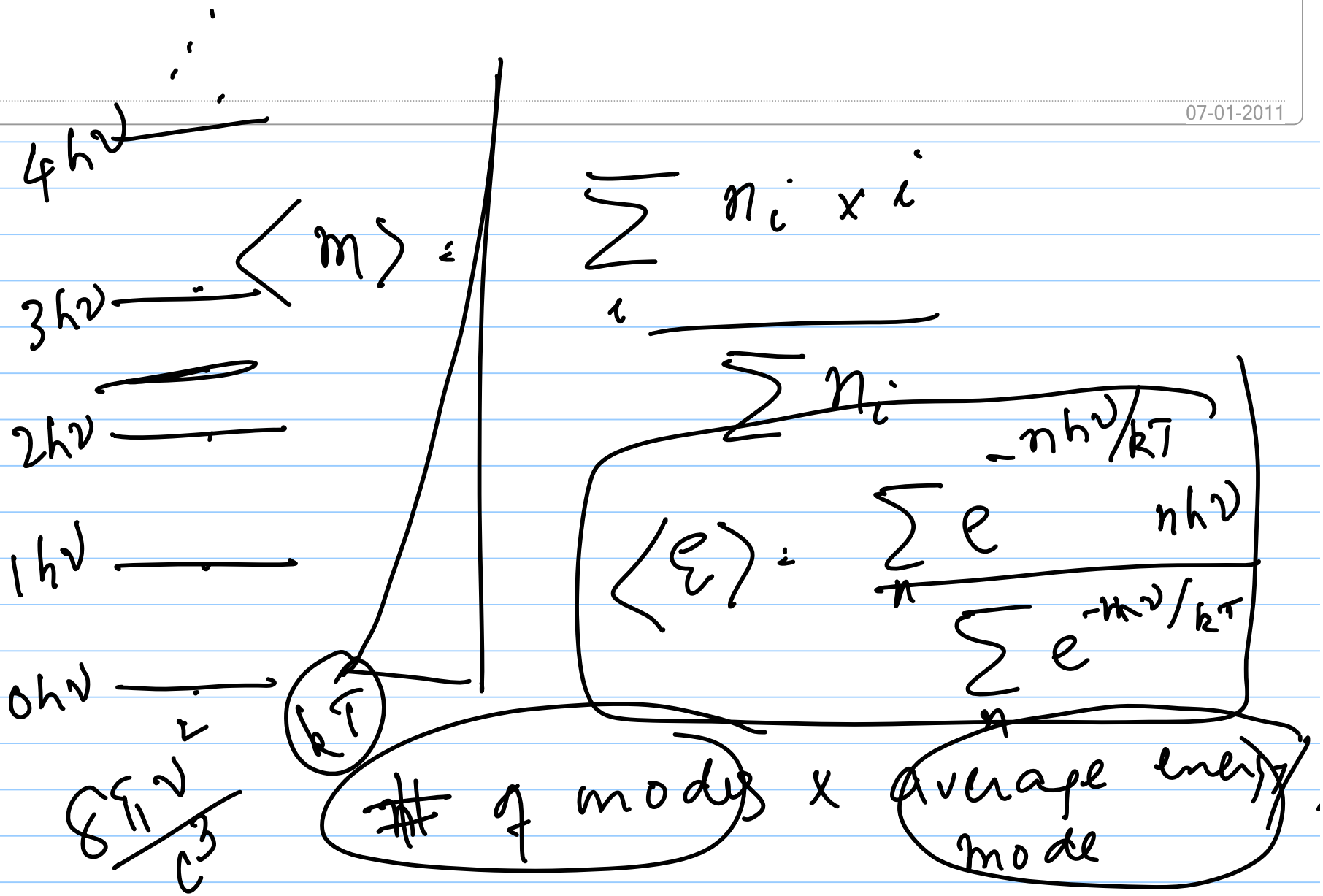

Note Title 07-01-2011

$$\frac{8\pi\nu^2}{c^3} \times \frac{h\nu}{e^{h\nu/kT} - 1}$$

Section 8.2 (a) (b) Atkins

8.2 (c) Heat capacity

8.2 (d) Photoelectric effect

(e) Line spectra, quantum

Not discussed in class: Read at home!