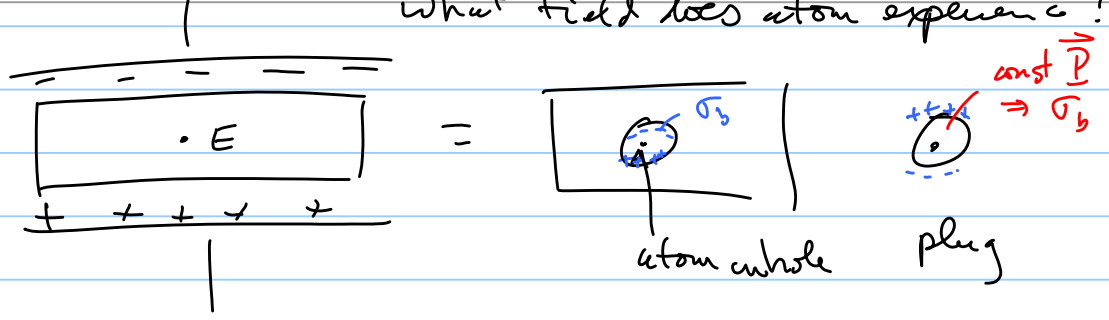
Lecture 24

Note Title 3/15/2006

what field does atom experience?



$$E = E_{hole} + E_{plug}$$

$E_{plug} = \frac{-P}{3\epsilon_0}$

$$E_{hole} = E + \frac{P}{3\epsilon_0}$$

$$P = N\alpha E_{hole} = N\alpha\left(E + \frac{P}{3\epsilon_0}\right)$$

(N: # atoms / vol; α: polarizability of atom)

$$P = \frac{N\alpha}{1 - \frac{N\alpha}{3\epsilon_0}} E$$

($N\alpha$: microscopic parameter)

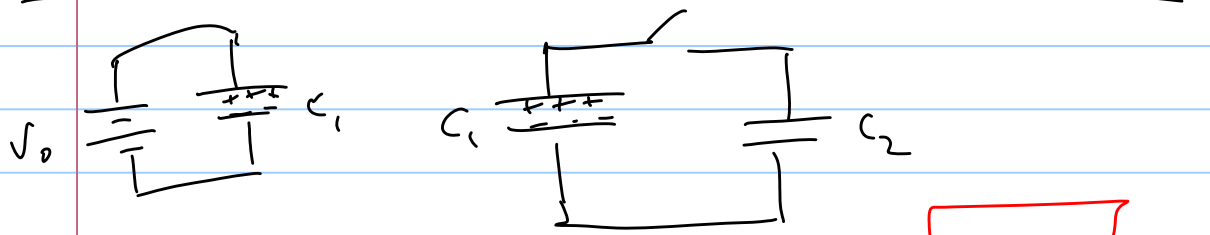
positive feedback

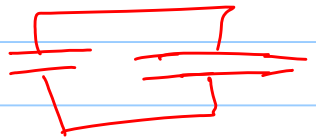
$\frac{N\alpha}{3\epsilon_0} < 1$

$K - 1 = \frac{P}{\epsilon_0 E}$ $\quad \chi_e = K - 1$ measured in cap

↑ microscopic measurement

Clausius - Mossotti eqn





before

Charge is conserved

$$Q_0 = Q_{1f} + Q_{2f}$$

Energy conservation not with resistor $\quad \frac{1}{2} C V_0^2 = \frac{1}{2} C_1 V_f^2 + \frac{1}{2} C_2 V_f^2$

$C = \frac{Q}{V}$

Voltage same $\quad V_{1f} = V_{2f}$

$$\frac{Q_{1f}}{C_1} = \frac{Q_{2f}}{C_2}$$

Overview of Ch 5

$$\vec{F} = q\vec{v} \times \vec{B} + q\vec{E}$$

Wire ~~⟹~~ $\vec{F} = q\vec{v} \times \vec{B} \Rightarrow \int I\, d\vec{l} \times \vec{B}$ (wire)

Sheet ⟹ current ⟹ ——

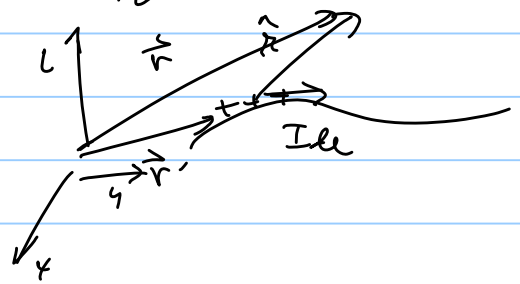
Vol. ⟹ ——

Need $\vec{B}$ assuming magnetostatics (steady currents)

$$\vec{B} = \frac{\mu_0}{4\pi} \int \frac{I\, d\vec{l} \times \hat{r}}{r^2}$$

Sheet ⟹ current

Vol ⟹ current



Electrostatics