EFFECTIVE MASS

$$E = \frac{mV^2}{2} = \frac{m^2 V^2}{2m}$$

$$p = mV$$

$$E = \frac{p^2}{2m}$$

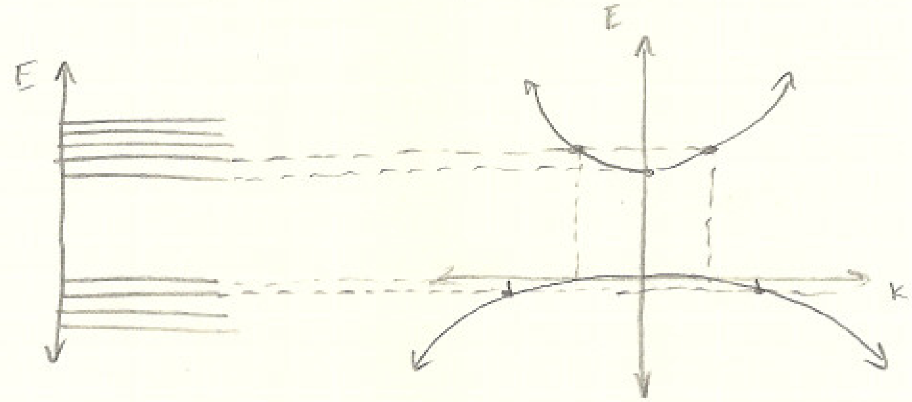
$$\vec{p} = h\vec{K}, \quad \vec{K} = \frac{2\pi}{\lambda}\vec{K_0}$$

$$E = \frac{h^2}{2m}k^2$$

$$\frac{\partial^2 E}{\partial K^2} = \frac{h^2}{m}$$

$$m = h^2 \left(\frac{\partial^2 E}{\partial K^2}\right)^{-1}$$

this means that if E(K) is a second order function, then mass is constant.



different energy states coeside with different energy levels.

the effective mass of the electron is usually less then the effective mass of the holes.

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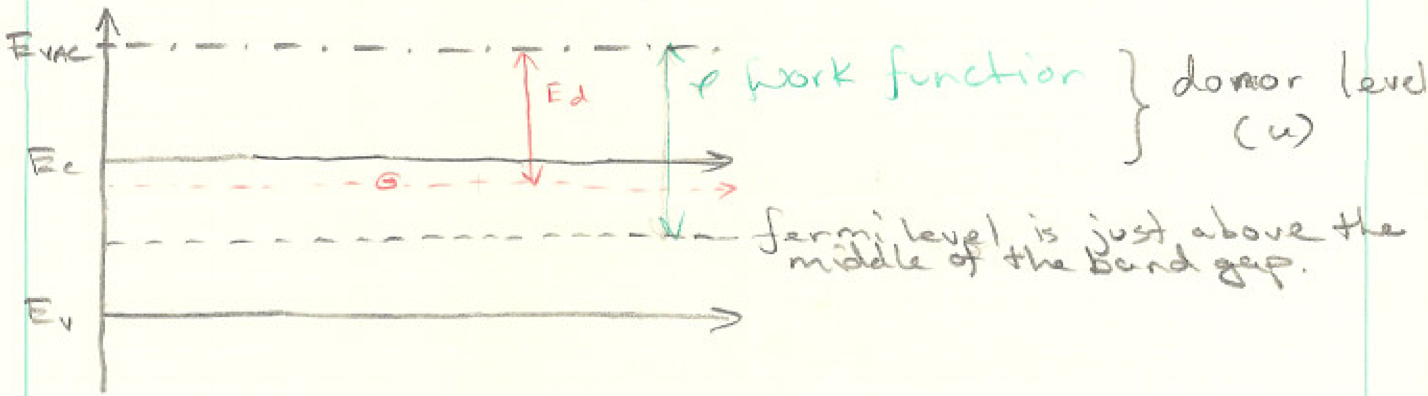

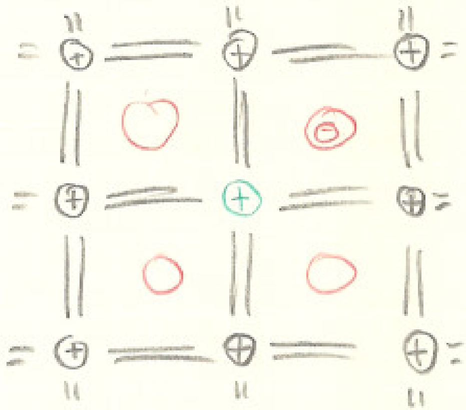

⊕ - Si Atom (4 valances)

⊕ - Posphorous Atom (5 valances)

○ - conduction bands.

⊖ - electron in conduction band.

therefore there is one extra electron in the band gap or the conduction band.

$$\Delta E = E_d - E_c$$

$\Delta E > 0$ real.

$\Delta E = 0$ ideal however unlikely.

we need to give energy to the crystal to have the electron get to conduction band.

these electrons in the conductance band can more easilly be put into the E_{VAC}

Work function φ decreases
fermi level increases.

note: this is N type semiconductor.