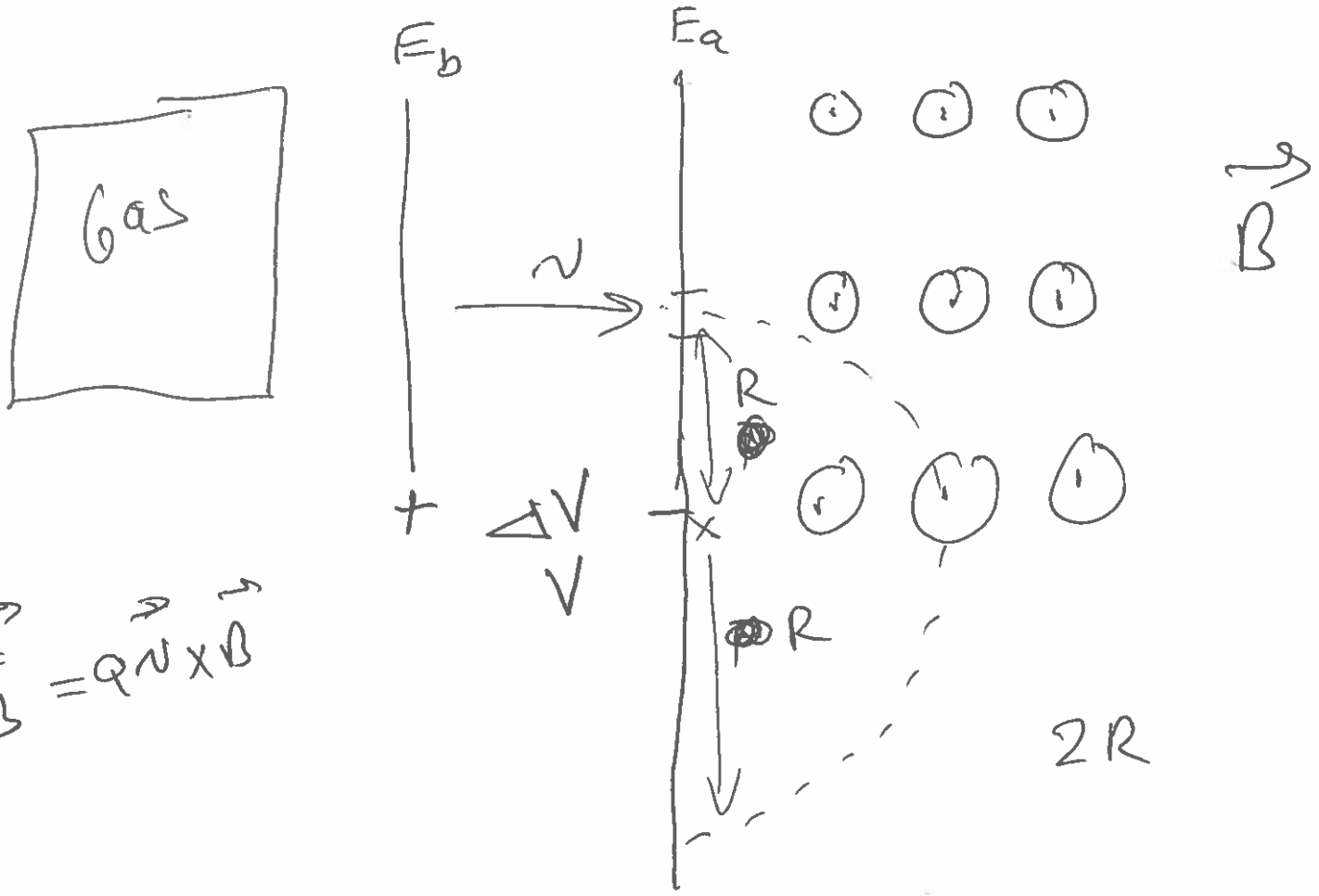


$\vec{F_B} = q\vec{v} \times \vec{B}$

$v = ?$ $\qquad E_b = E_a$

$$qV = \frac{1}{2} mv^2$$

$$v^2 = \frac{2qV}{m}$$

$$v = \sqrt{\frac{2qV}{m}}$$

$$F_B = QvB\sin\theta = QvB\sin(90)$$

$$F_B = QvB = \frac{mv^2}{R}$$

Centripetal motion (uniform circular motion)

$$R = \frac{mv^2}{QvB} = \frac{mv}{QB}$$

$$R = \frac{m}{QB}\sqrt{\frac{2QV}{m}} = \sqrt{\frac{m^2}{Q^2B^2}\left(\frac{2QV}{m}\right)}$$

$$\boxed{R = \sqrt{\frac{2Vm}{QB^2}}}$$

Mass Spec comparing ^{12}C with ^{13}C

$m_{^{12}C} = 12.000\ U$

$m_{^{13}C} = 13.003\ U$

U = atomic mass units

~~$1\ U = 1.67 \times 10^{-27}\ kg$~~

$1\ U = 1.67 \times 10^{-27}\ kg$

$$R = \sqrt{\frac{2VM}{QB^2}}$$

$B = 50\ T$

$V = 100\ V$

$$R = \sqrt{\frac{2(100\ V)(12.00\ U)(1.67 \times 10^{-27}\ kg/U)}{(1.6 \times 10^{-19}\ C)(50\ T)^2}}$$

$$R = \sqrt{\frac{4.008 \times 10^{-24}}{\text{~~4.1 X 10}^{-15}\text{~~}\ 4.0 \times 10^{-16}}}$$

$$= \sqrt{1. \times 10^{-8}\ m^2} = 10^{-4}\ m$$

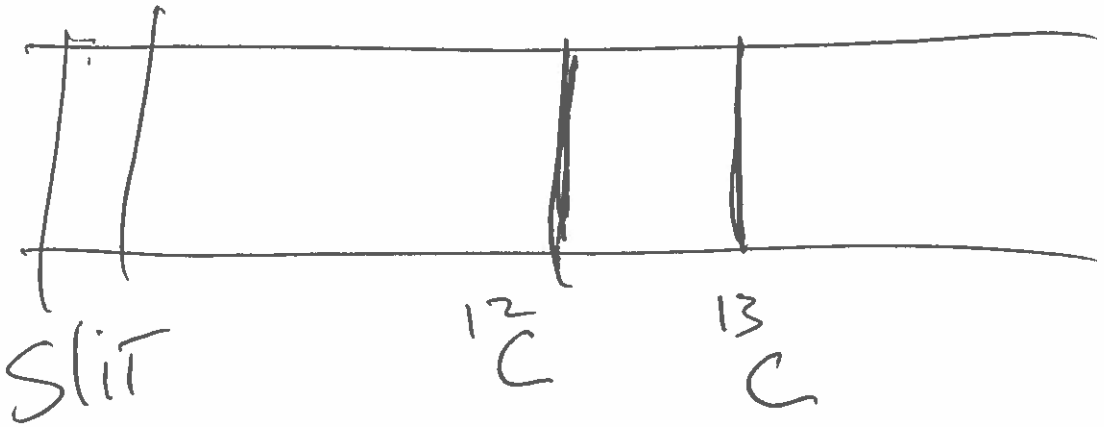
$$R = \sqrt{\frac{2(100V)(13.003\ U)(1.67\times10^{-27}\ kg/U)}{(1.6\times10^{-19}C)(5.0\ T)^2}}$$

$$= \sqrt{\frac{4.343\times10^{-24}}{4.0\times10^{-16}}}$$

$$= \sqrt{1.086\times10^{-8}} = 1.04\times10^{-4}\ m$$

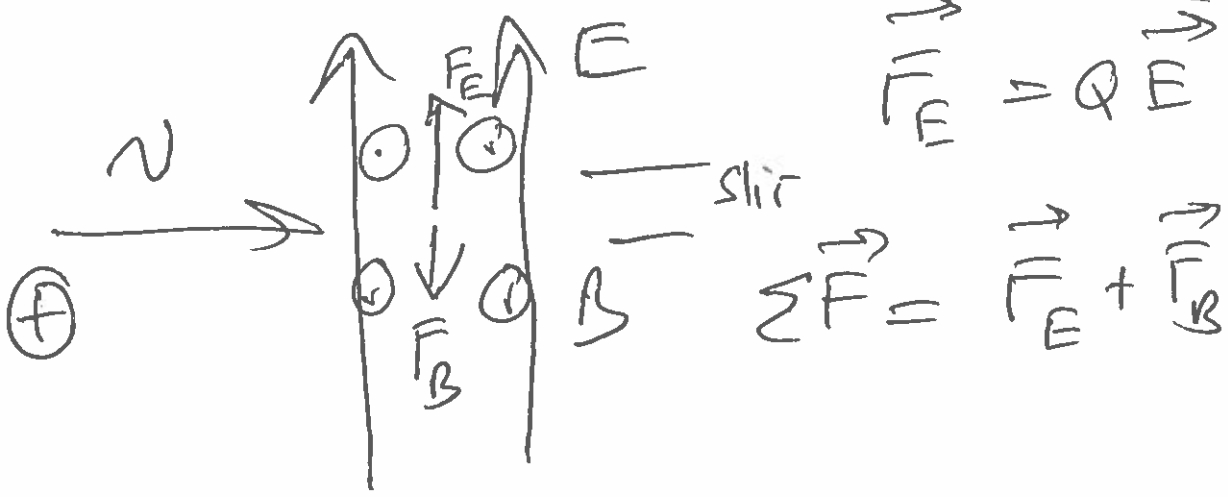
$$R_{12_C} = 1\times10^{-4}\ m = 0.10\ mm$$

$$R_{13_C} = 0.104\ mm$$



$$R = \sqrt{\frac{2VM}{qB^2}}$$

Velocity Selector



$$\vec{F}_E = Q\vec{E}$$

$$\Sigma\vec{F} = \vec{F}_E + \vec{F}_B$$

$$\Sigma\vec{F} = QE\,\hat{up} + QvB\,\hat{down}$$

$$\Sigma\vec{F} = QE - QvB = 0$$

$$QvB = QE$$

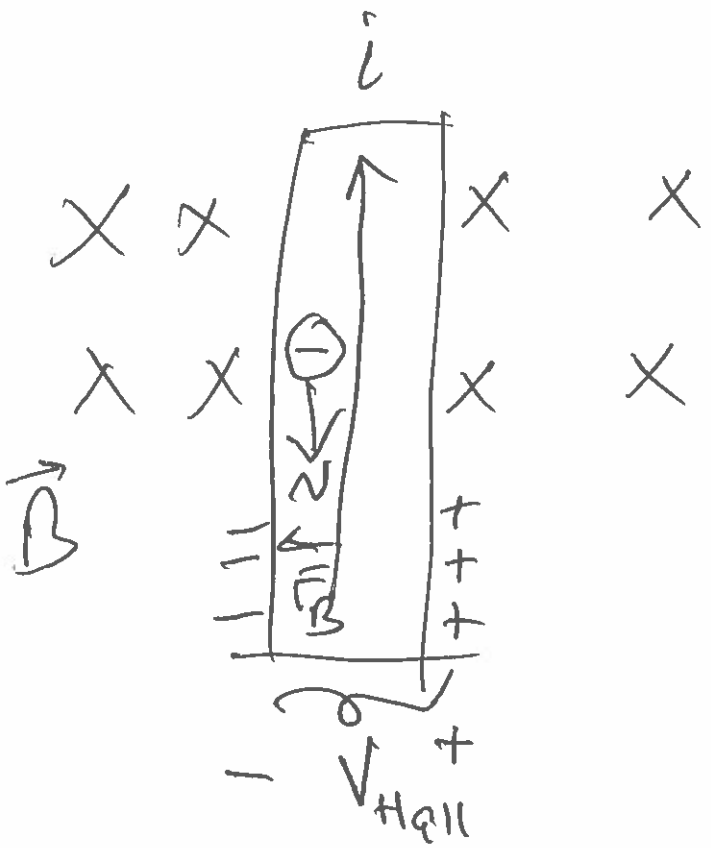
$$\boxed{v = \frac{E}{B}}$$

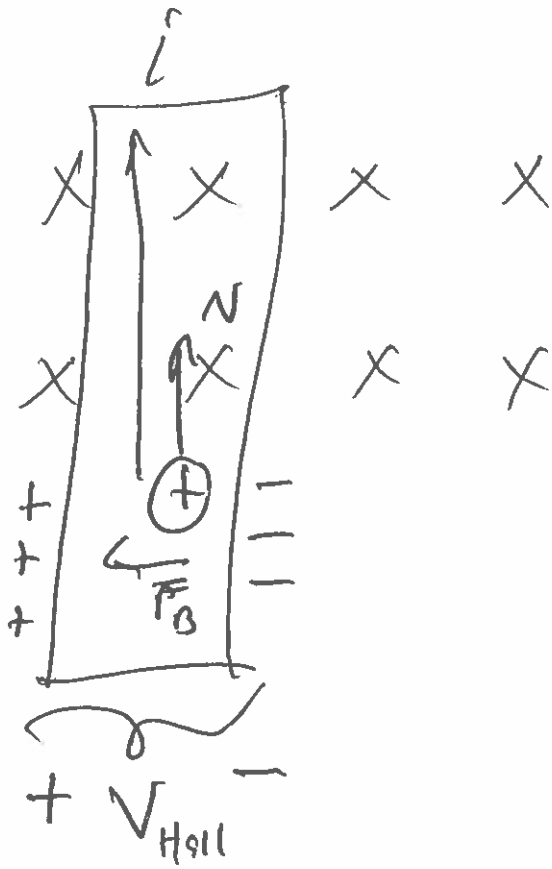
$E = 5.6 \times 10^4$ N/C

$B = 50$ T

$$v = \frac{5.6 \times 10^4 \text{ N/C}}{50 \text{ T}}$$

$$v = 1{,}120 \text{ m/s}$$





Dominant Negative charge carriers

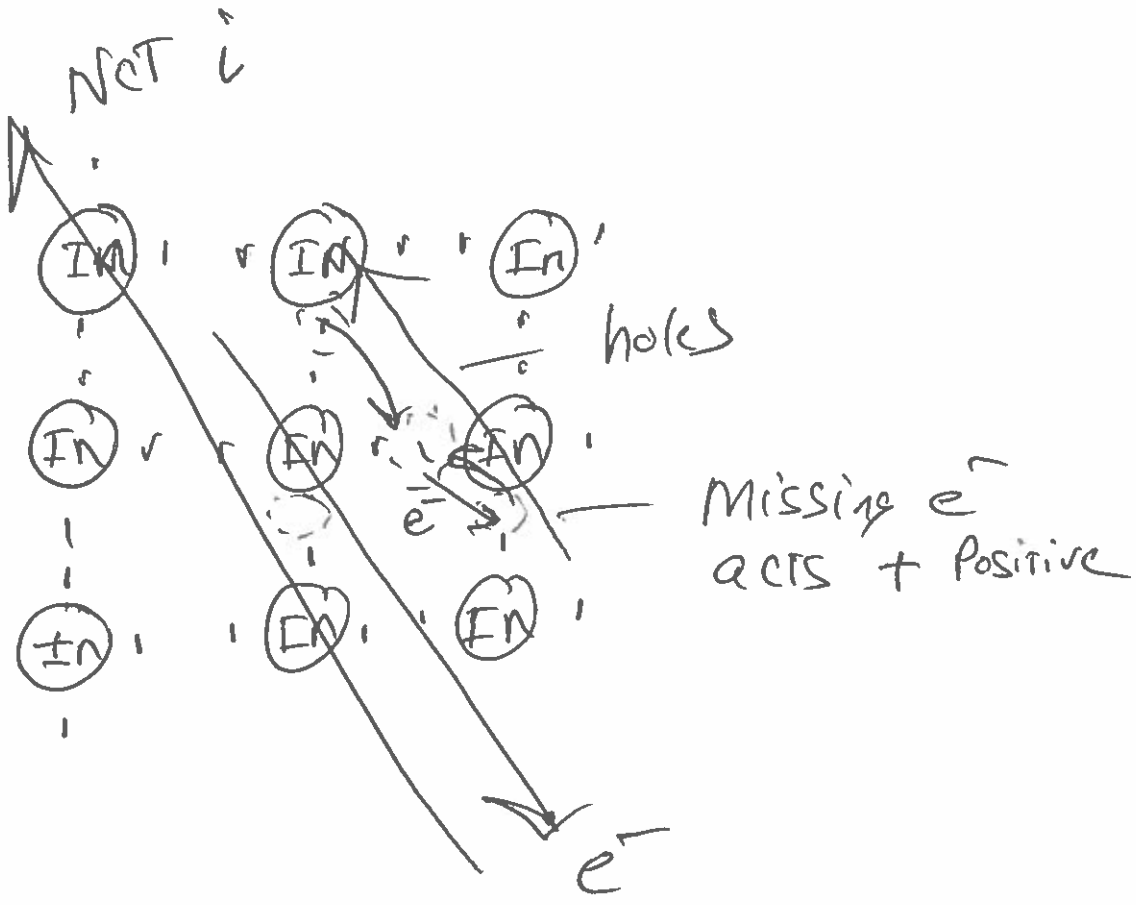
Cu, Ag, Au, Li, K, Na

Be, As, In, Al

Dominant Positive charge carriers

Positive Charge Carriers

Protons do NOT move in normal conduction!



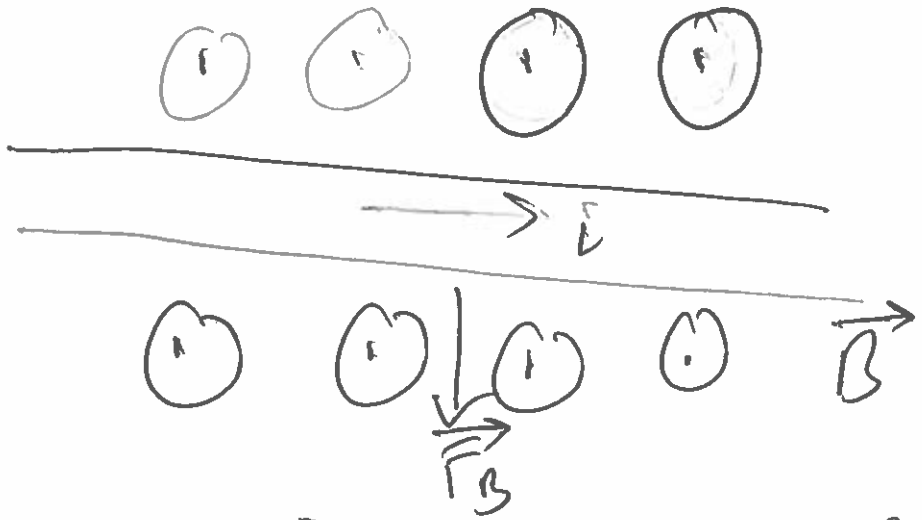
$$F_B = QvB\sin\theta$$

Multiply by $\frac{t}{t}$

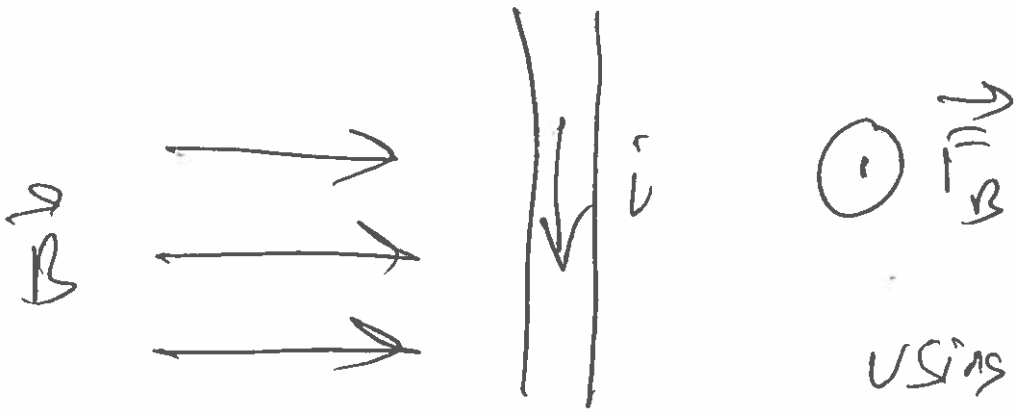
$$F_B = \frac{Q}{t}(vt)B\sin\theta$$

$$= iLB\sin\theta$$

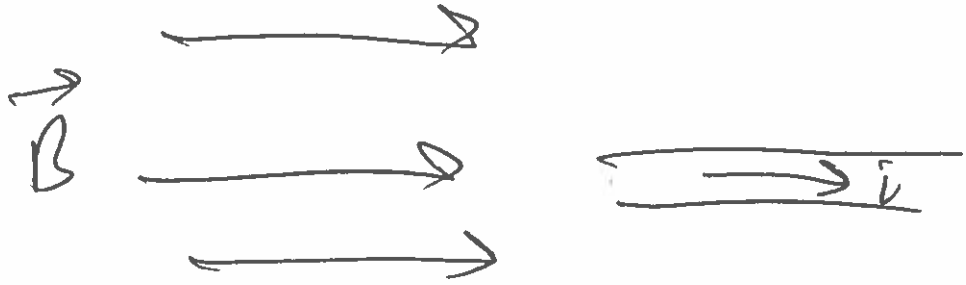
$$\vec{F}_B = i\vec{L}\times\vec{B}$$ — Force of a Magnetic field Acting on a current Carrying wire.



direction of $\vec{L}$ is direction of current



USIS $\vec{F}_B = i\,\vec{L} \times \vec{B}$



$\vec{F}_B = 0$