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(you can call me "Mike")
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Welcome!

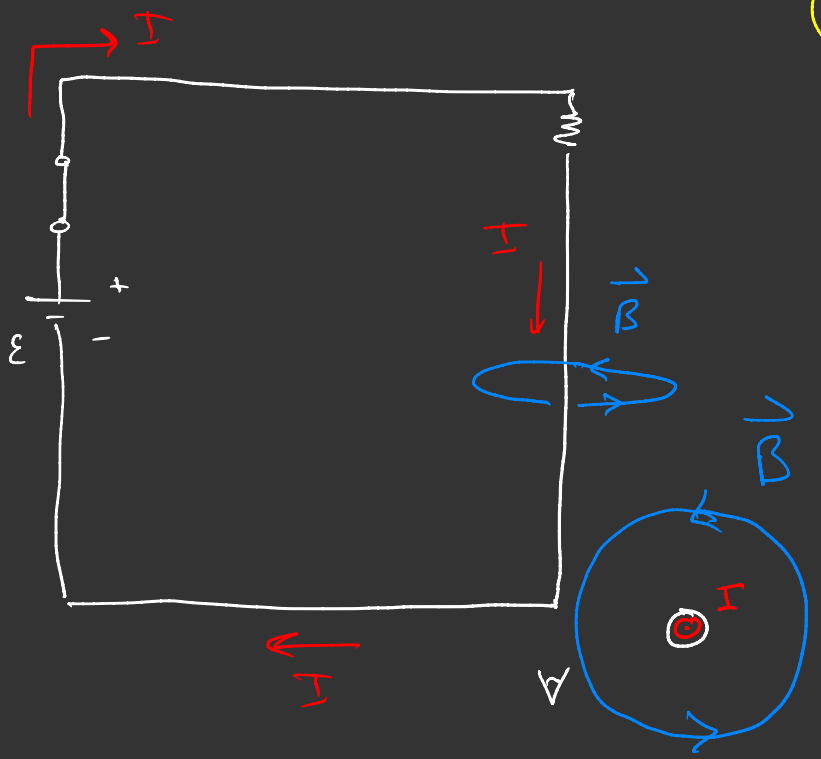
# Physics 194 - Lecture 9

Have a question during class? Please ask it right away, even if it means interrupting in the middle of a thought. I want you to!

## Agenda

- The magnetic force, quantitatively
- The magnetic field produced by currents
- The mass spectrometer
- The Hall effect (if there's time)

Class starts @2:15 pm

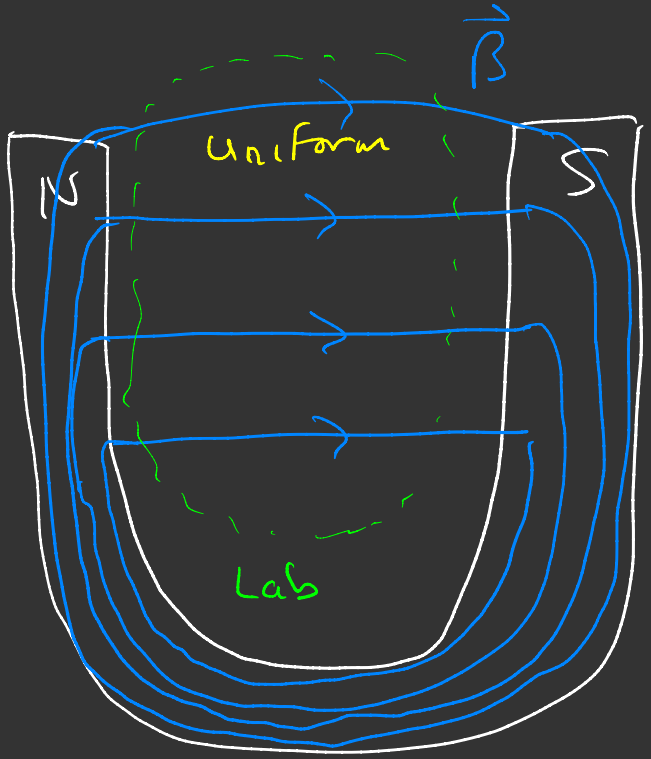


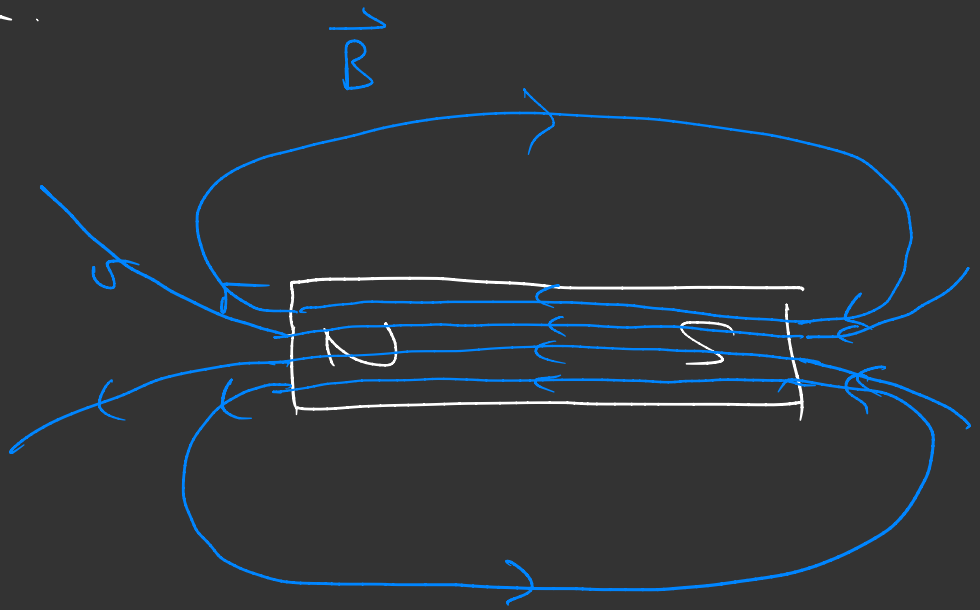

When the current is flowing the compass no longer pointed north!

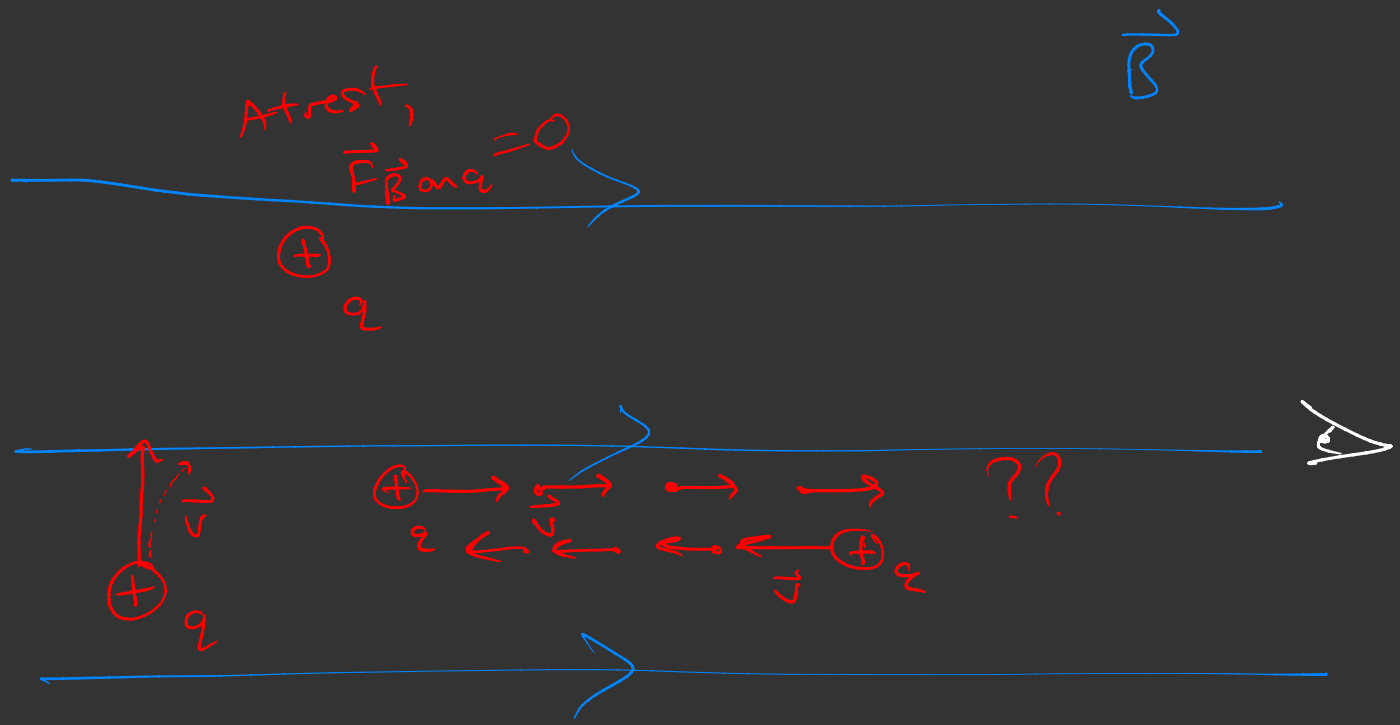
Electric currents produce a magnetic field!

Fundamentally, a moving charged object produces a magnetic field!

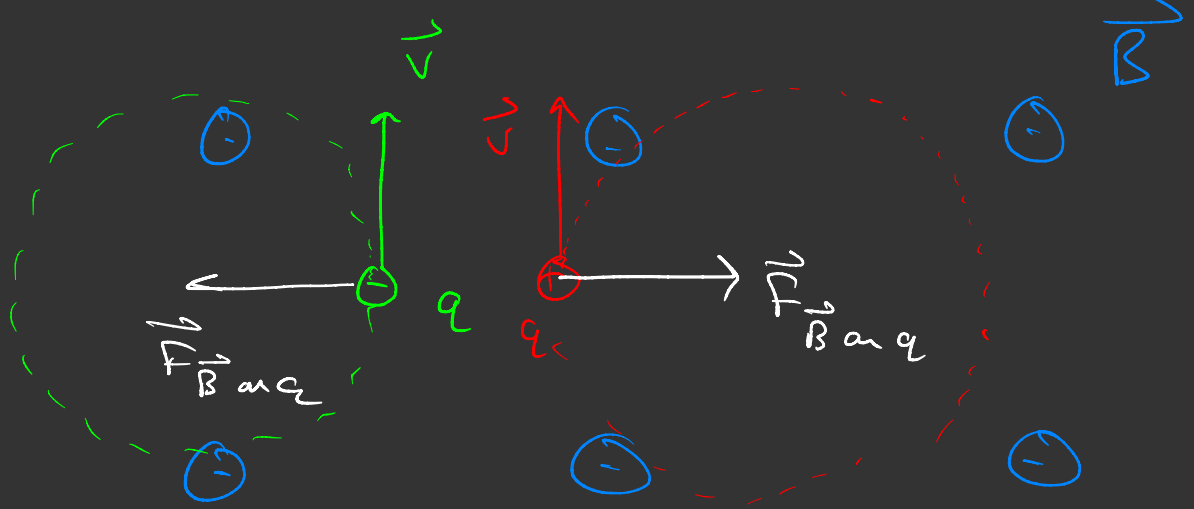
We need to start investigating the magnetic interaction.




B
At rest,
$\vec{F}_{B\text{ on }q} = 0$
q
v
q
v
q
v
q
??

# Right hand rule

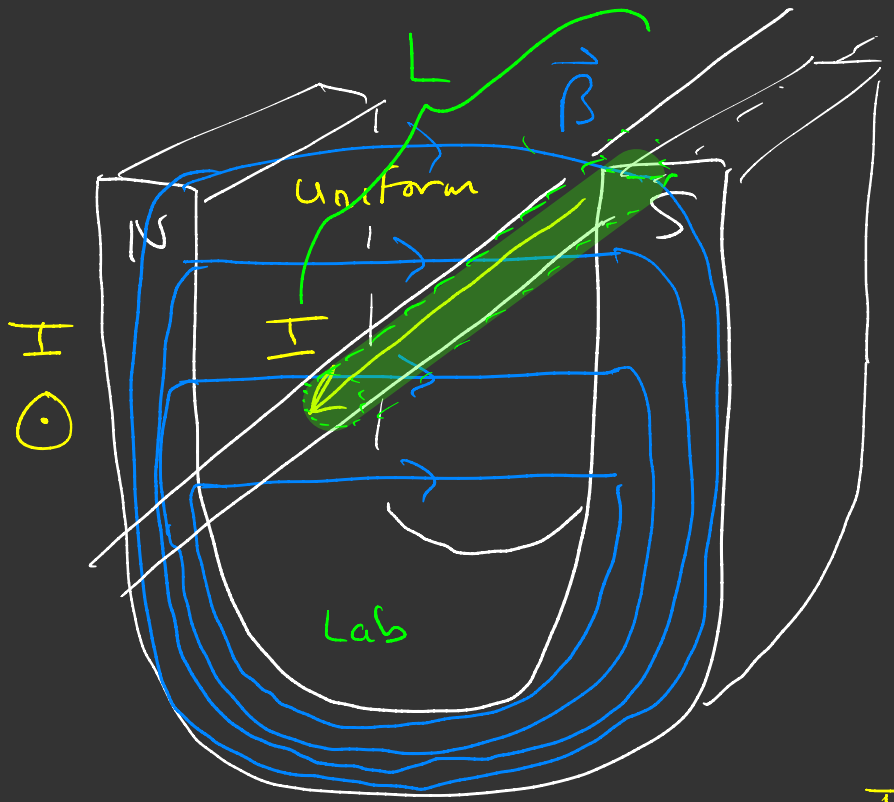



Fingers : $\vec{B}$

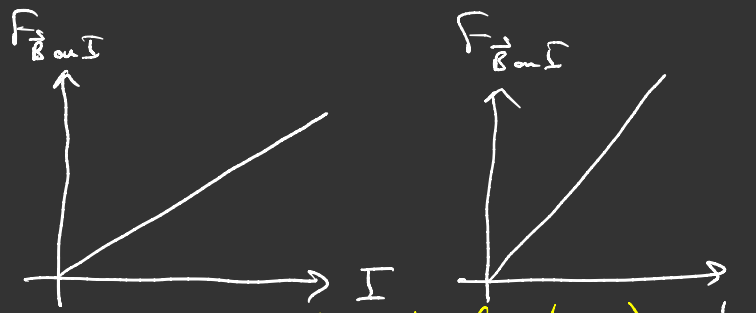
Thumb : $\vec{v}$

Palm : $\vec{F}_{\vec{B} \text{ on } q}$ ↙ +

Knuckles : $\vec{F}_{\vec{B} \text{ on } q}$ ↙ −



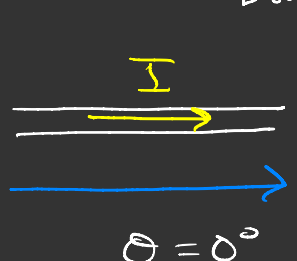

GT: What direction does this wire get pushed by the $\vec{B}$-field?

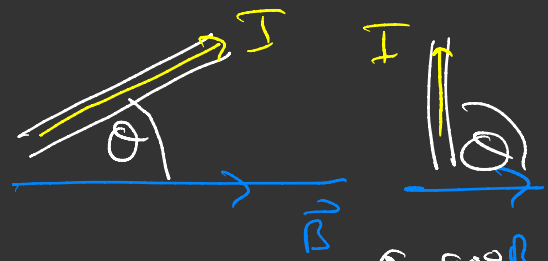


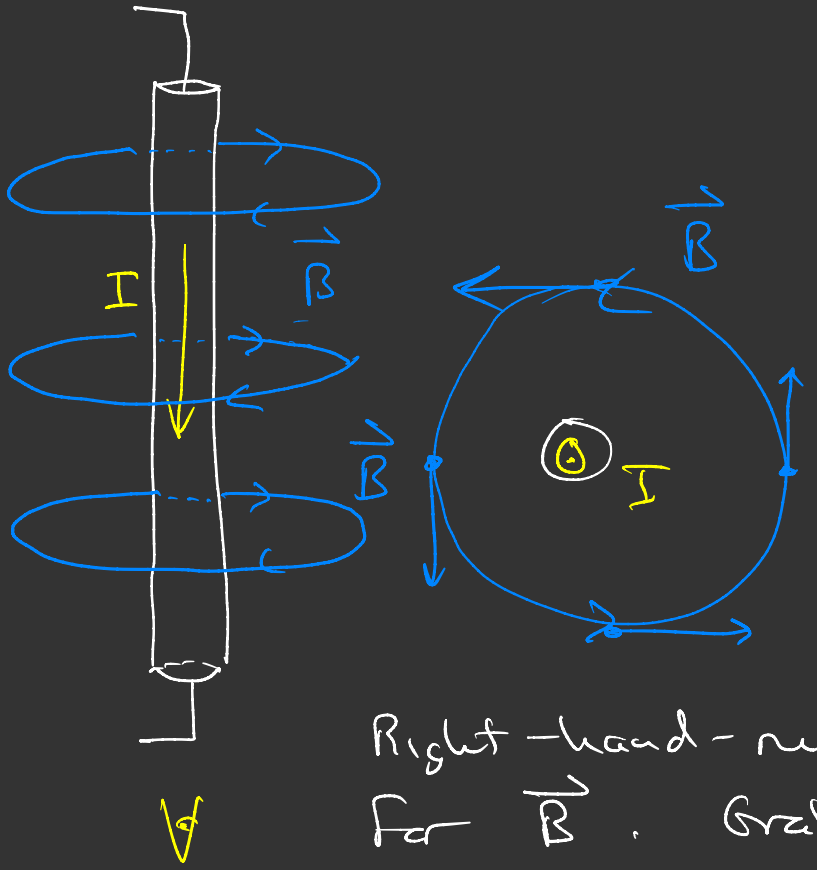

$$F_{\vec{B}\text{ on }I} = I L B \sin\theta$$

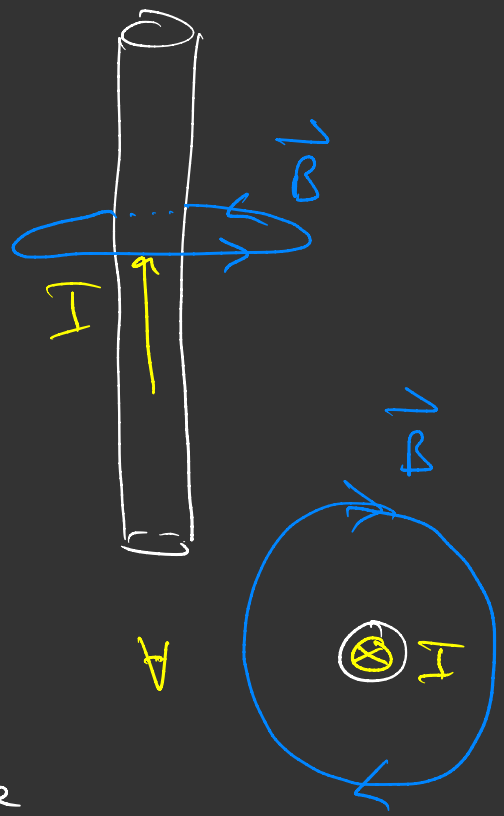
$$\frac{N}{A \cdot m} = T \text{ (Tesla)}$$

$B_{\text{Earth surface}} = 5 \times 10^{-5}\,T$






Right-hand-rule for $\vec{B}$. Grab the current w. thumb in the direction of current.

What about the $\vec{B}$-field produced by a coil w. a current in it?