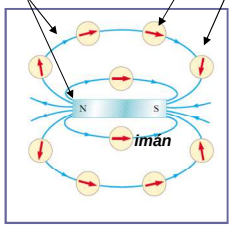
Repaso

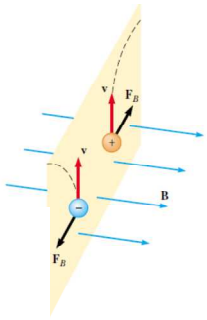
Líneas de Campo magnético

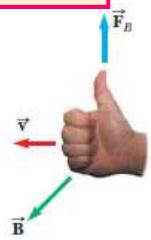
brújulas



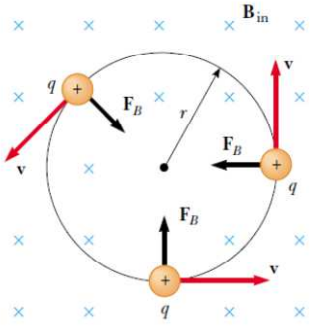
Fuerza de Lorenz

$$\mathbf{F}_B = q\mathbf{v} \times \mathbf{B}$$





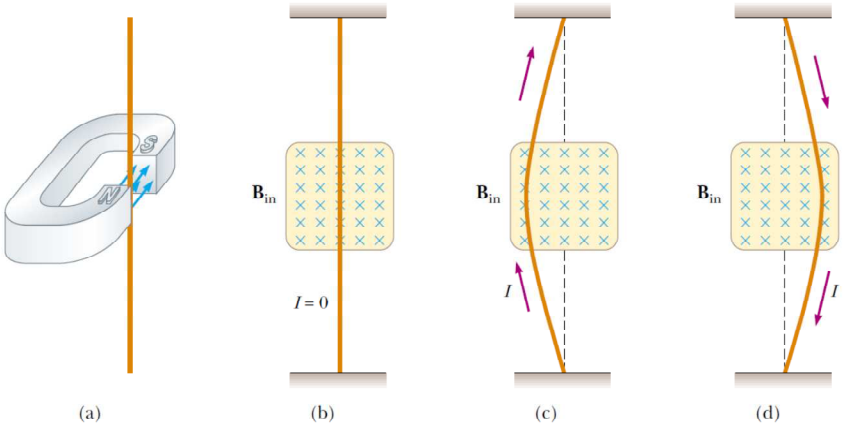
$$1\ \mathrm{T} = 1\ \frac{\mathrm{N}}{\mathrm{A \cdot m}}$$



$$r = \frac{mv}{qB}$$

La fuerza magnética puede aumentar la energía cinética??

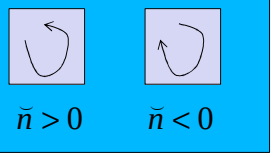
Fuerza magnética sobre un conductor con corriente



$$d\mathbf{F} = I\,d\mathbf{l} \times \mathbf{B}$$

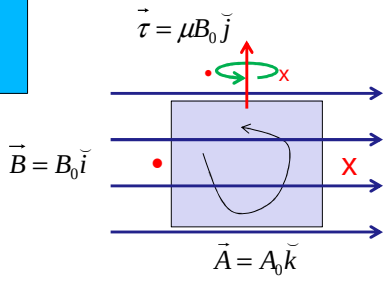
Torque sobre un circuito con corriente en un **B** uniforme

Momento dipolar magnético $\vec{\mu} = IA\breve{n}$

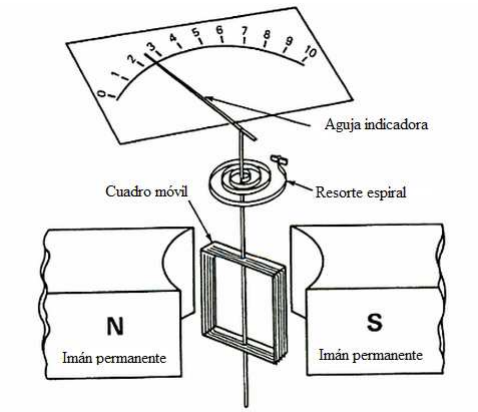


$$\vec{\tau} = IA\breve{n} \times \vec{B}$$

Torque $\vec{\tau} = \vec{\mu} \times \vec{B}$

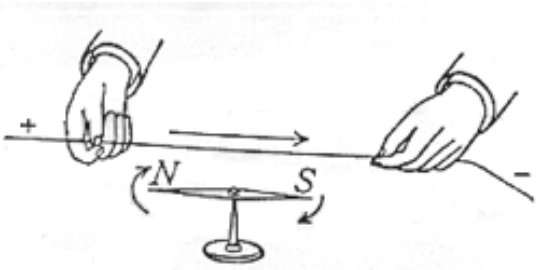


Galvanómetro

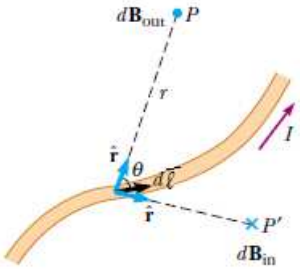


Oersted (1820)

Hans Christian Ørsted
(1777-1851)



Campo magnético generado por un conductor: Ley de Biot-Savart

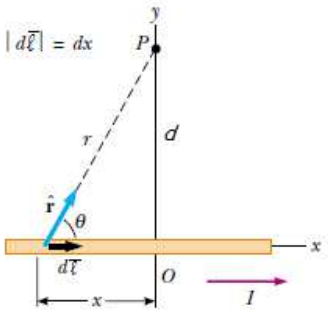


$$d\vec{B}(\vec{r}) = \frac{\mu_0}{4\pi}\frac{Id\vec{l}\times\breve{r}}{r^2}$$

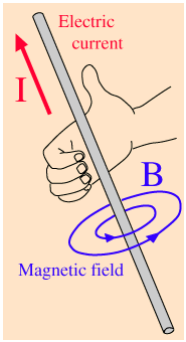
$\mu_0 = 4\pi 10^{-7}\ N/A^2$

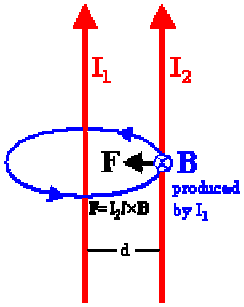
Permeabilidad magnética

Campo magnético generado por un conductor lineal infinito

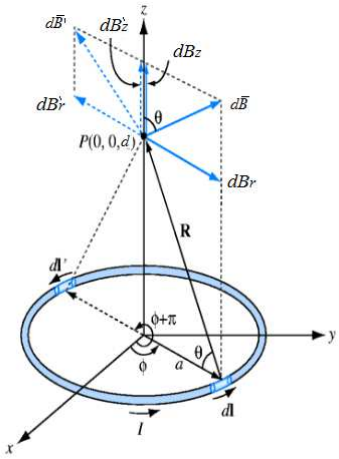


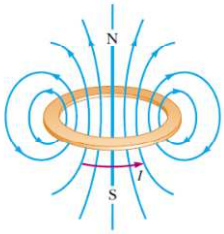
$$B = \frac{\mu_0 I}{2\pi d}$$



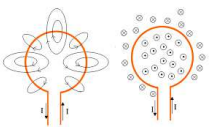


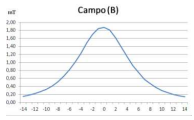
Aplicaciones de Biot-Savart: espira con corriente



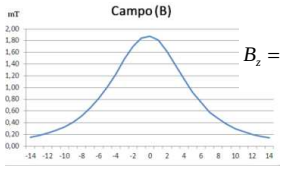


$$B_z = \frac{\mu_0 I 2\pi a^2}{4\pi (d^2 + a^2)^{3/2}}$$

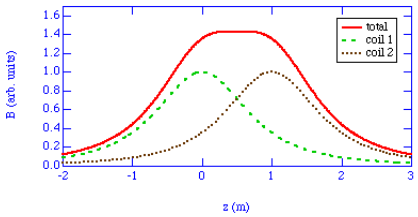


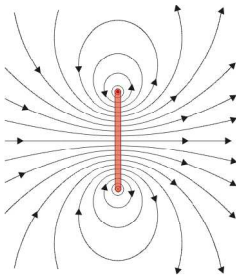


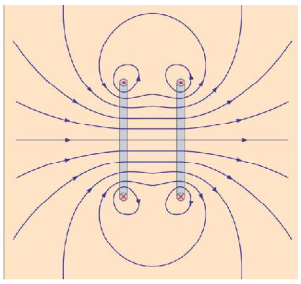
Bobinas de Helmholtz



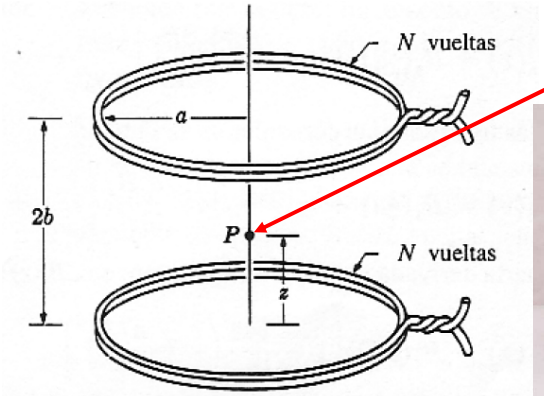
$$B_z = \frac{\mu_0 I 2\pi a^2}{4\pi (d^2 + a^2)^{3/2}}$$







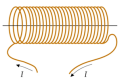
Bobina de Helmholtz

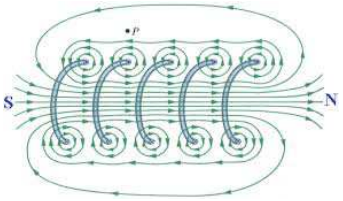


$$B_z = \frac{\mu_0 N I}{a} \frac{8}{5^{3/2}}$$

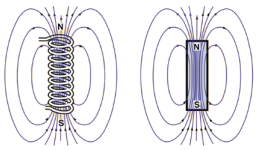
$$B_z(z) = \frac{N\mu_0 I a^2}{2} \left\{ \frac{1}{(z^2 + a^2)^{3/2}} + \frac{1}{[(2b - z)^2 + a^2]^{3/2}} \right\}$$

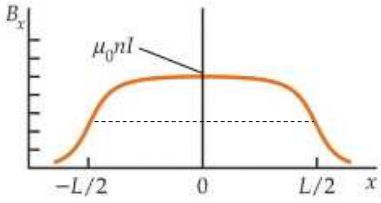
Campo Magnético de un solenoide





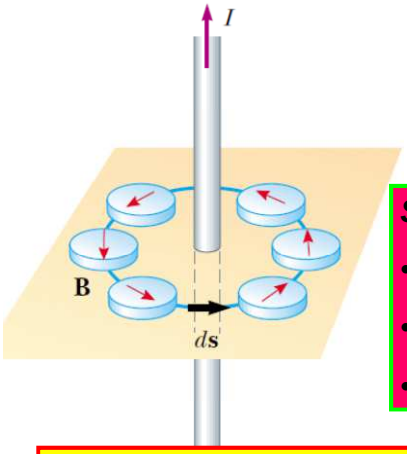
$$B_z(z_0) \cong \frac{\mu_0 N I}{L}$$





El sentido del B depende de la I y del bobinado

Ley de Circuitos de Ampere



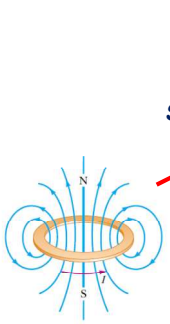
$$\oint \vec{B}, \vec{dl} = \mu_0 I$$

Simetrías para la Ley de Ampere:

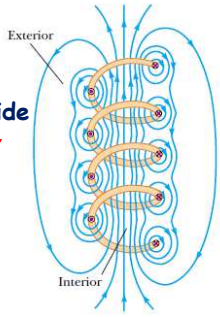
- ***Hilo infinito con corriente***
- ***Solenoide infinito***
- ***Plano infinito con corriente***

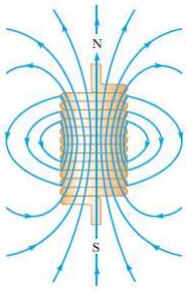
La ley de Ampere es análoga a la Ley de Gauss en electrostática: permite obtener B debido a distribuciones de corriente de gran simetría.

Aplicaciones de la Ley de Ampere



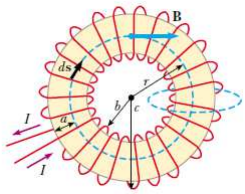
Solenoide





$$B_z(z_0) \cong \frac{\mu_0 NI}{L}$$

Toroide



$$B = \frac{\mu_0 NI}{2\pi r}$$