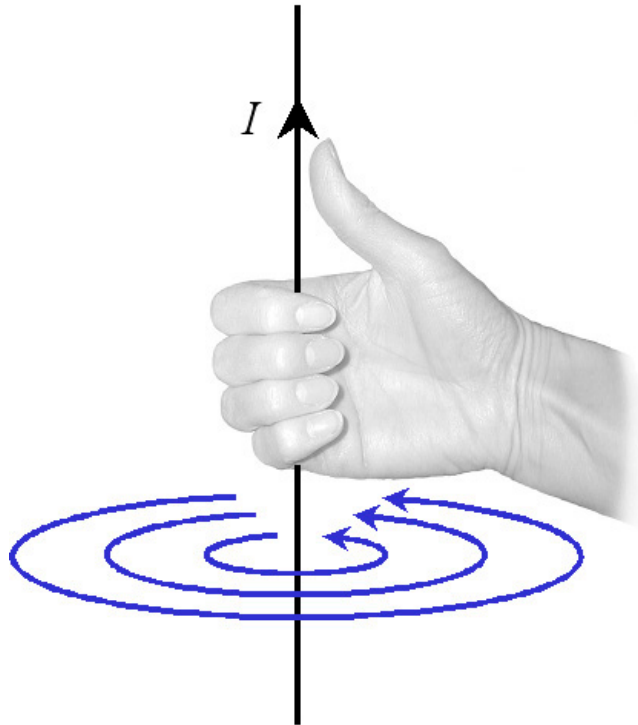


Clase 25

30/04/2013

Lecturas 29.3 - 29.4
30.1 - 30.4

Cálculo del campo magnético debido a una corriente



$$d\vec{B} = \frac{\mu_0}{4\pi} \frac{i d\vec{s} \times \hat{r}}{r^2}$$

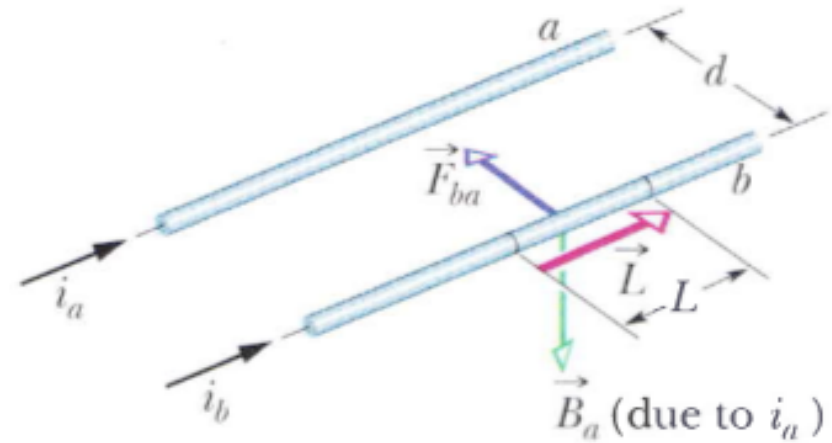


Ley de Biot-Savart



Fuerza entre corrientes paralelas

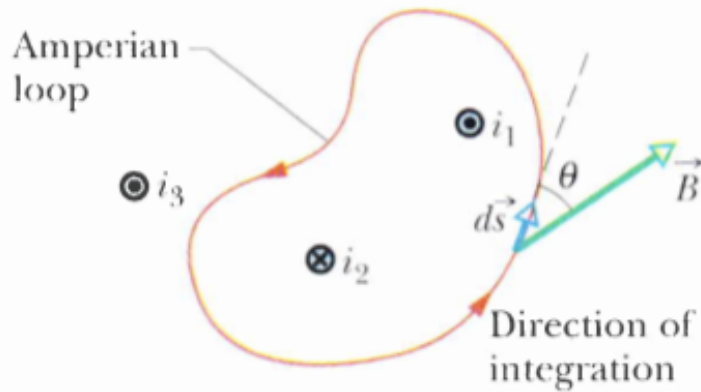
$$B_a = \frac{\mu_0 i_a}{2\pi d}.$$



$$\vec{F}_{ba} = i_b \vec{L} \times \vec{B}_a,$$

$$F_{ba} = i_b L B_a \sin 90^\circ = \frac{\mu_0 L i_a i_b}{2\pi d}.$$

Ley de Ampere

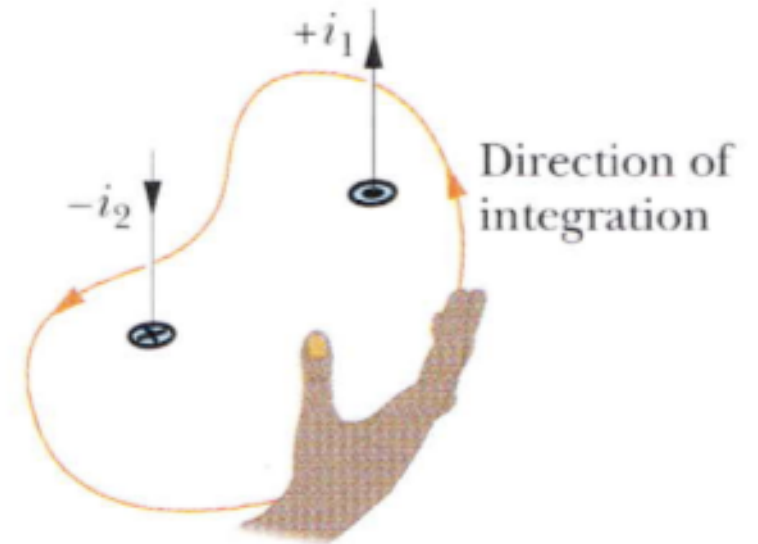


$$\oint \vec{B} \cdot d\vec{s} = \mu_0 i_{\text{enc}}$$

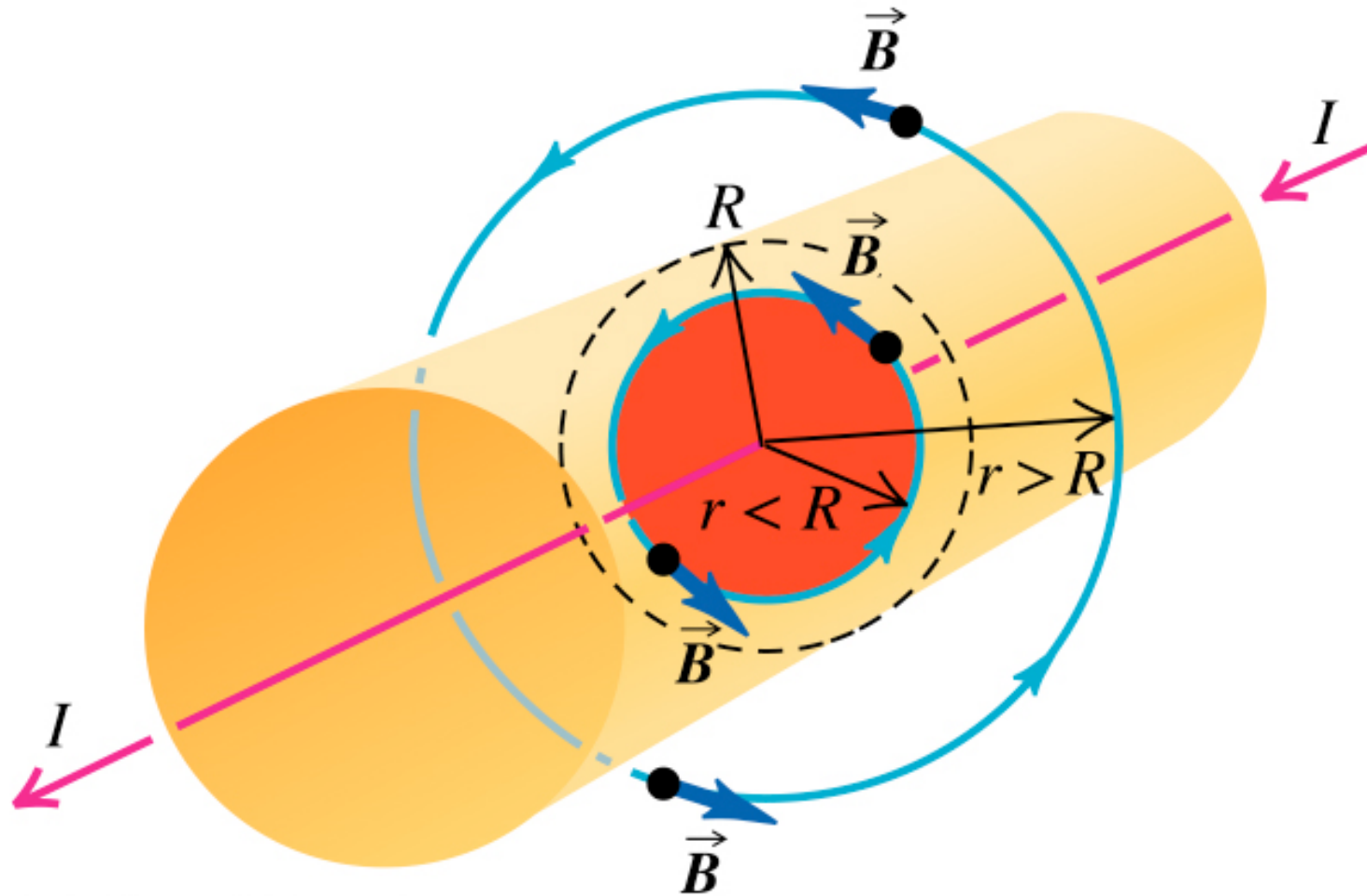
$$\oint \vec{B} \cdot d\vec{s} = \oint B \cos \theta ds = \mu_0 i_{\text{enc}}$$

$$i_{\text{enc}} = i_1 - i_2$$

$$\oint B \cos \theta ds = \mu_0 (i_1 - i_2)$$



Campo magnético en un alambre recto y largo

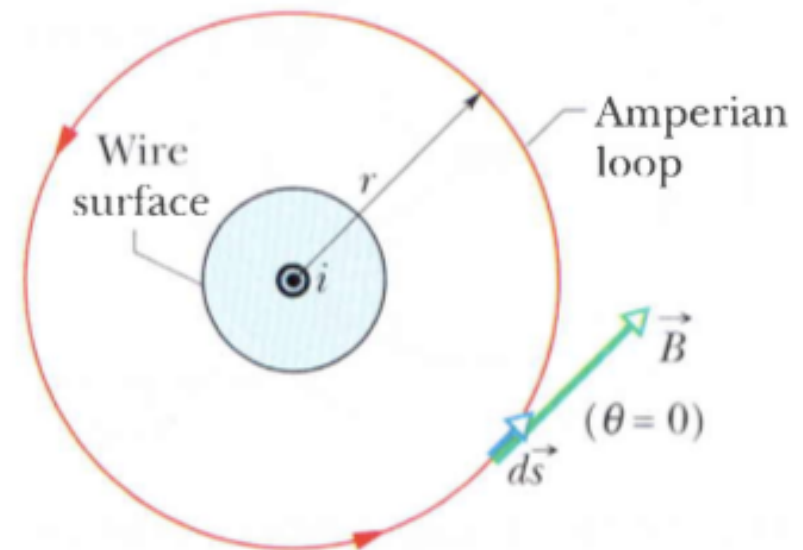


Campo magnético FUERA de un alambre recto y largo con corriente

$$\oint \vec{B} \cdot d\vec{s} = \oint B \cos \theta ds = B \oint ds = B(2\pi r).$$

$$B(2\pi r) = \mu_0 i$$

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



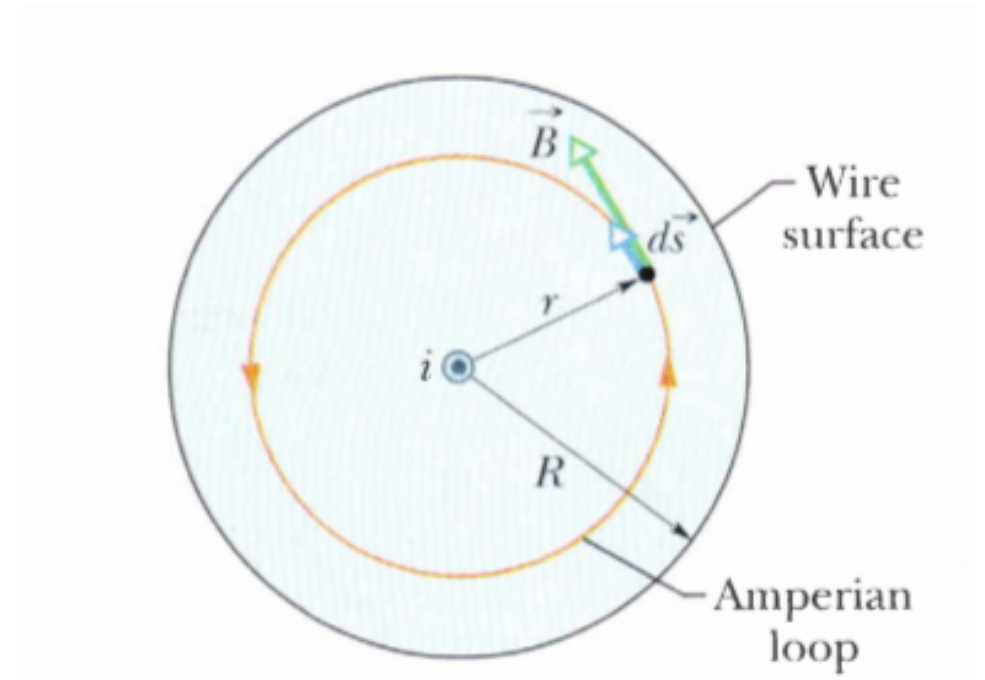
Campo magnético DENTRO de un alambre recto y largo con corriente

$$\oint \vec{B} \cdot d\vec{s} = B \oint ds = B(2\pi r).$$

$$i_{\text{enc}} = i \frac{\pi r^2}{\pi R^2}.$$

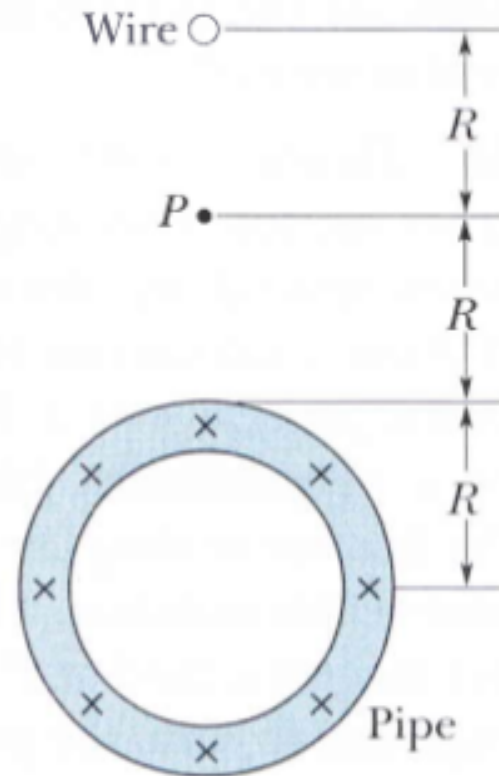
$$B(2\pi r) = \mu_0 i \frac{\pi r^2}{\pi R^2}$$

$$B = \left(\frac{\mu_0 i}{2\pi R^2} \right) r$$

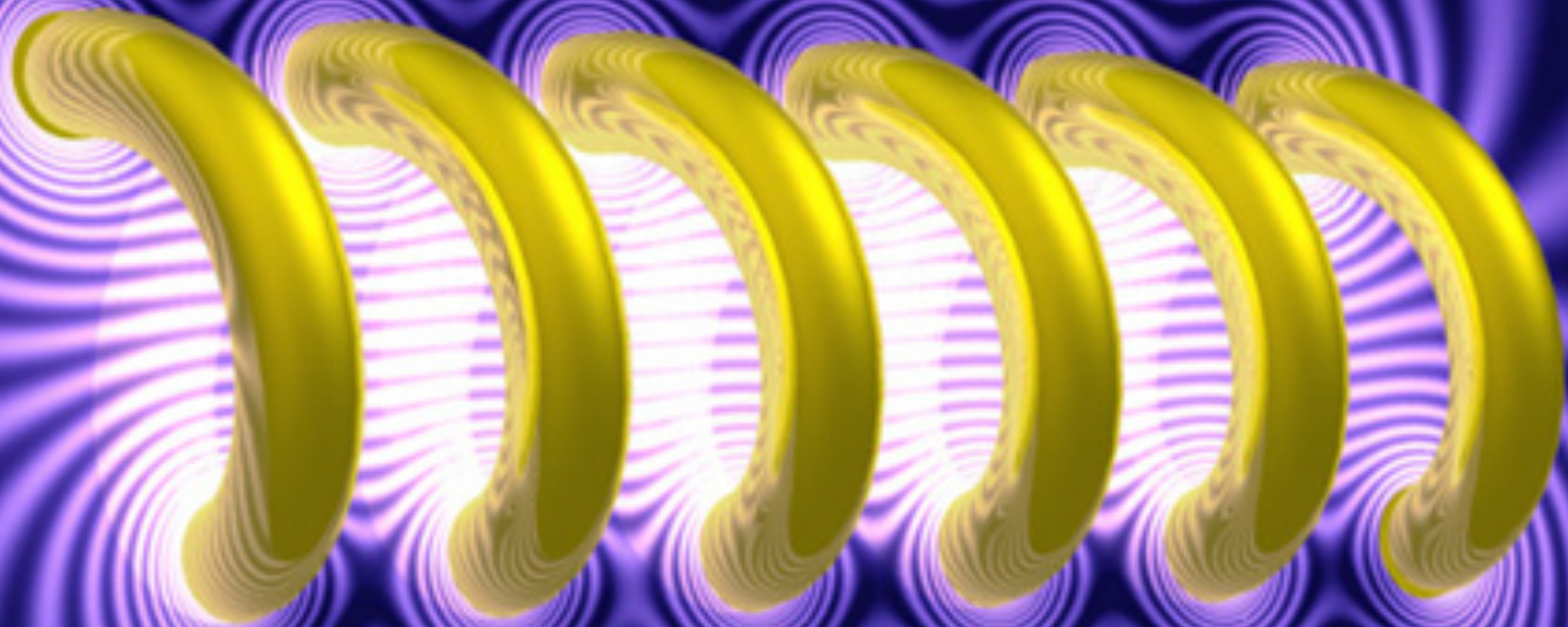


Ejercicio para desarrollar en clase

••48 In Fig. 29-71, a long circular pipe with outside radius $R = 2.6 \text{ cm}$ carries a (uniformly distributed) current $i = 8.00 \text{ mA}$ into the page. A wire runs parallel to the pipe at a distance of $3.00R$ from center to center. Find the (a) magnitude and (b) direction (into or out of the page) of the current in the wire such that the net magnetic field at point P has the same magnitude as the net magnetic field at the center of the pipe but is in the opposite direction.

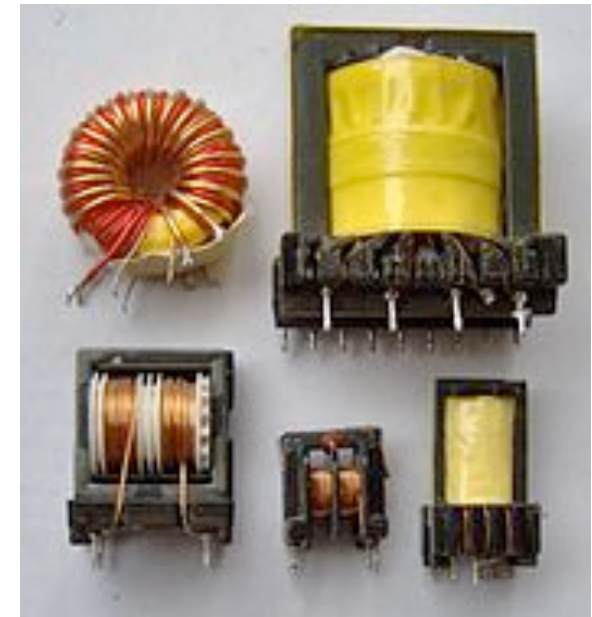
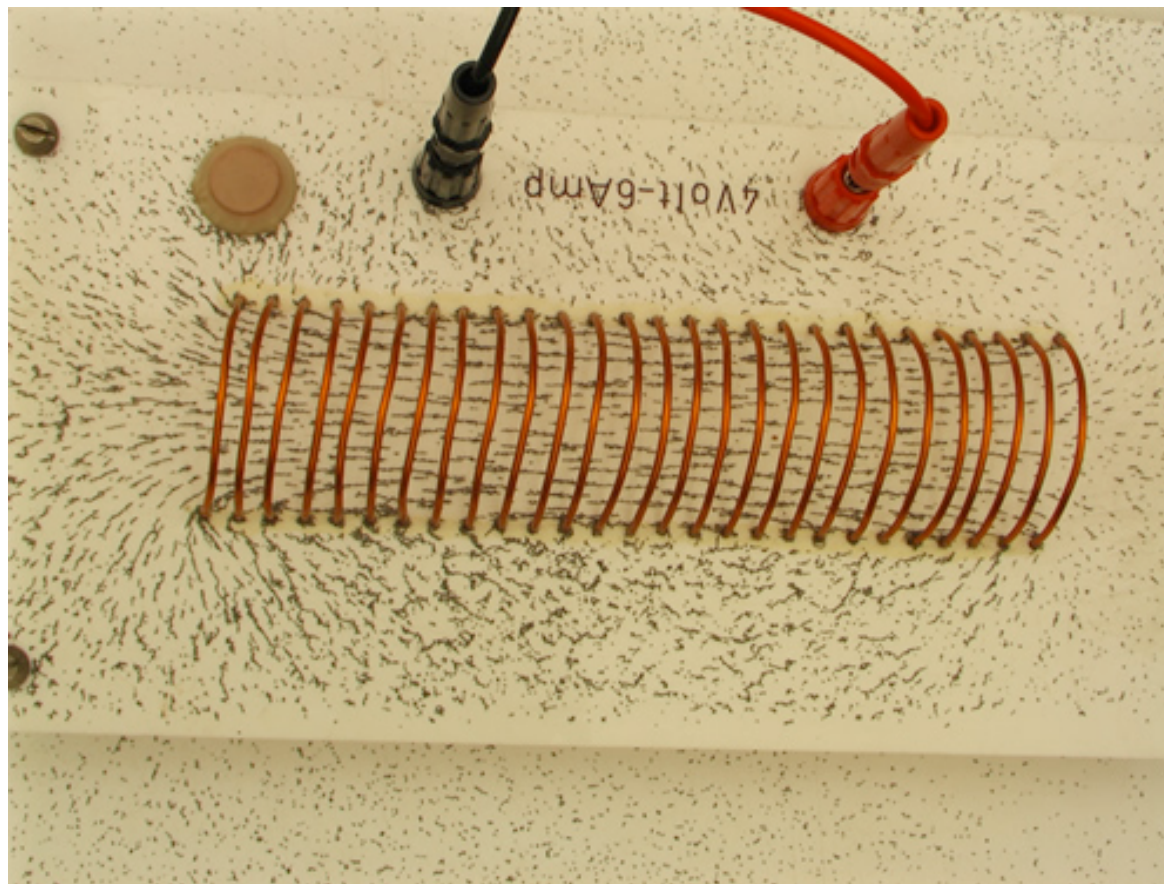


Solenoides y Toroides



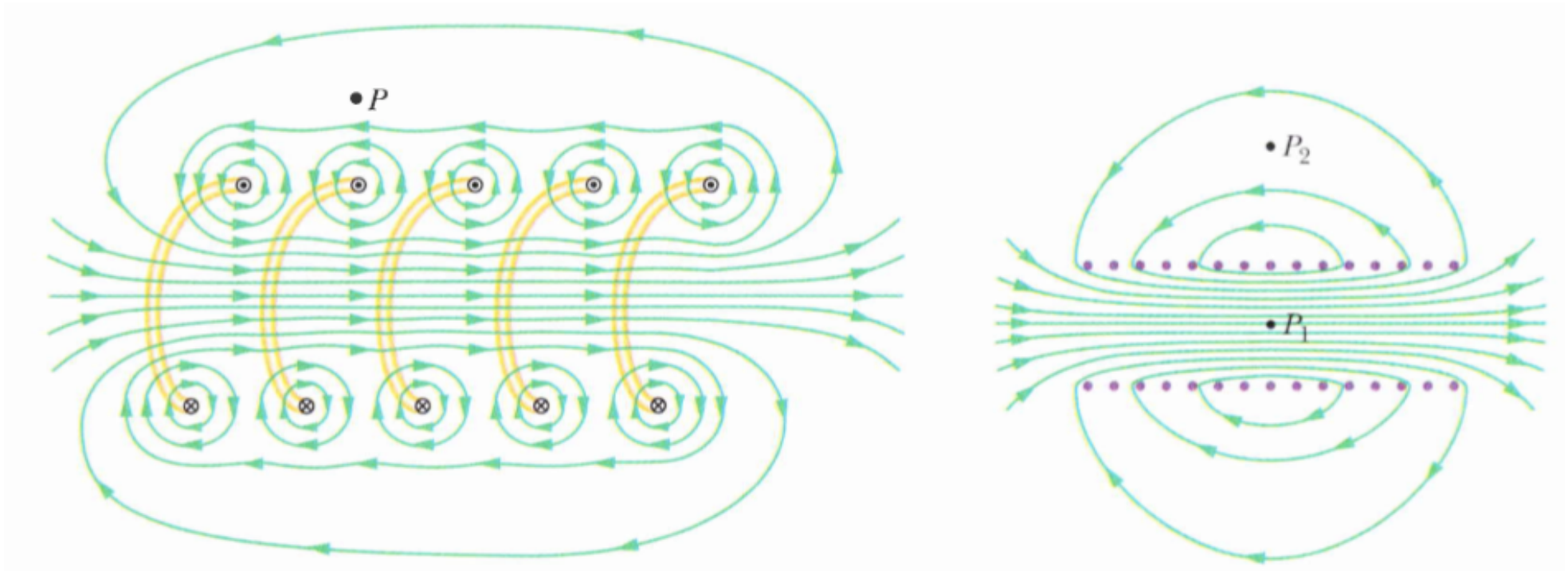
Solenoides y Toroides

Campo magnético



Solenoides

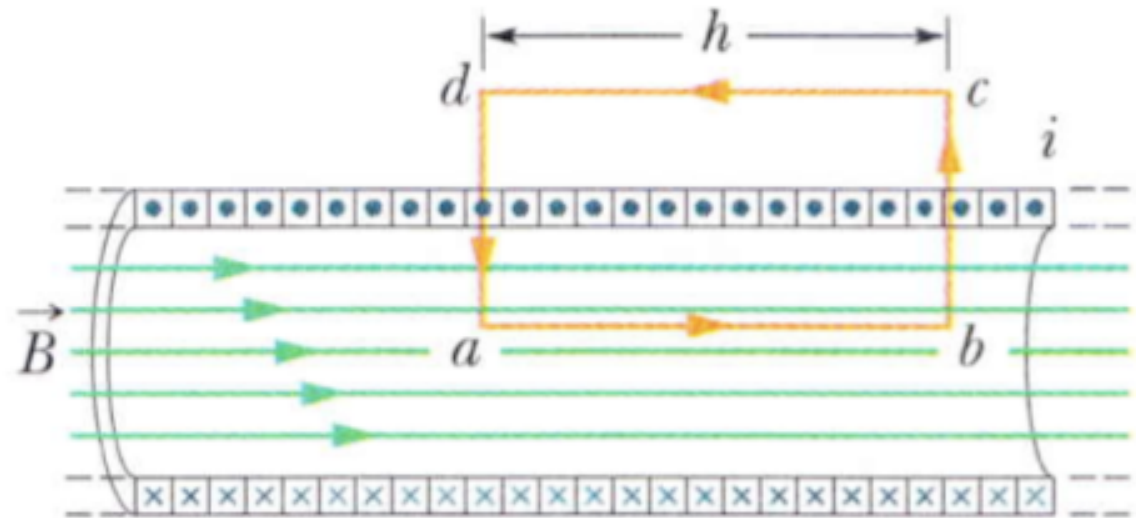
Campo magnético



Solenoides

Campo magnético

$$\oint \vec{B} \cdot d\vec{s} = \mu_0 i_{\text{enc}},$$



$$i_{\text{enc}} = i(nh).$$

$$Bh = \mu_0 i n h$$

$$B = \mu_0 i n$$

Toroides

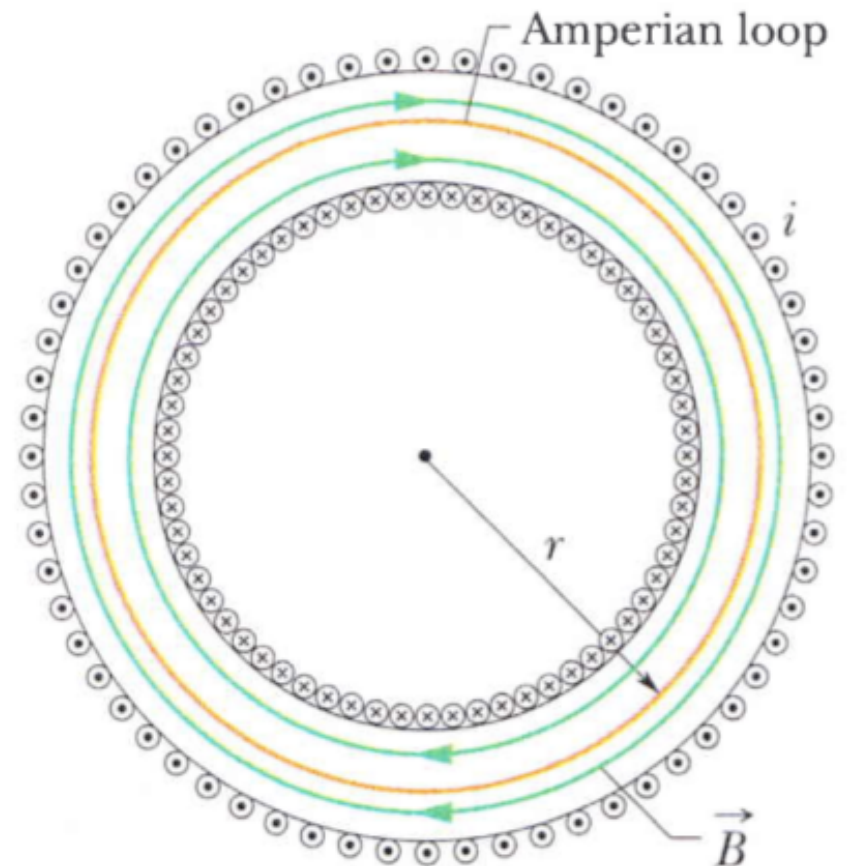
Campo magnético

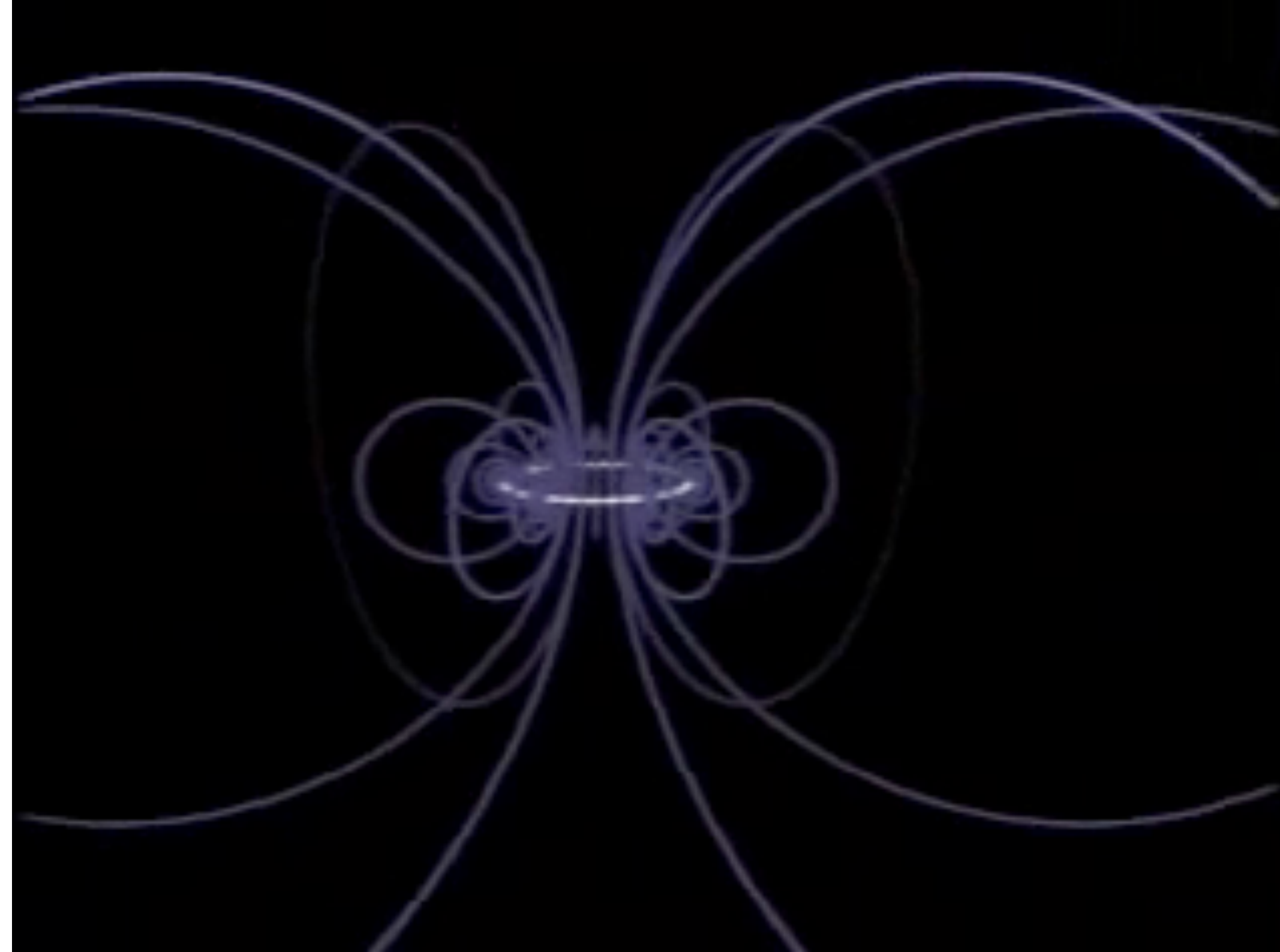


$$\oint \vec{B} \cdot d\vec{s} = \mu_0 i_{\text{enc}},$$

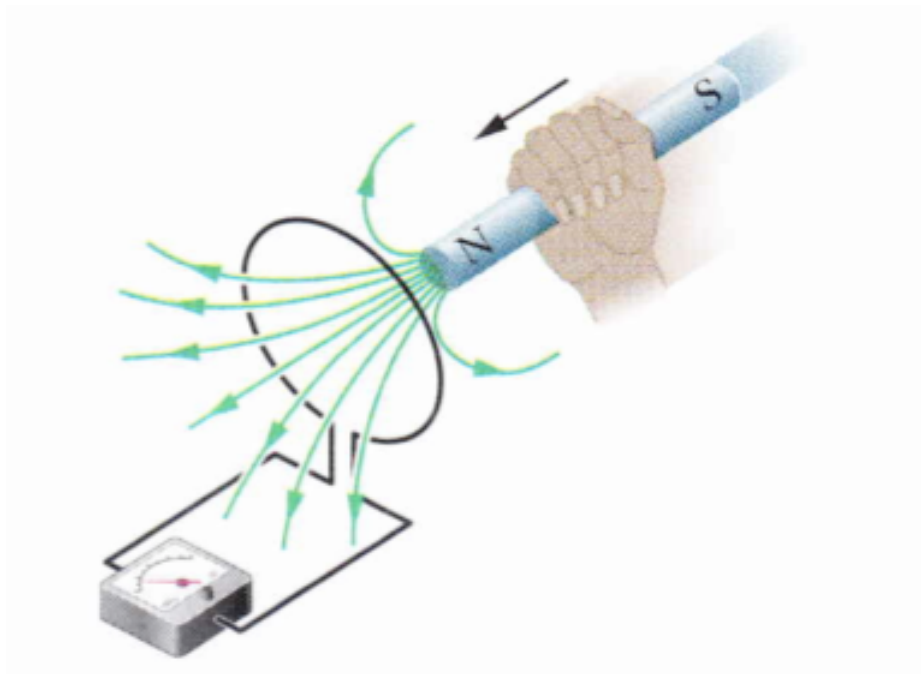
$$(B)(2\pi r) = \mu_0 iN,$$

$$B = \frac{\mu_0 iN}{2\pi} \frac{1}{r}$$

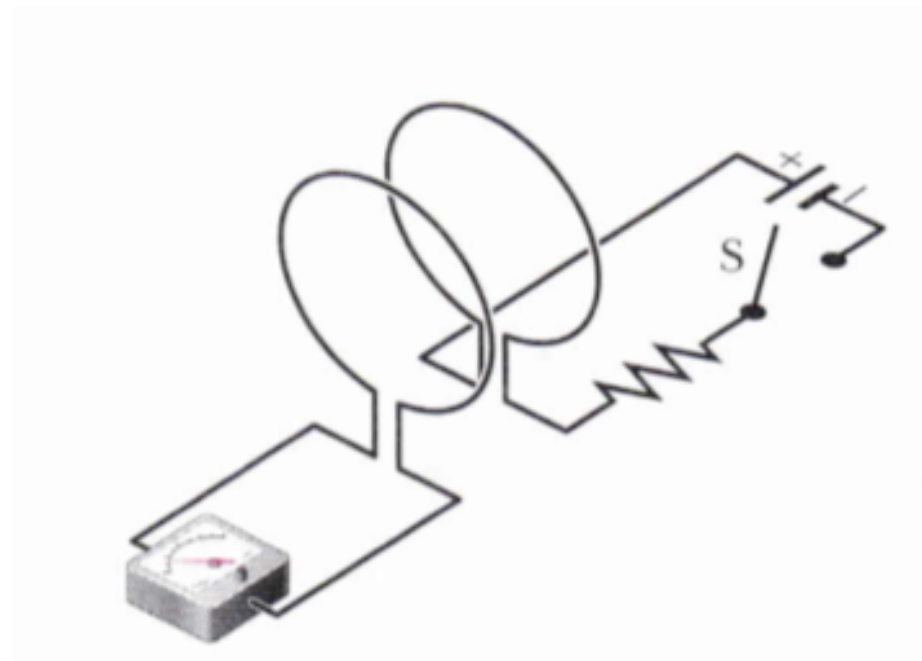




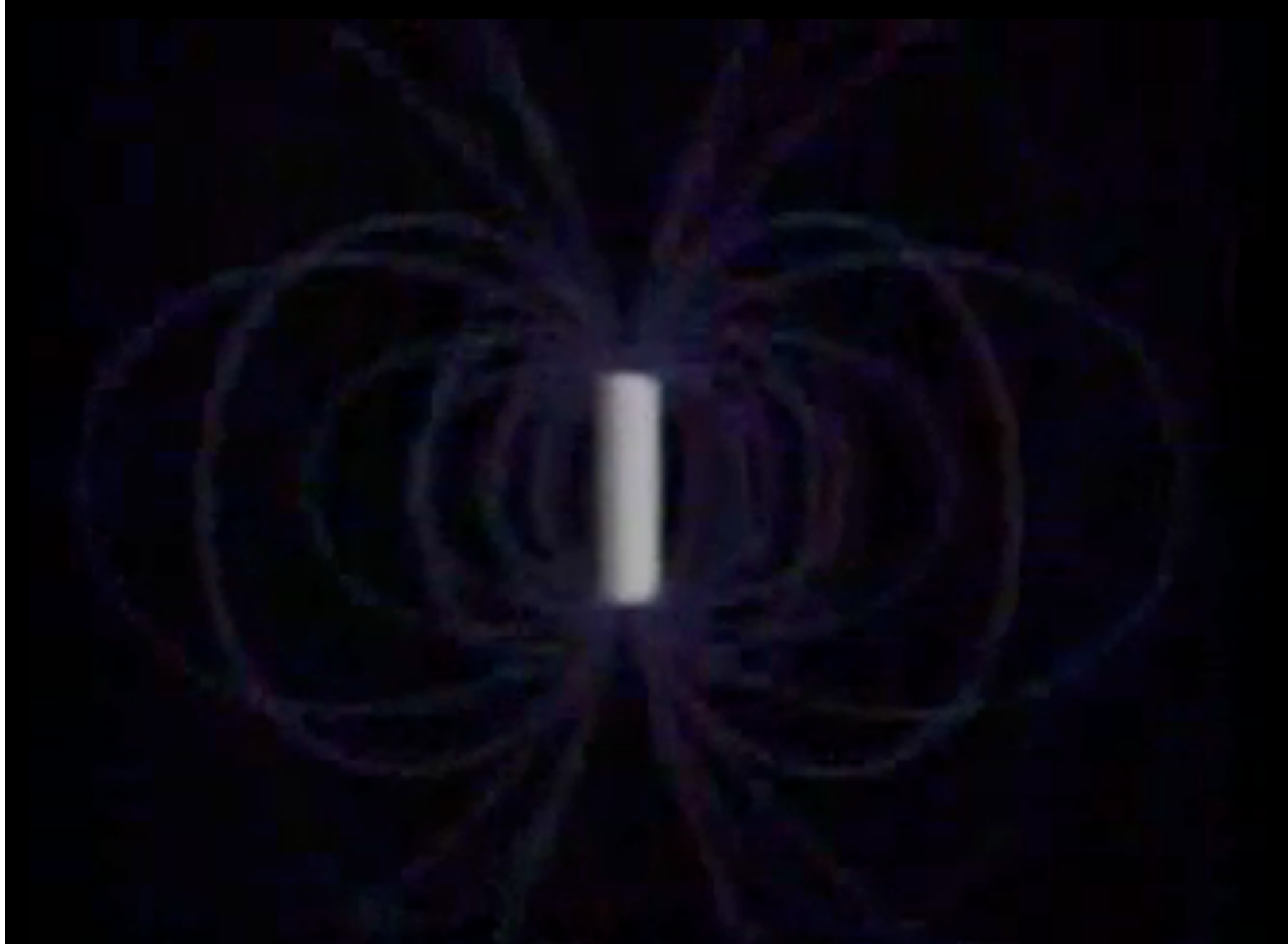
Inducción e Inductancia



$$\Phi_B = \int \vec{B} \cdot d\vec{A}$$



$$\Phi_B = BA \quad (\vec{B} \perp \text{area } A, \vec{B} \text{ uniform}).$$



Ley de Faraday

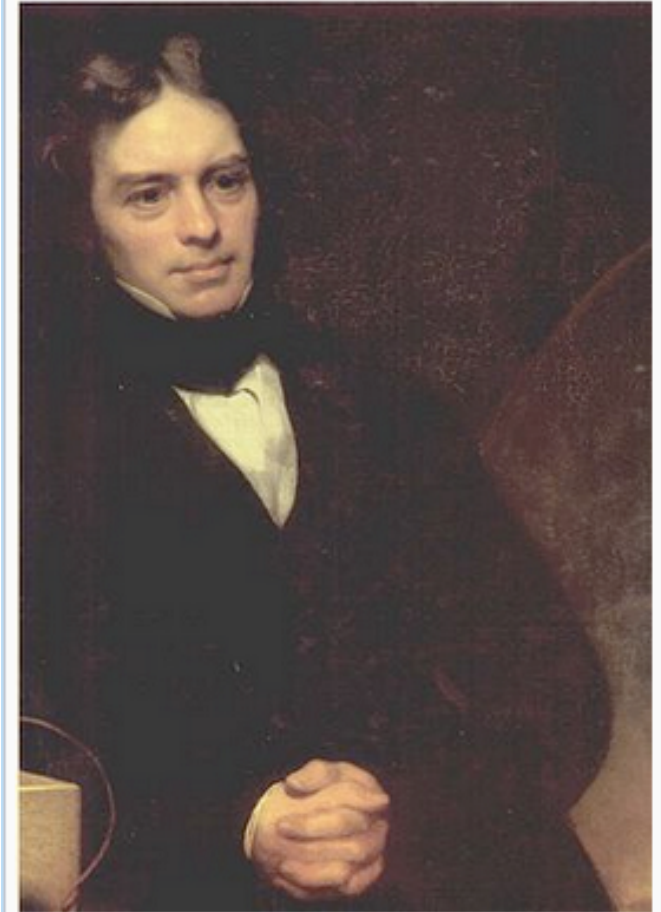
$$\mathcal{E} = - \frac{d\Phi_B}{dt}$$

Flujo magnético

$$1 \text{ weber} = 1 \text{ Wb} = 1 \text{ T} \cdot \text{m}^2.$$

$$\mathcal{E} = -N \frac{d\Phi_B}{dt}$$

Michael Faraday



Michael Faraday

Nacimiento 22 de septiembre de 1791
Newington

Fallecimiento 25 de agosto de 1867 (75 años)

Residencia Reino Unido

Nacionalidad británico

Campo electromagnetismo, electroquímica

Instituciones Royal Institution

Conocido por Descubrimiento del benceno y de la inducción electromagnética (motor eléctrico)

Firma

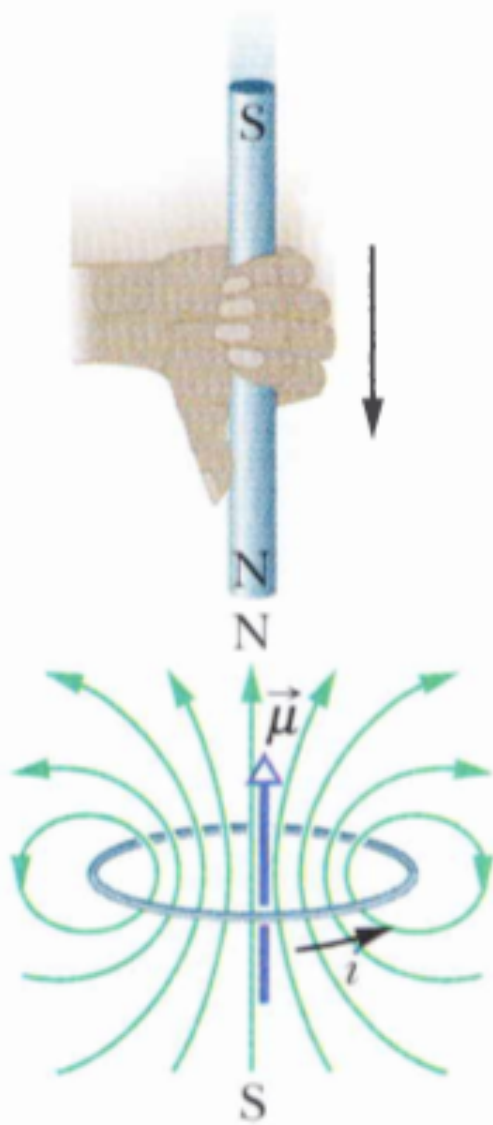
Para cambiar el flujo

Cambio de B en magnitud

Cambio de A

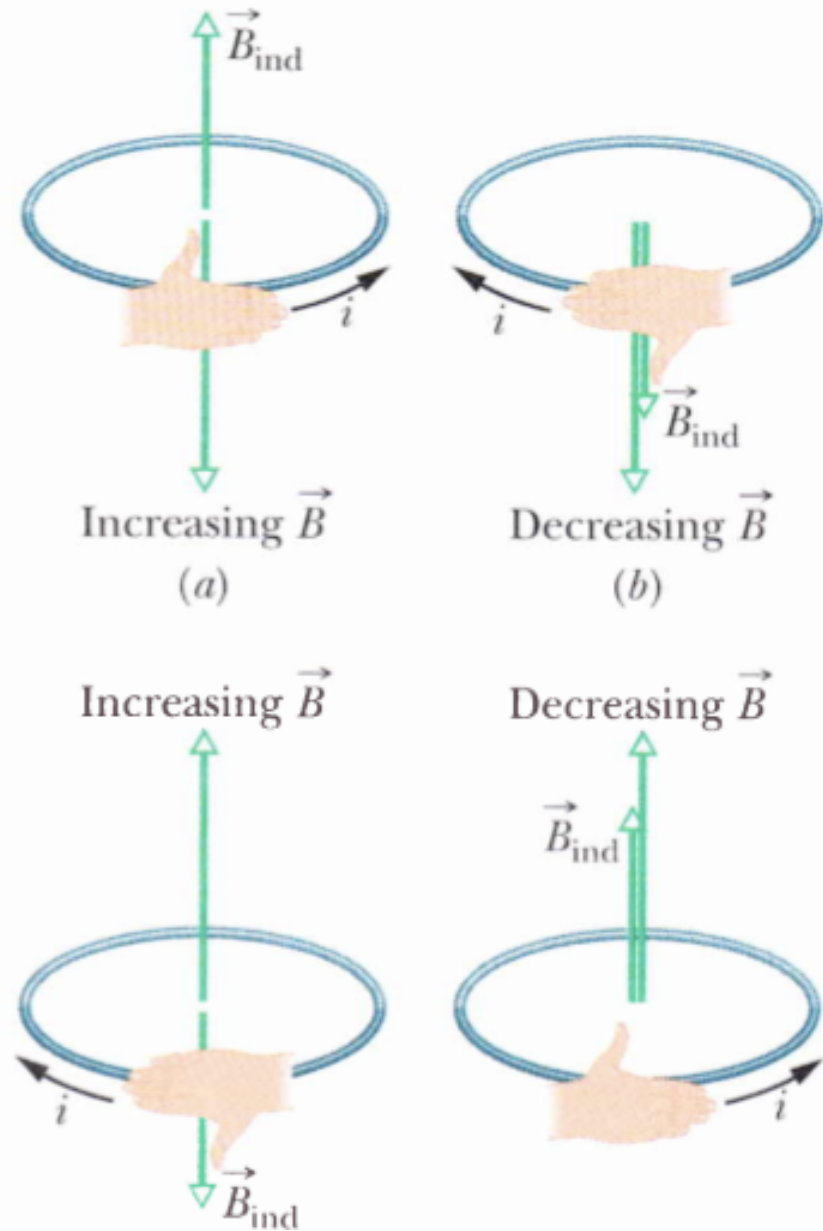
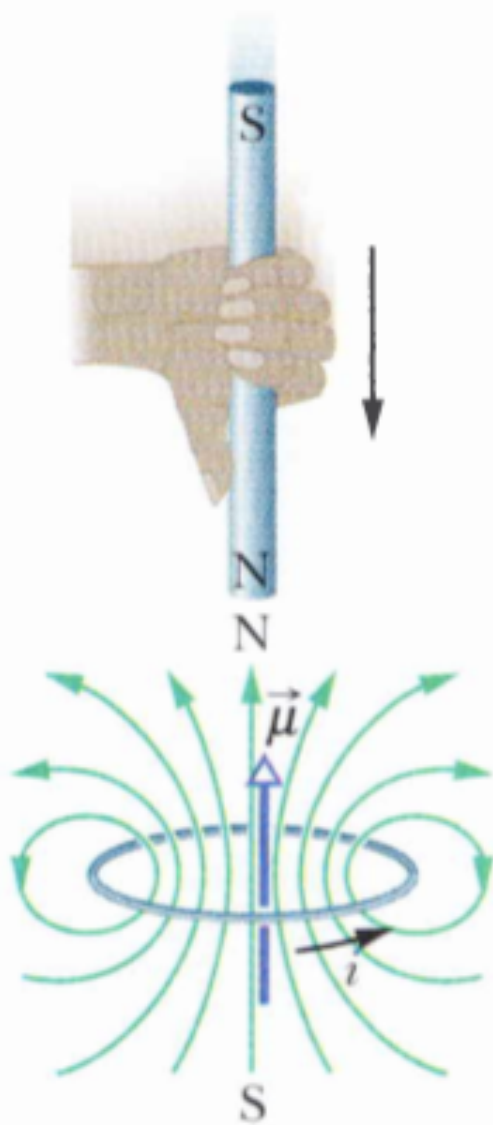
Cambio del ángulo entre B y A

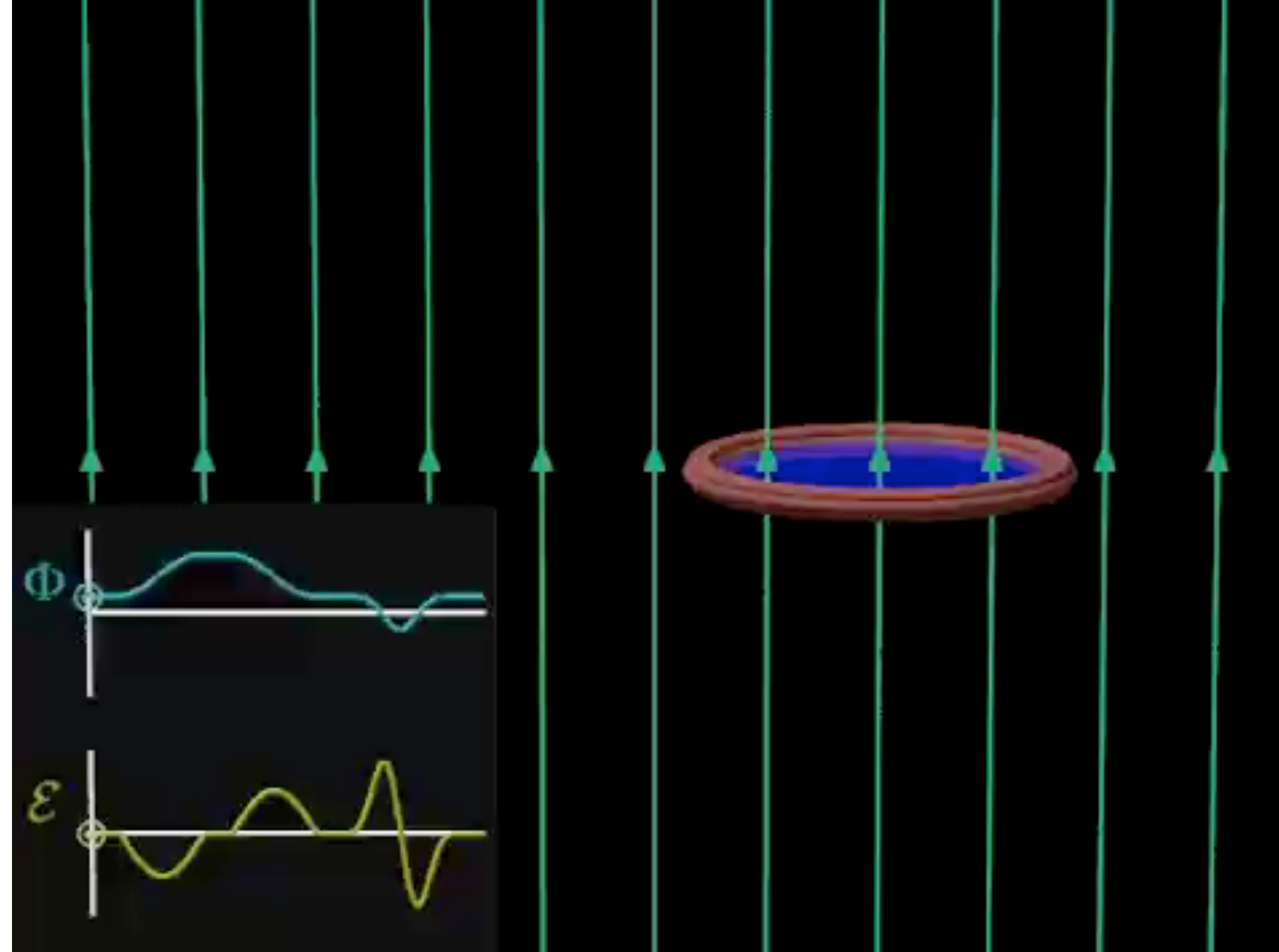
Ley de Lenz



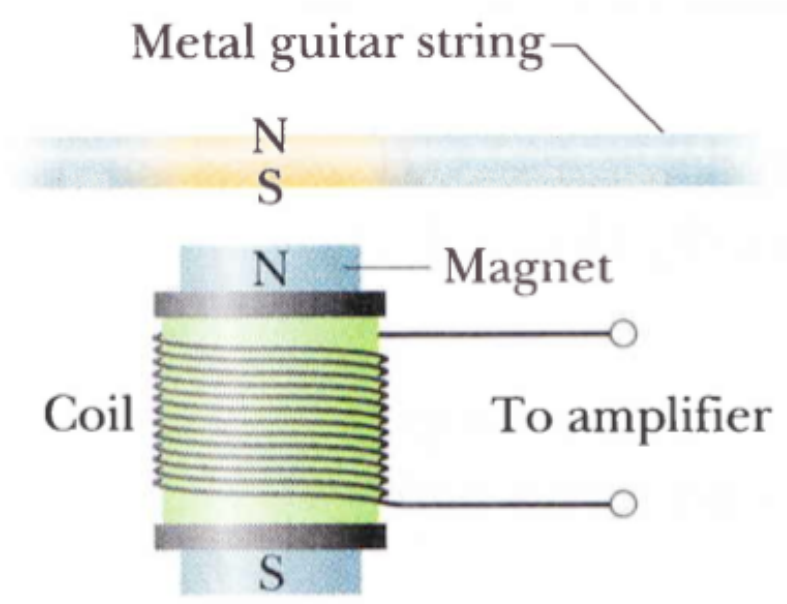
Una corriente inducida tiene una dirección tal que el campo magnético debido a la corriente inducida se opone al cambio de flujo magnético que induce la corriente

Ley de Lenz











CICLO
DE CINE
DE FICCIÓN

EN MAYO

FICCION,
CIENCIA
Y
CRISPETAS

Organiza: Grupo de Astronomía
Departamento de Física

Universidad de
los Andes



MUY PRONTO

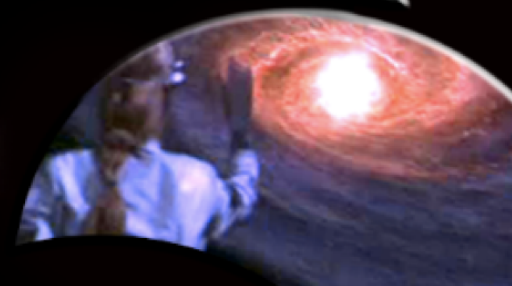
CICLO
DE CINE
DE FICCIÓN

FICCION, CIENCIA
Y CRISPETAS

JUEVES
2 DE MAYO
5:00 PM
W-101

CONTACT

Escrita por: Carl Sagan



Organiza: Grupo de Astronomía
Departamento de Física

Universidad de
los Andes