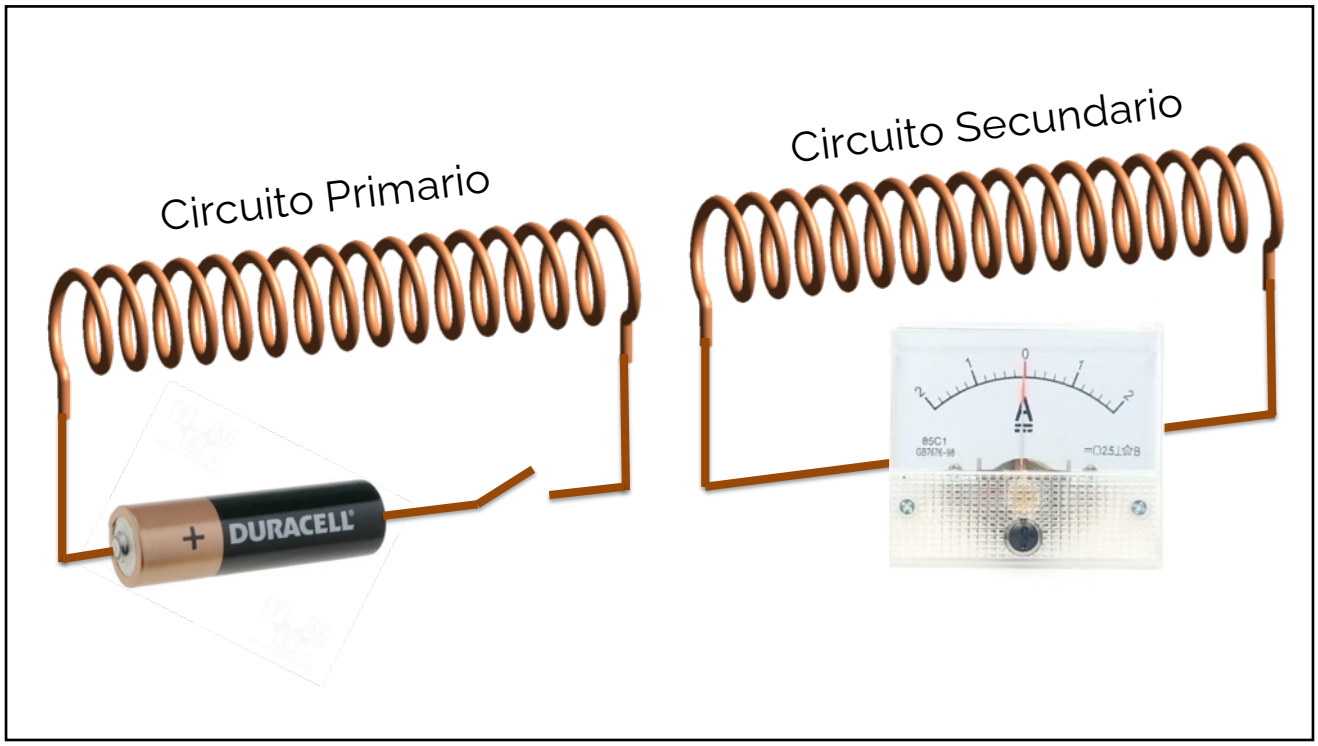
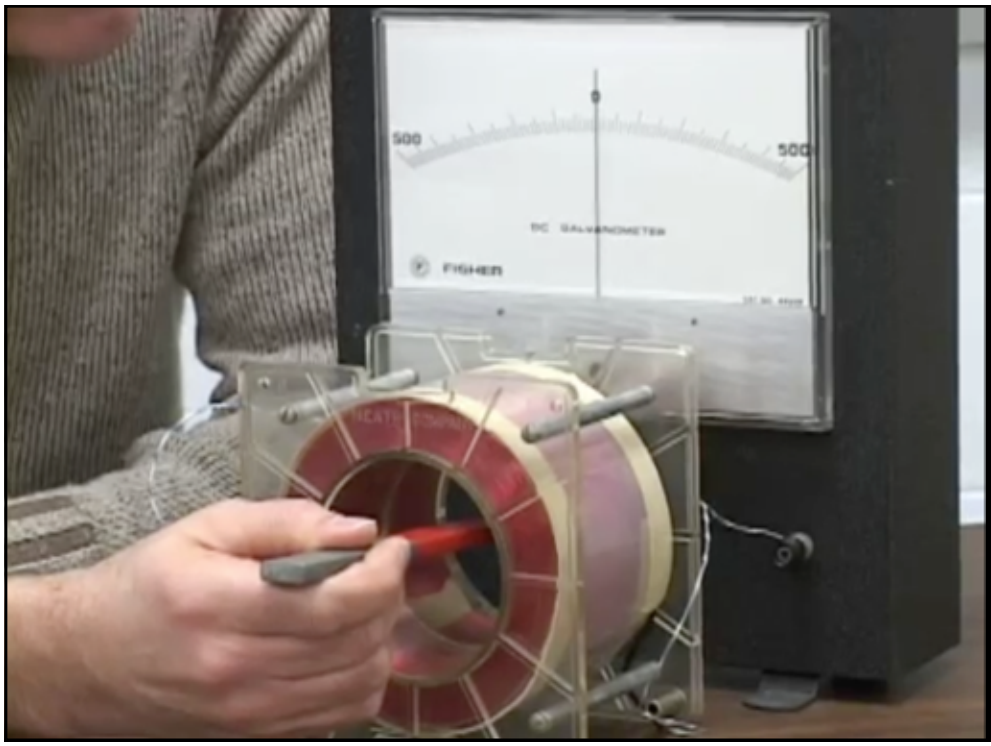
Ley de Lenz

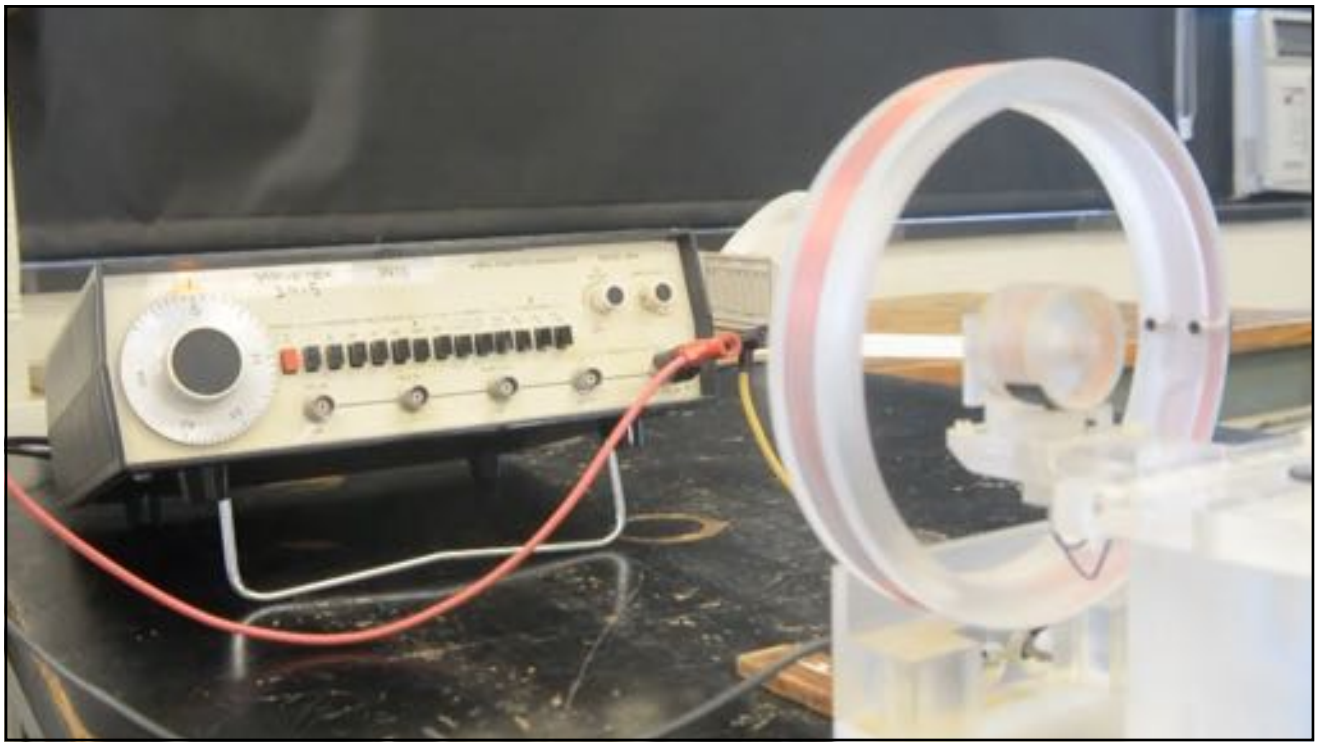
La ***fem*** inducida produce una corriente cuyo campo magnético se opone siempre a variaciones del campo existente.

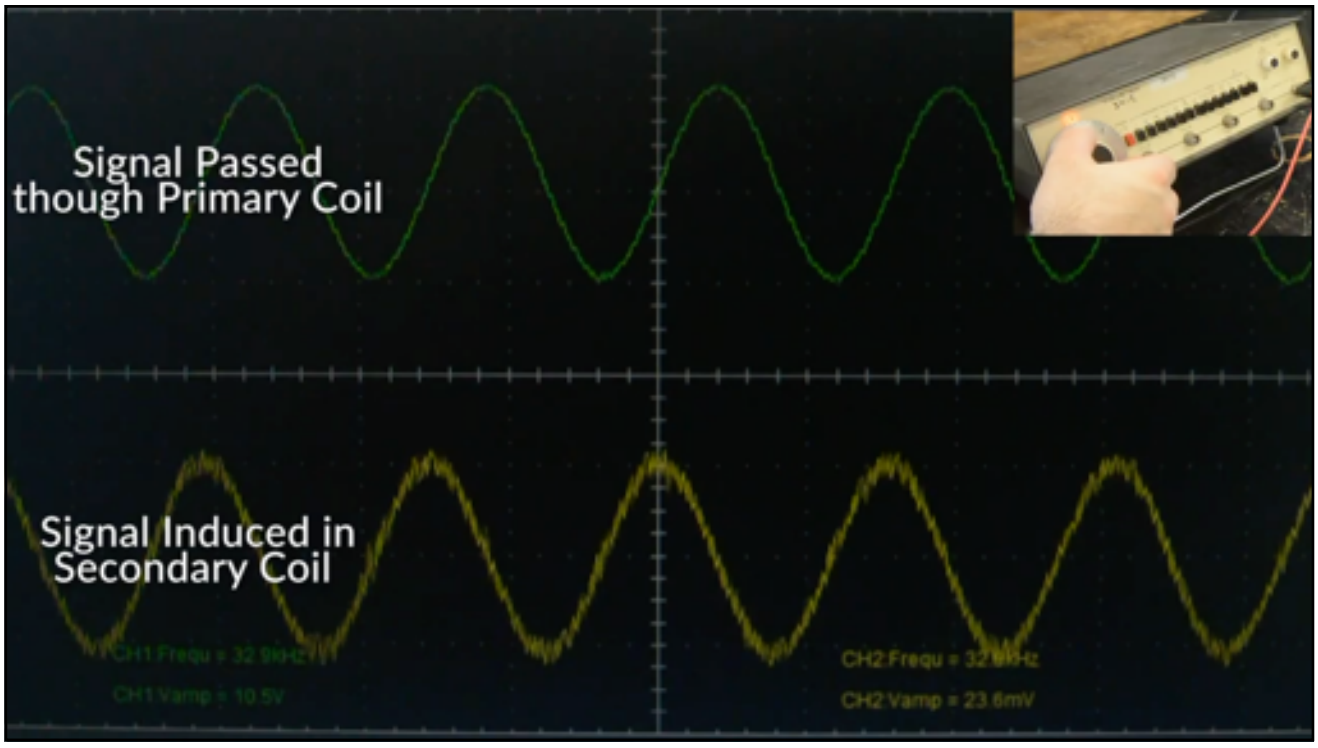


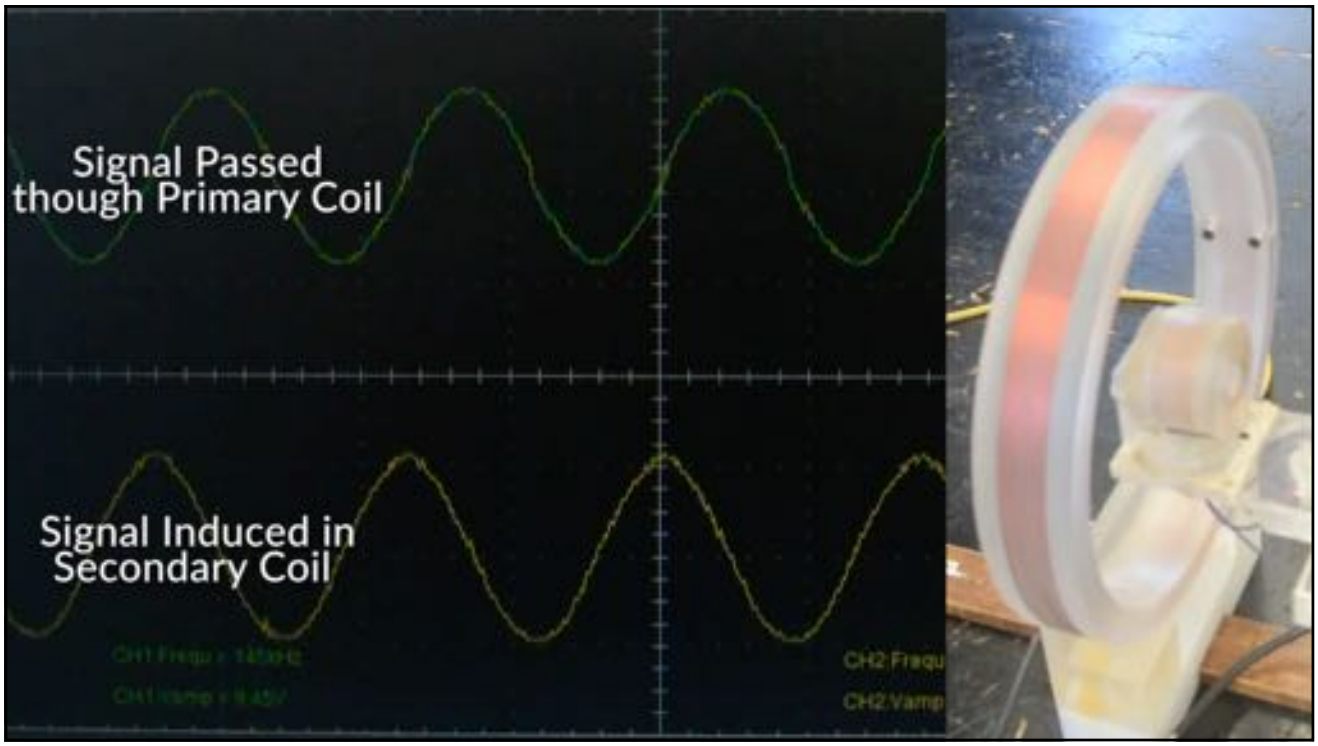


Experimento de Faraday

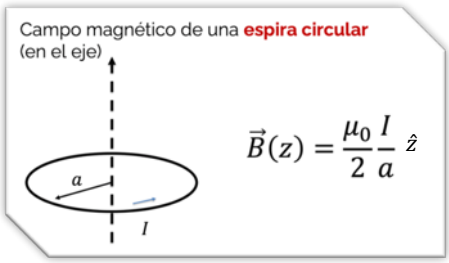
(uno de los tantos)




Signal Passed
though Primary Coil
Signal Induced in
Secondary Coil
CH1 Vamp = 10.5V
CH2 Vamp = 23.6mV

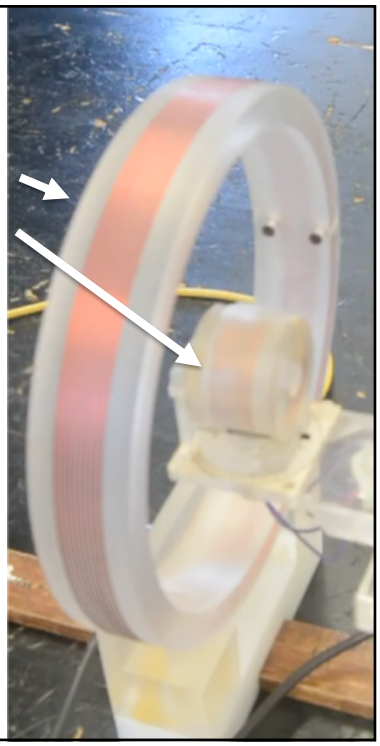


Campo magnético de una **espira circular** (en el eje)



$$\vec{B}(z) = \frac{\mu_0}{2}\frac{I}{a}\,\hat{z}$$

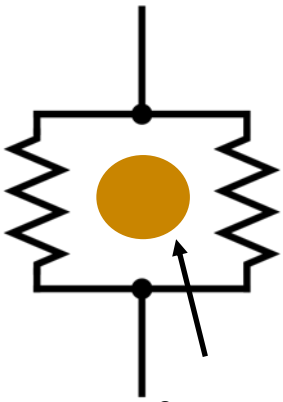
Circuitos
Primario
Secundario



$$fem = -\frac{d\Phi_B}{dt} = -\frac{d}{dt}\int_{sec} \vec{B}_{pri}\, d\vec{s}$$

$$= -\frac{d}{dt}\left(\frac{\mu_0}{2}\frac{I}{a}\, A_{sec}\, \hat{z}\, \hat{n}\right)$$

El campo eléctrico no es conservativo (en presencia de un campo magnético variable)



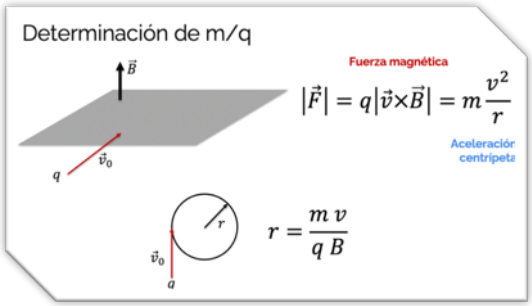
Campo magnético variable

$$\oint \vec{E}\, d\vec{\ell} = \frac{\oint \vec{F}\, d\vec{\ell}}{q} = fem = -\frac{d\Phi_B}{dt}$$

$$\oint \vec{E}\, d\vec{\ell} = -\frac{\partial}{\partial t}\int \vec{B}\; d\vec{s}$$

$$\vec{\nabla}\times\vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

Acelerando electrones



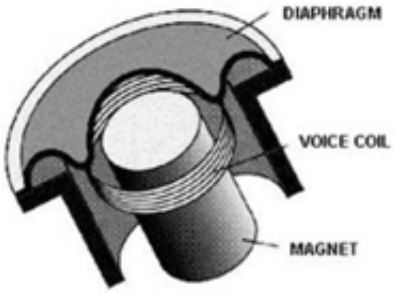
Cyclotron

Betatrón

Acelerando electrones

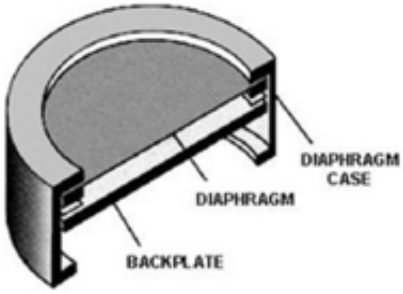
Instrumento	Forma	Campo Eléctrico	Campo Magnético	Energía del Electrón MeV
Van de Graaf generator	lineal	constante	constante	25
Linear accelerator	lineal	variable	constante	2.85 (50.000)
Cyclotron	circulo	variable	constante	0.025
Betatron	toroide	constante	variable	300
Synchrotron	toroide	variable	variable	10.000

Micrófonos: ondas de presión a voltaje/corriente



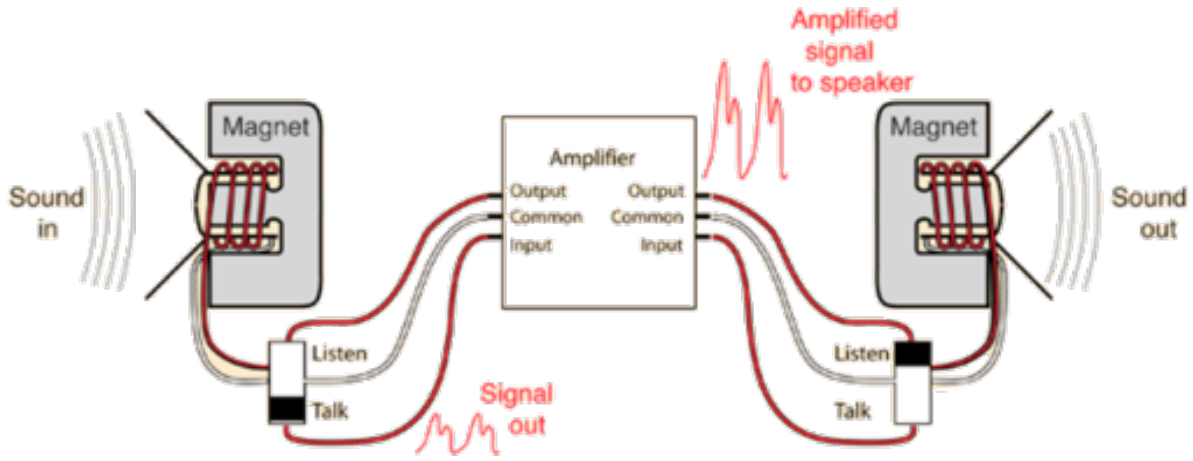
Dynamic

Unidad 5/6

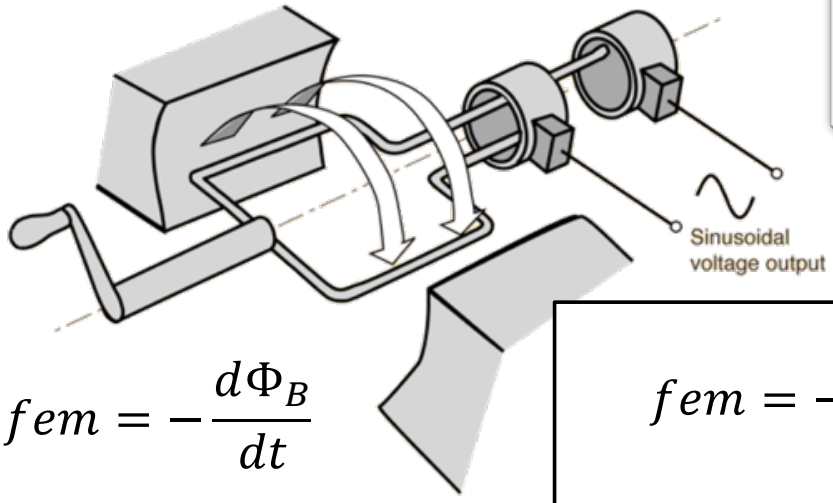


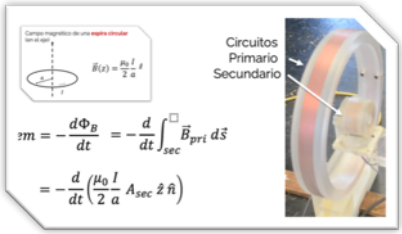
Condenser

Unidad 2/3



Aplicaciones: Generador eléctrico

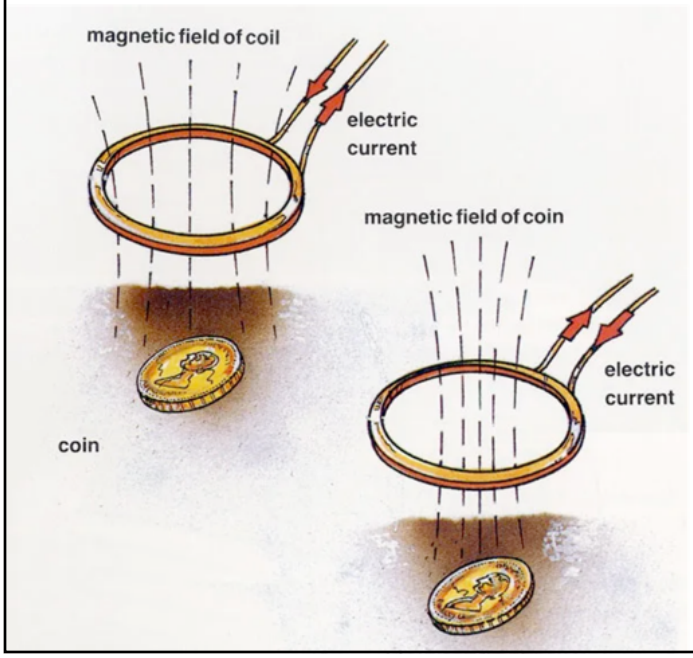


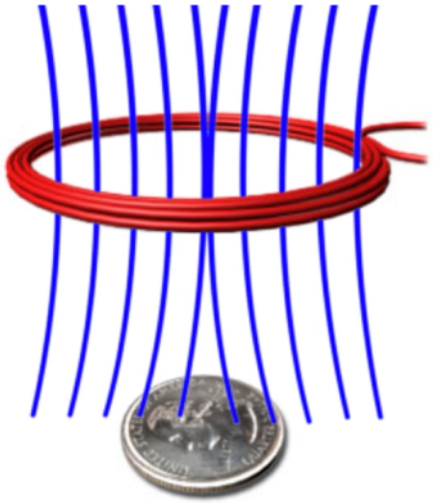


$$fem = -\frac{d\Phi_B}{dt}$$

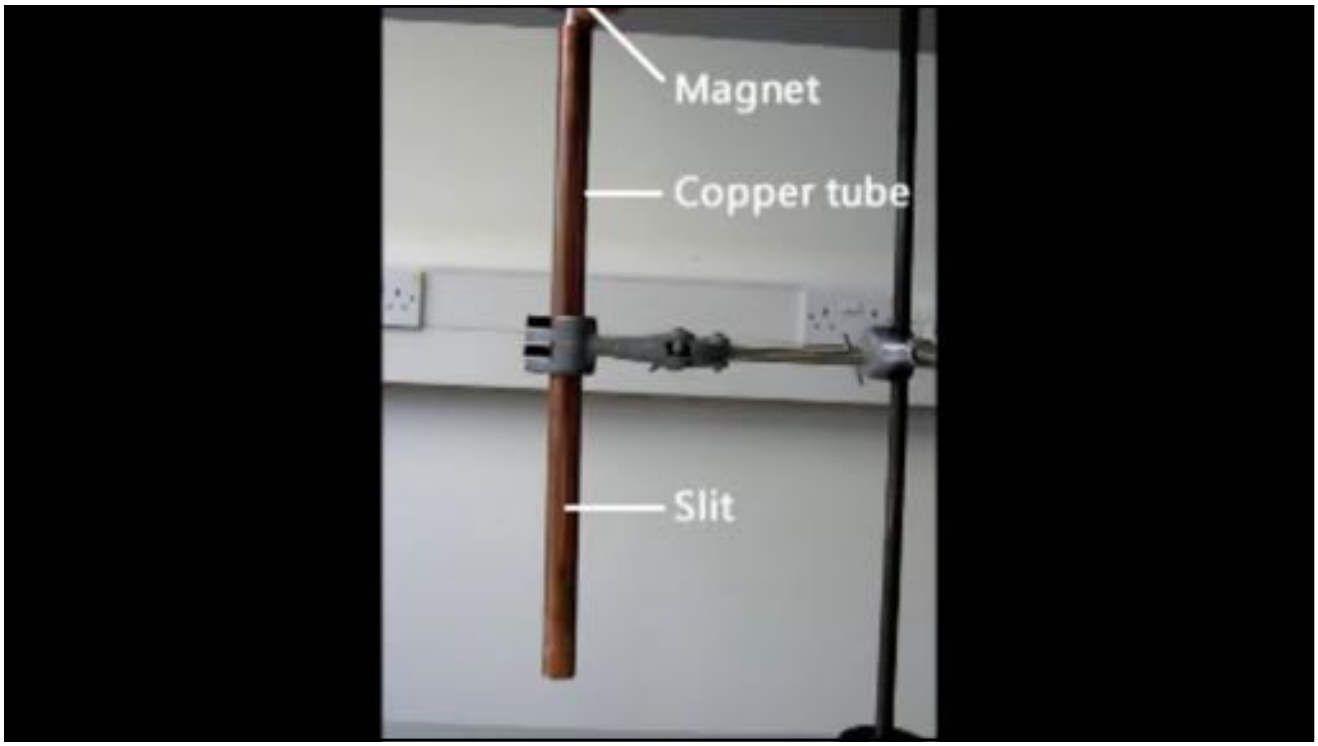
$$fem = -B_0 \frac{d}{dt}(\hat{z}\,\hat{n})$$

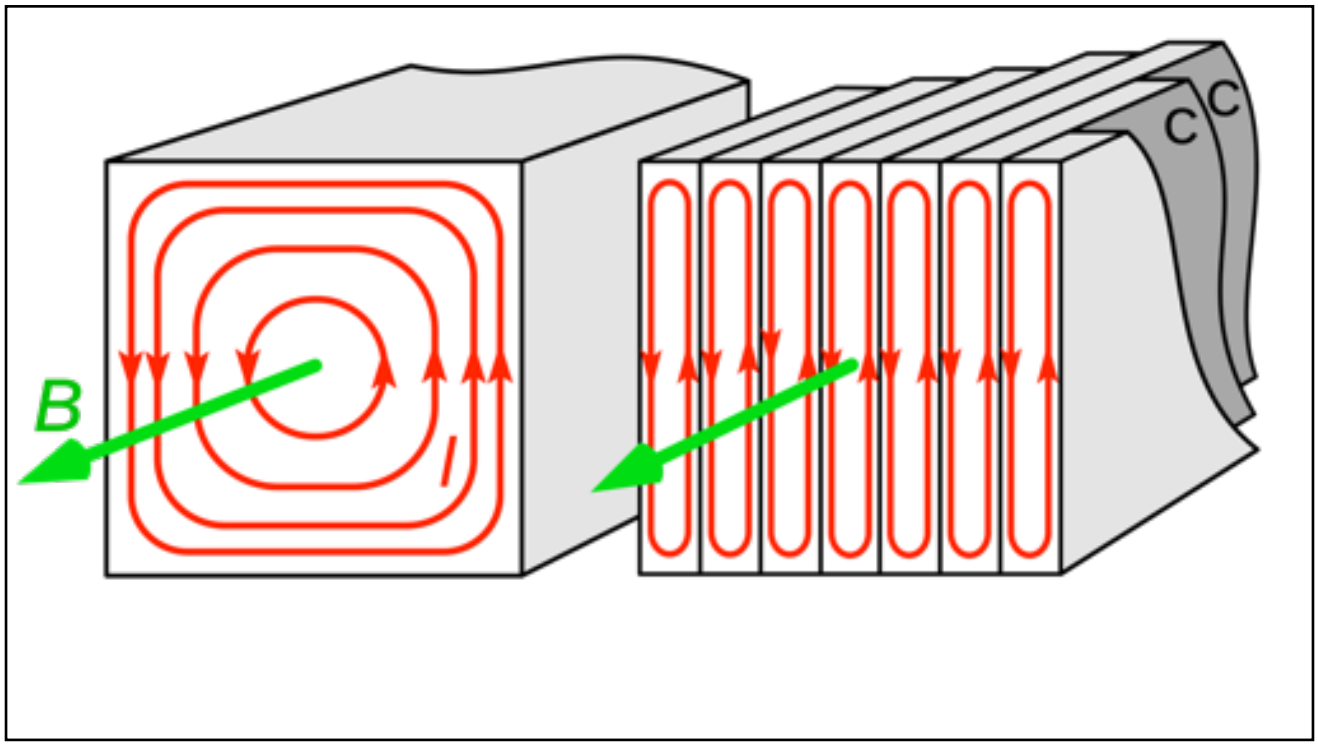
Aplicaciones: detector de metales

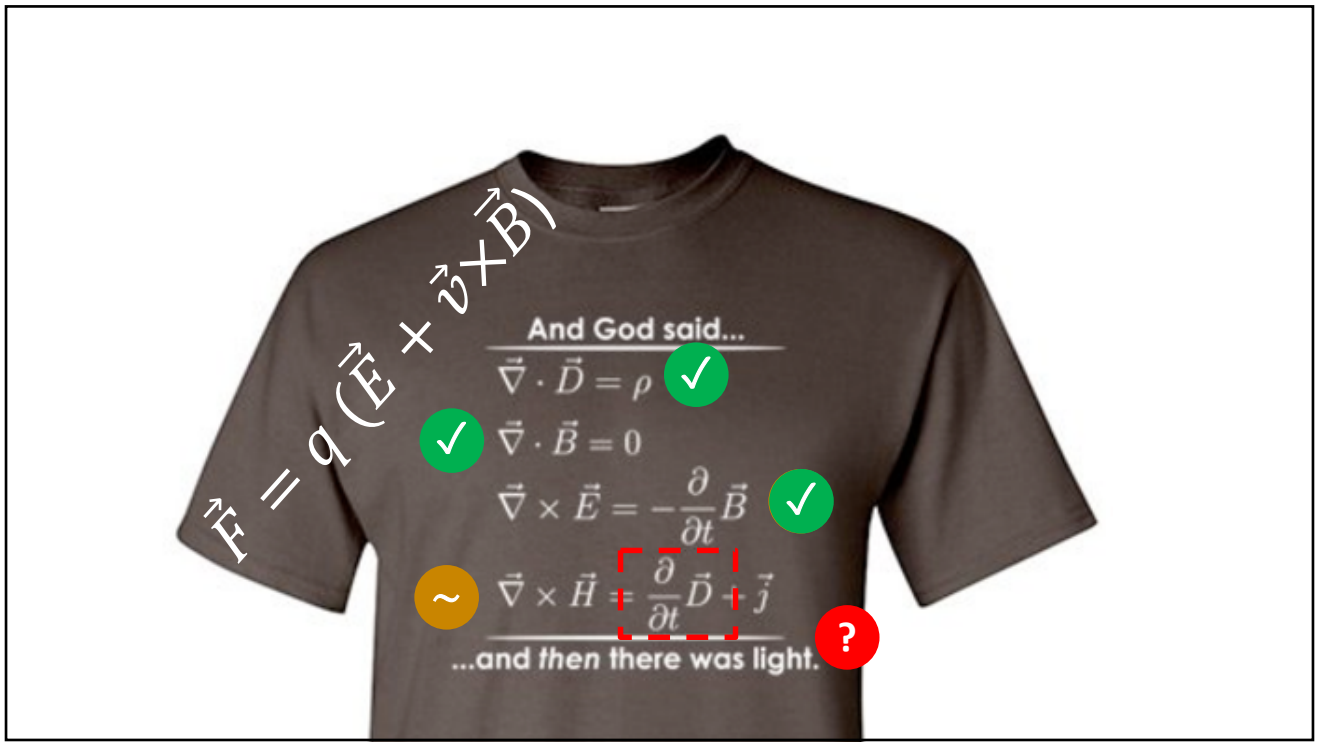




Corrientes parásitas


Magnet
Copper tube
Slit


B
I
C
C


$\vec{F} = q(\vec{E} + \vec{v} \times \vec{B})$
And God said...
$\vec{\nabla} \cdot \vec{D} = \rho$
$\vec{\nabla} \cdot \vec{B} = 0$
$\vec{\nabla} \times \vec{E} = -\frac{\partial}{\partial t}\vec{B}$
$\vec{\nabla} \times \vec{H} = \frac{\partial}{\partial t}\vec{D} + \vec{j}$
...and then there was light.


¿Cómo funciona un transformador eléctrico?
Energía magnética
$U_m = \frac{1}{2} I_0 \Phi_0 = \frac{1}{2\mu_0} \iiint_{-\infty}^{\infty} B^2 dV$
Energía de una distribución continua de cargas
Próximo episodio el viernes
Watch Credits
Next Episode