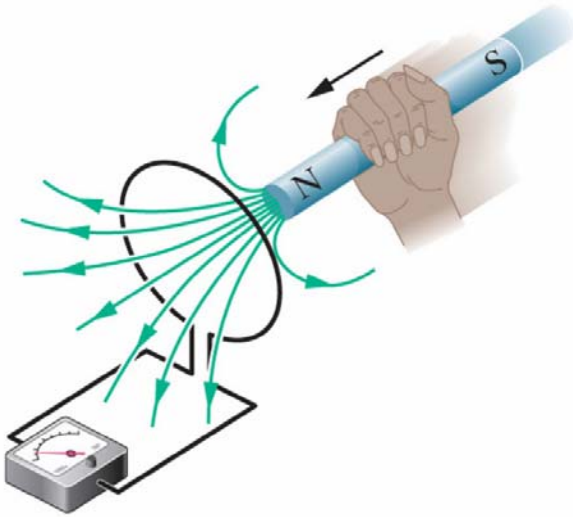
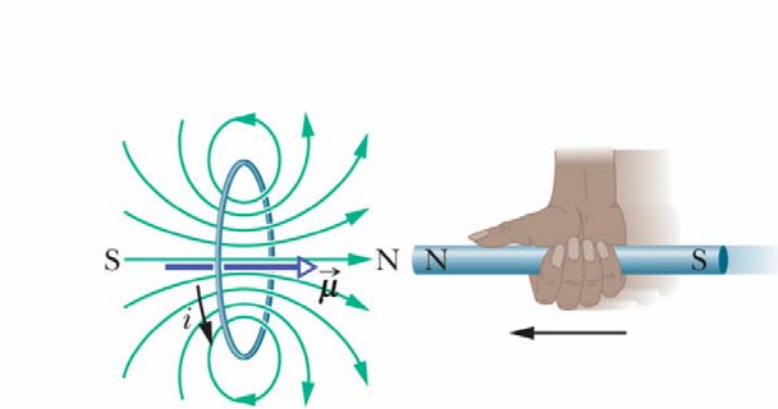
Magnetismo

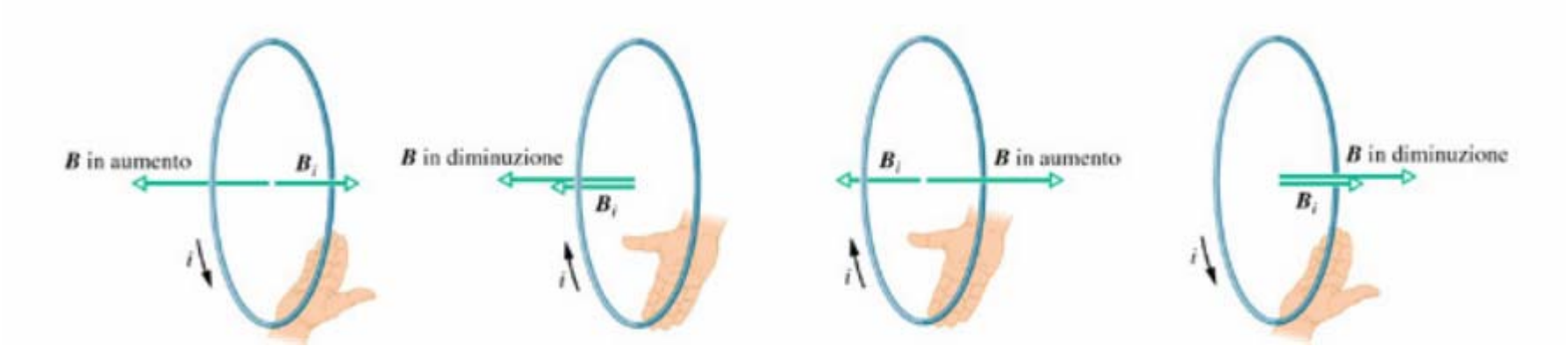
- Il campo magnetico
- Campo magnetico e correnti
- **Induzione elettromagnetica (auto e mutua)**
- Campi magnetici nella materia

Induzione





Induzione



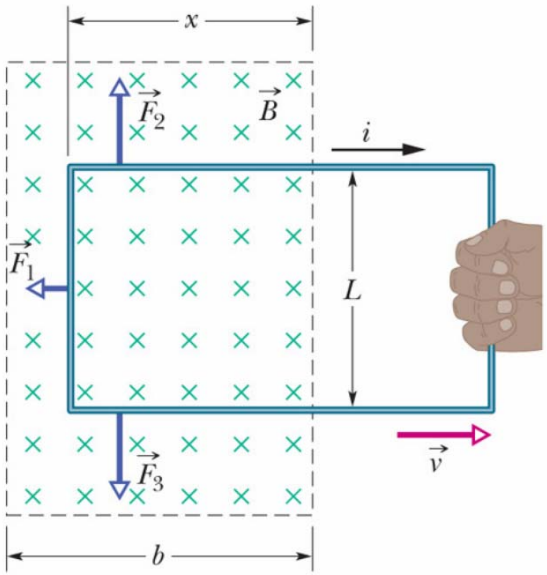
$$\Phi_B = \int \mathbf{B} \cdot d\mathbf{s}$$

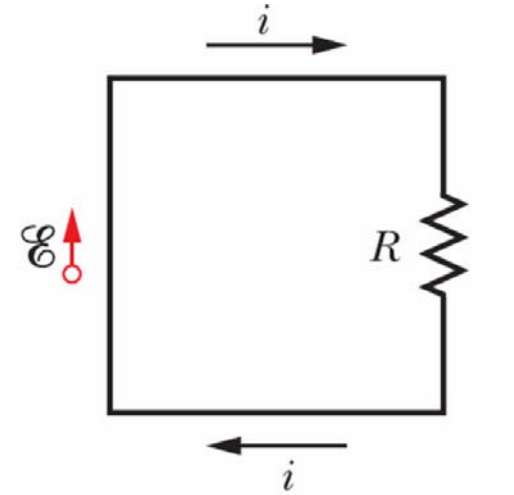
$$f.e.m. = -\frac{d\Phi_B}{dt}$$

$$[V] = [Wb/s]$$

Legge di Faraday-Neumann-Lentz

Spira in movimento





$$\Phi_B = \int \mathbf{B} \cdot d\mathbf{s} = BLx$$

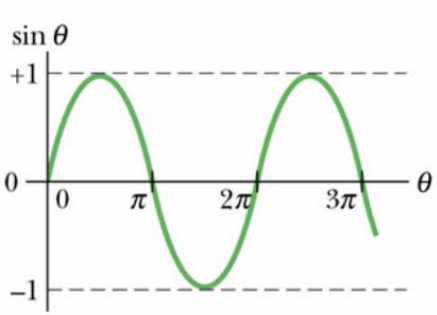
$$f.e.m. = \left| \frac{d\Phi_B}{dt} \right| = \left| \frac{d(BLx)}{dt} \right| = BL \left| \frac{dx}{dt} \right| = BLv$$

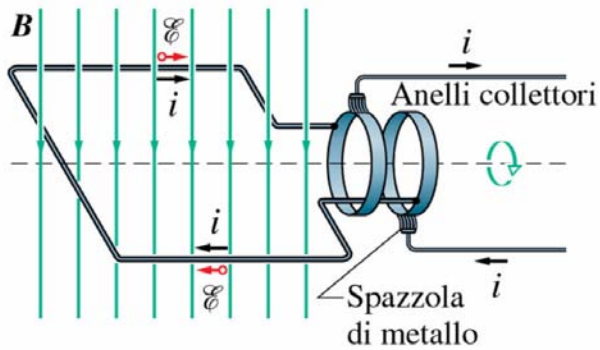
Generatore AC

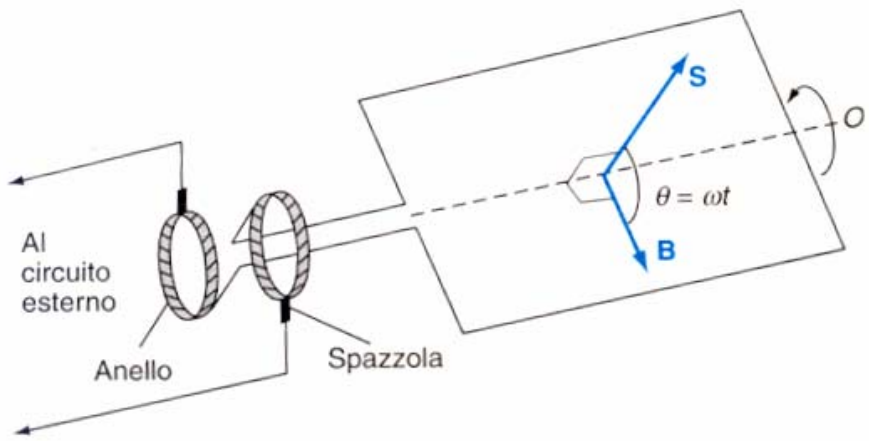
$$\Phi_B = \int \mathbf{B} \cdot d\mathbf{s} = \mathbf{B} \cdot \mathbf{S} = BS\cos\theta$$

$$\Phi_B = BS\cos\omega t$$

$$f.e.m. = \left|\frac{d\Phi_B}{dt}\right| = BS\omega\sin\omega t$$







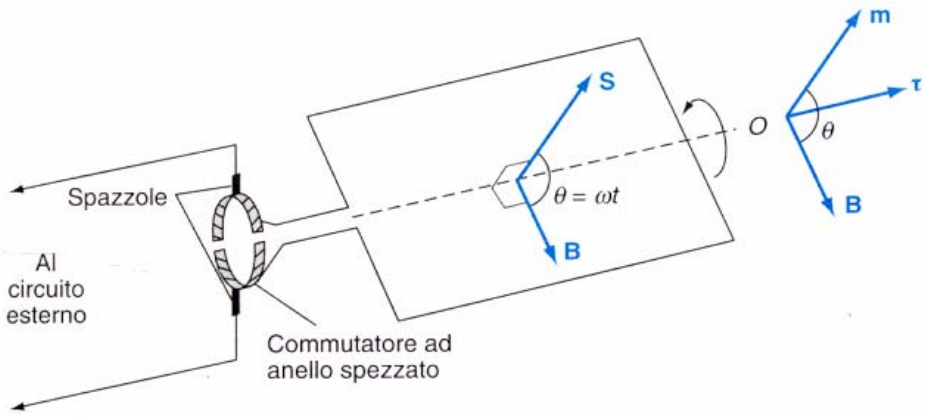
Generatore AC

$$\boldsymbol{\tau} = \mathbf{m} \wedge \mathbf{B}$$

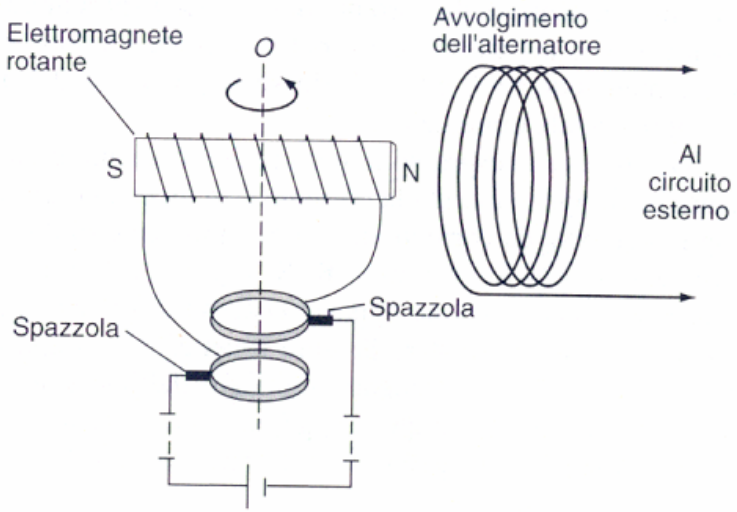
$$P = \boldsymbol{\tau} \cdot \omega = (ISB\sin\theta)\omega$$

$$\theta = \omega t$$

$$P_{el} = f.e.m.I = BS\omega\sin(\omega t)I$$



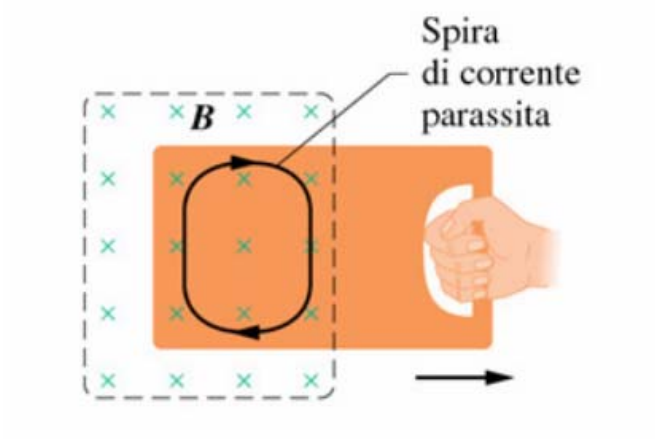
Alternatore

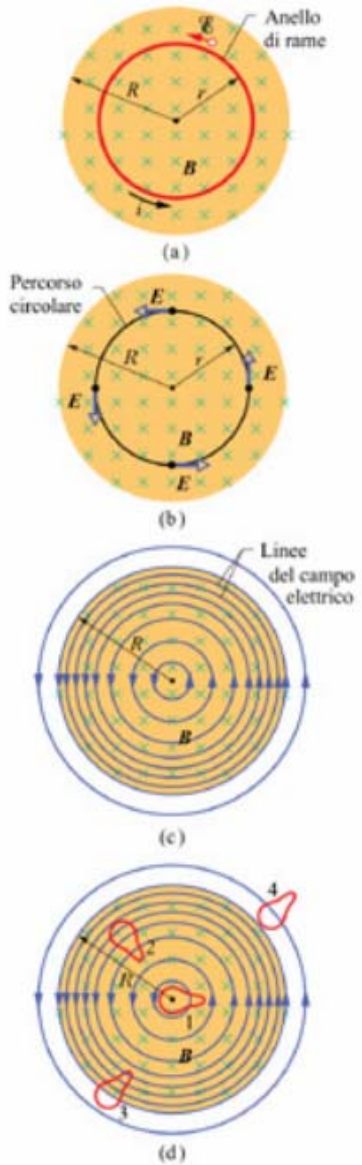


Campo E indotto

$$f.e.m. = \oint \frac{\mathbf{F} \cdot d\mathbf{l}}{q} = \oint \mathbf{E} \cdot d\mathbf{l} \quad \Longleftrightarrow \quad \oint \mathbf{E} \cdot d\mathbf{l} = 0$$

$$\oint \mathbf{E} \cdot d\mathbf{l} = -\frac{d\Phi_B}{dt} \qquad \oint \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt}\int \mathbf{B} \cdot d\mathbf{S}$$





Leggi di Faraday e Ampere

$$\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 \left(\sum i + \varepsilon_0 \frac{d\Phi_E}{dt} \right)$$

$$\oint \mathbf{E} \cdot d\mathbf{l} = -\frac{d\Phi_B}{dt}$$