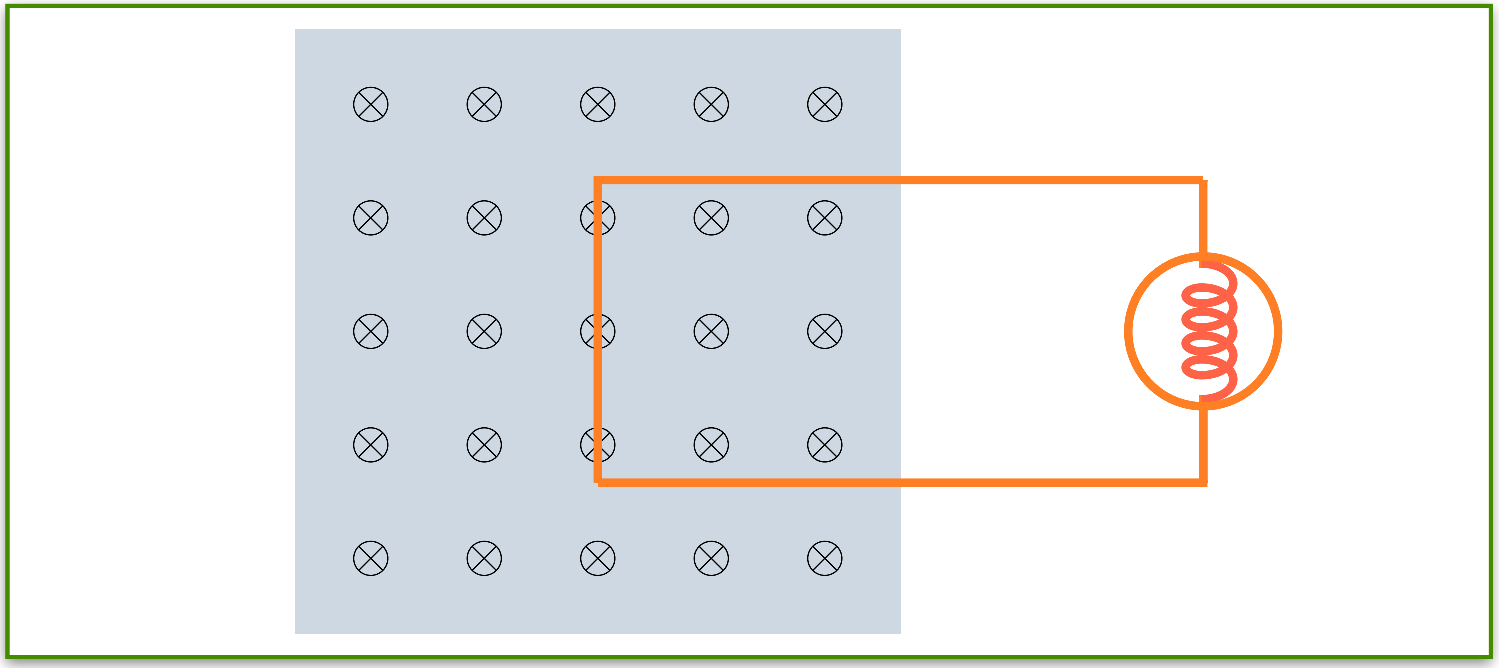
Eletromagnetismo

25 de junho

Eletrodinâmica

Lei de Faraday

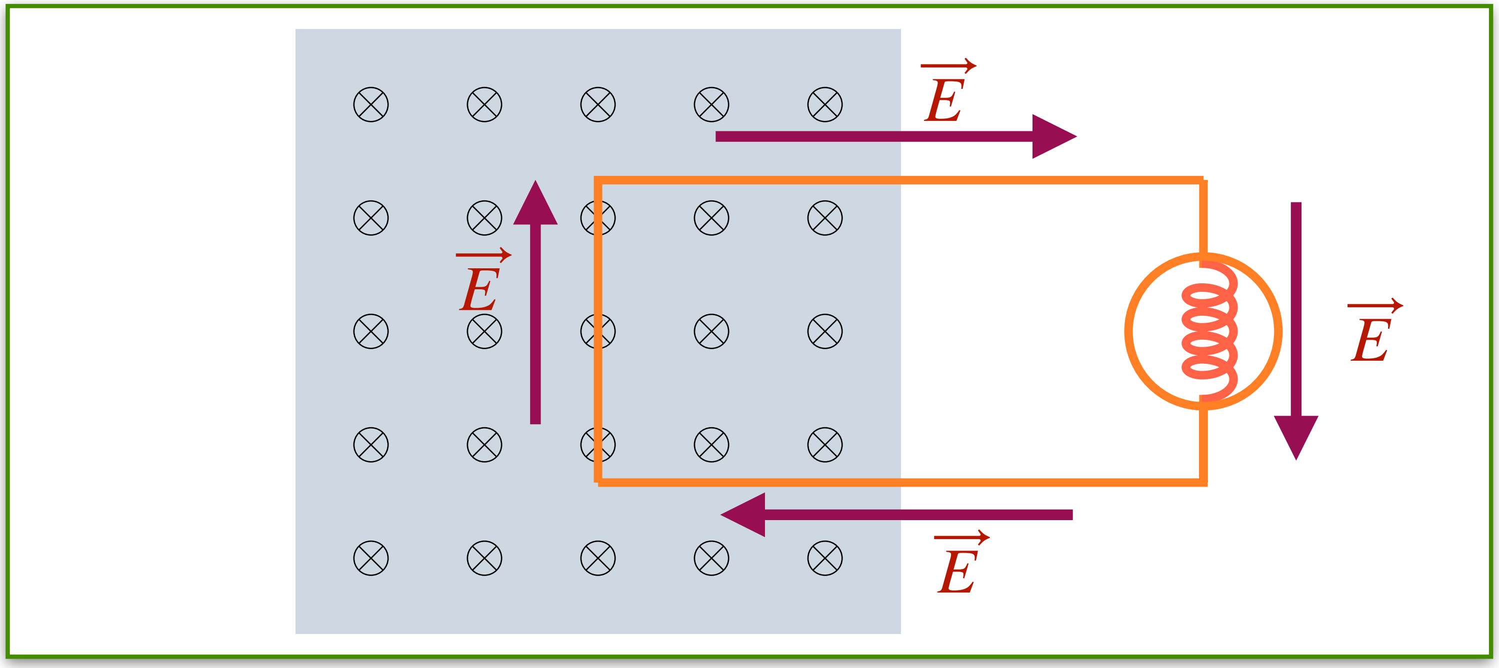
$$\mathcal{E} = -\frac{\mathrm{d}\phi}{\mathrm{d}t}$$



Lei de Faraday

$$\mathcal{E} = -\frac{\mathrm{d}\phi}{\mathrm{d}t}$$

$$\mathcal{E} = \oint \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\ell}$$



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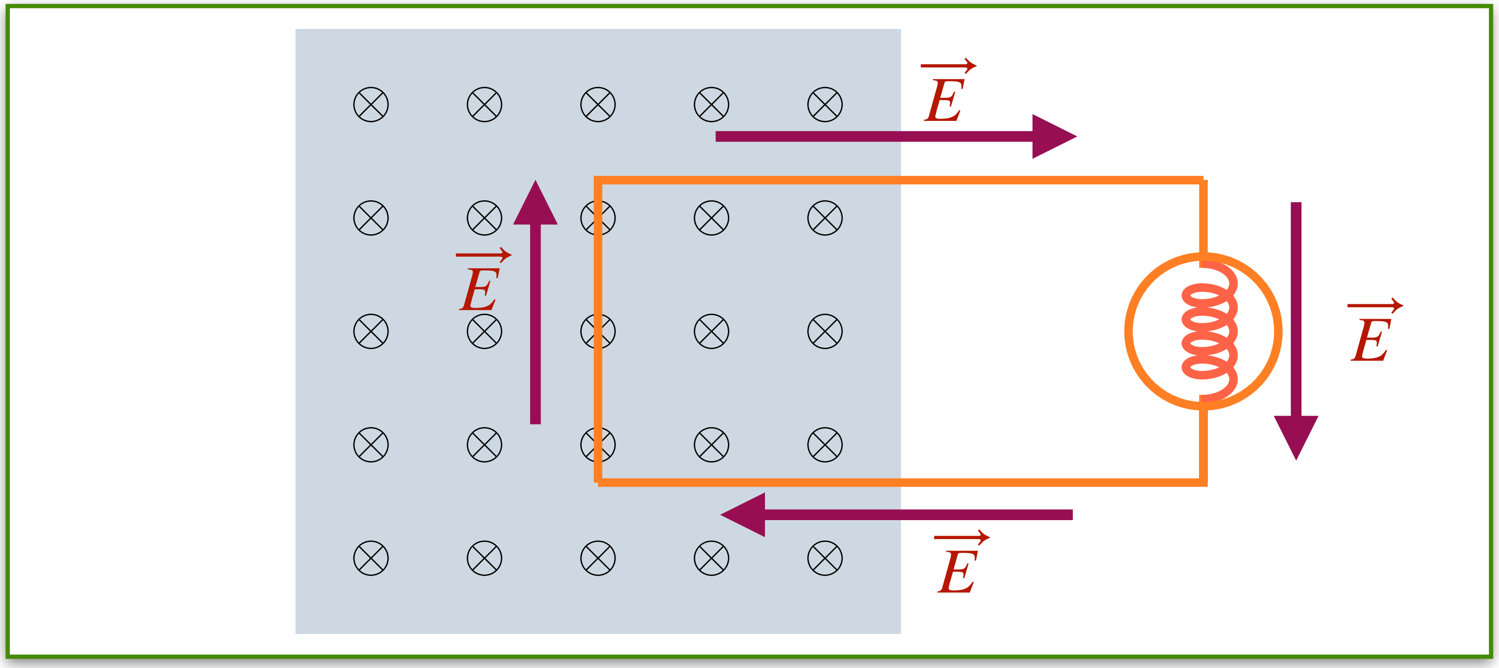

Sentido do campo elétrico indica que campo magnético está diminuindo

Lei de Faraday

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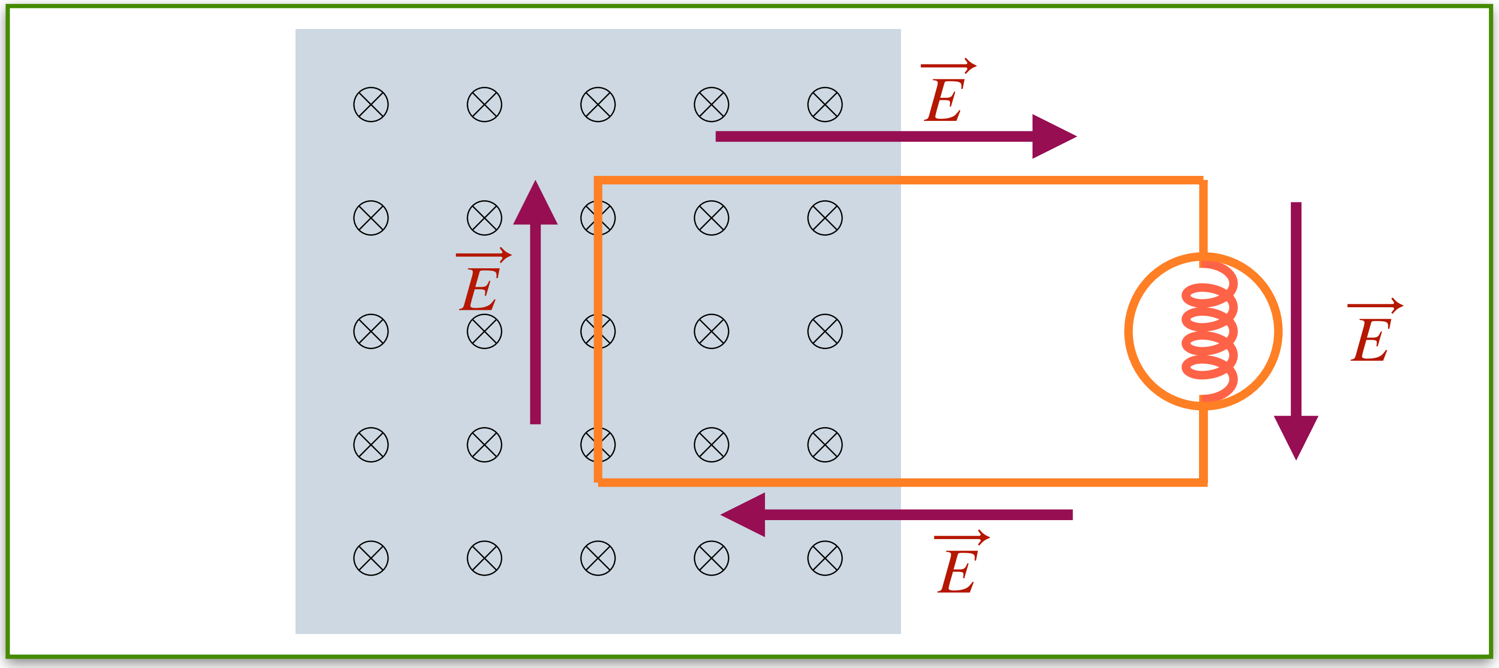
$$\mathcal{E} = \oint \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\ell}$$

$$\mathcal{E} = -\frac{\mathrm{d}}{\mathrm{d}t} \int_{\mathcal{A}} \vec{\mathbf{B}} \cdot \hat{\mathbf{n}}\, \mathrm{d}a$$



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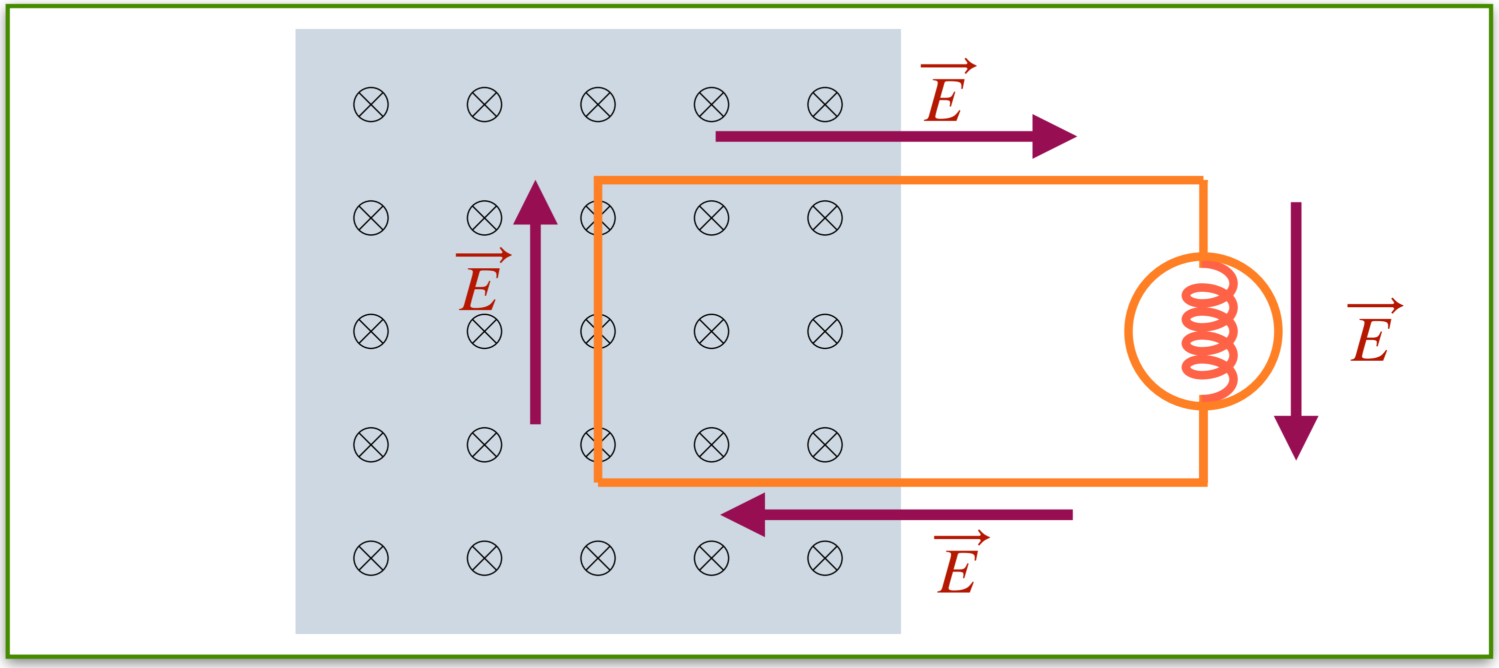

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$$\mathcal{E} = -\frac{\mathrm{d}}{\mathrm{d}t}\int_{\mathcal{A}} \vec{\mathbf{B}} \cdot \hat{\mathbf{n}}\,\mathrm{d}a$$

$$\Rightarrow \quad \oint \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\ell} = -\frac{\mathrm{d}}{\mathrm{d}t}\int \vec{\mathbf{B}} \cdot \hat{\mathbf{n}}\,\mathrm{d}A$$

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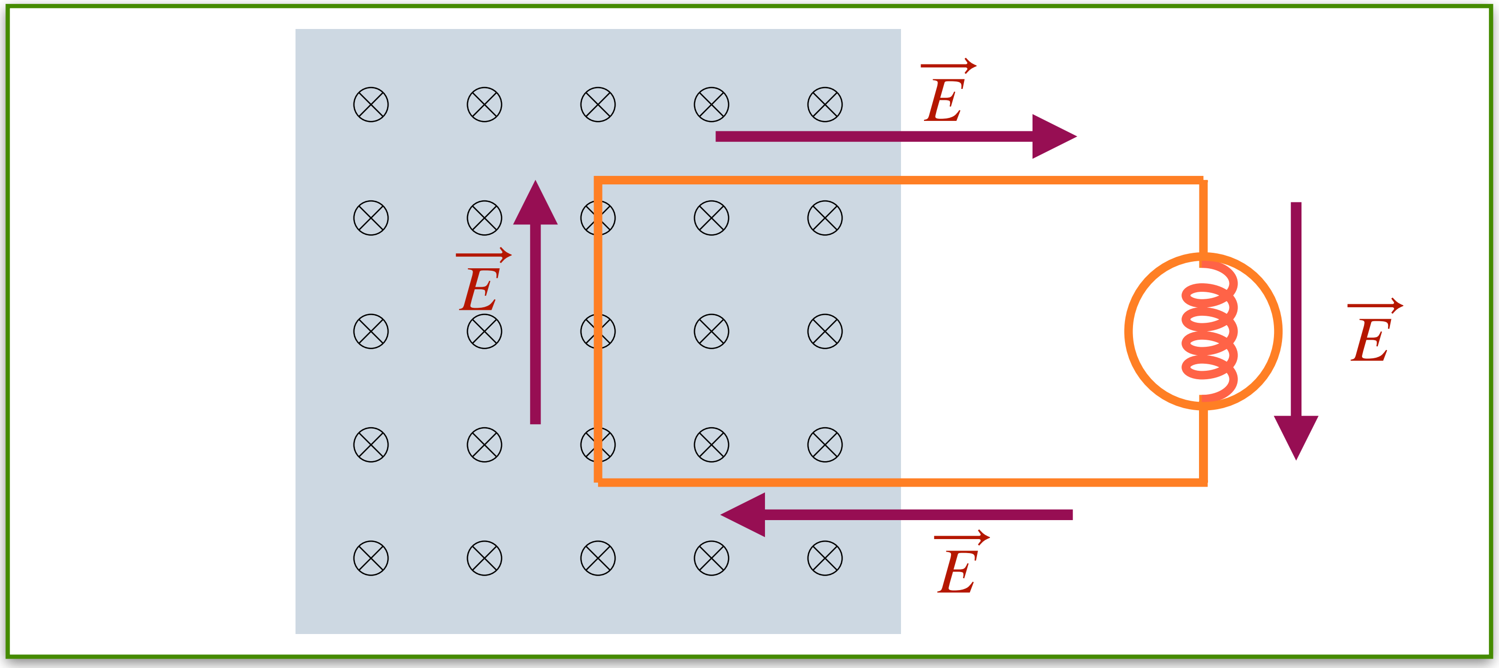

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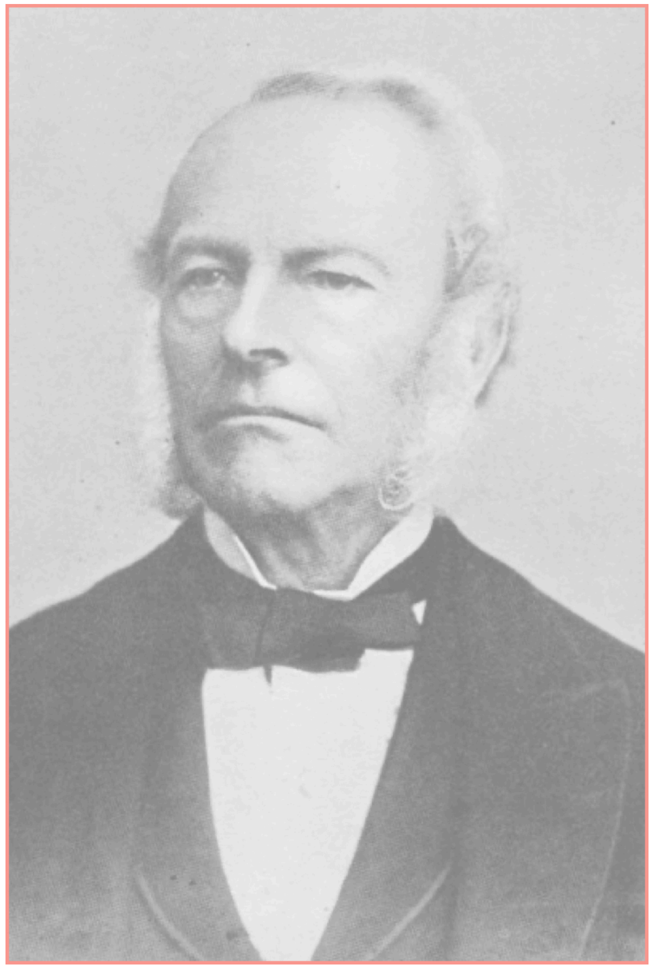
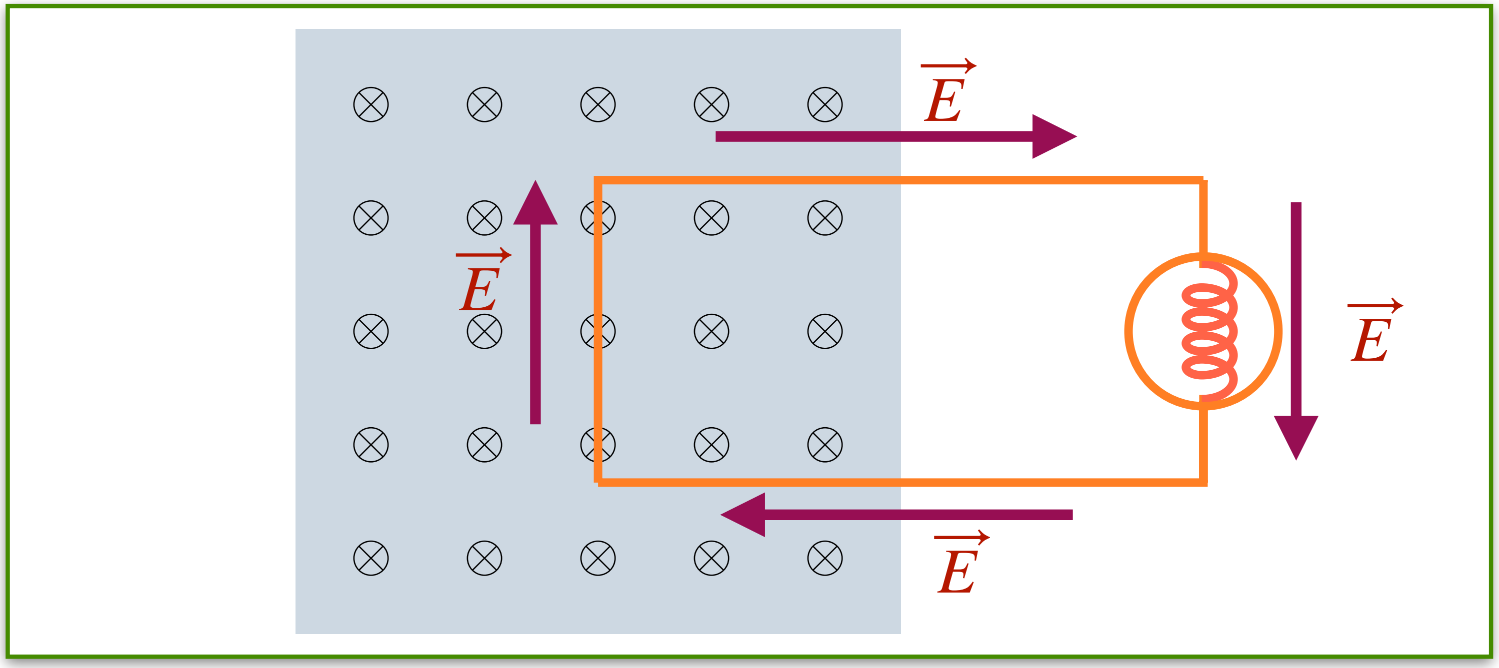


Lei de Faraday

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

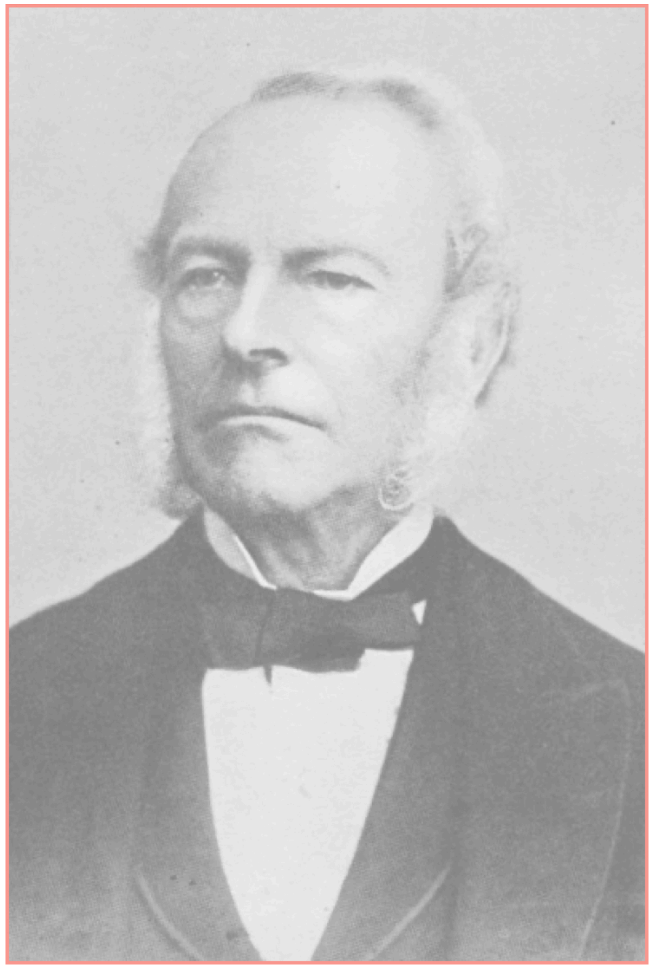


$$\mathcal{E} = \oint \vec{\mathbf{E}} \cdot d\vec{\ell}$$

$$\mathcal{E} = -\frac{d}{dt} \int_{\mathcal{A}} \vec{\mathbf{B}} \cdot \hat{\mathbf{n}} \, da$$

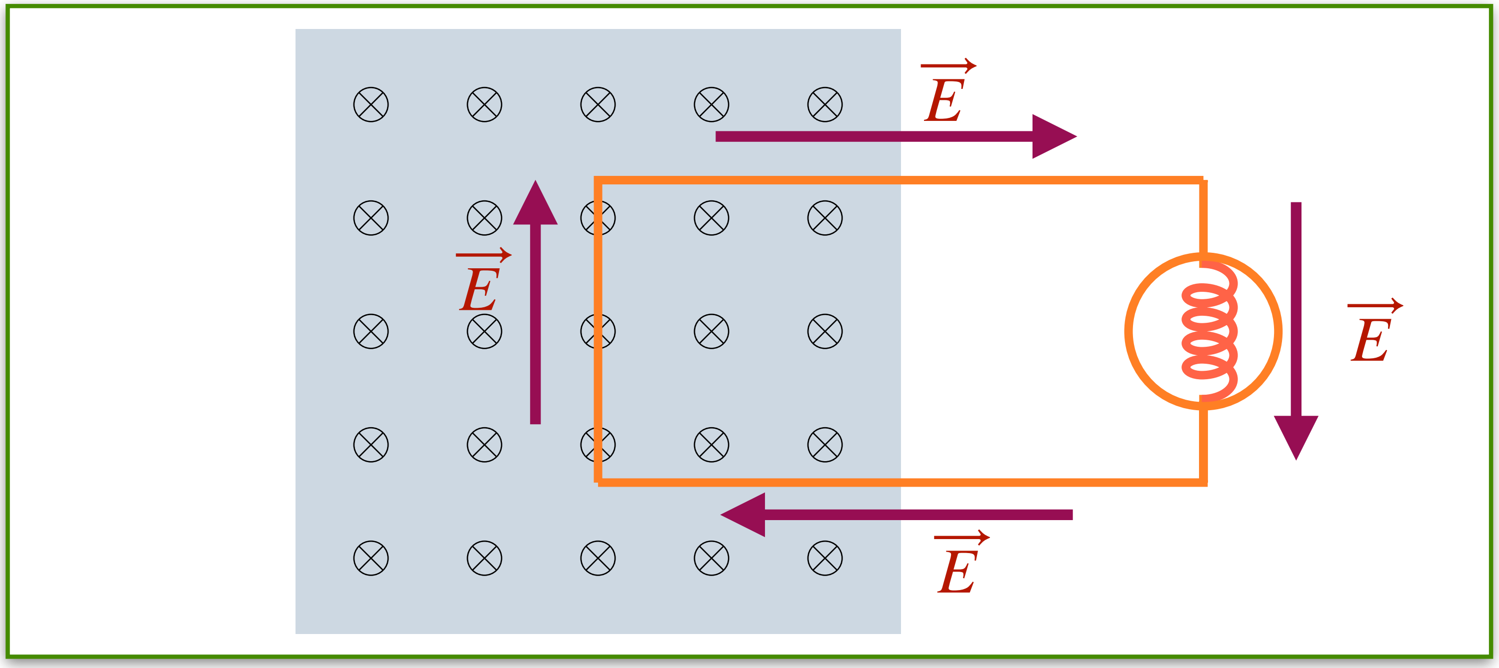
$$\oint \vec{\mathbf{E}} \cdot d\vec{\ell} = -\frac{d}{dt} \int \vec{\mathbf{B}} \cdot \hat{\mathbf{n}} \, dA$$

$$\int \vec{\boldsymbol{\nabla}} \times \vec{\mathbf{E}} \cdot \hat{\mathbf{n}} \, dA = -\frac{d}{dt} \int \vec{\mathbf{B}} \cdot \hat{\mathbf{n}} \, dA$$



Lei de Faraday

$$\mathcal{E} = -\frac{\mathrm{d}\phi}{\mathrm{d}t}$$



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$$\int \vec{\boldsymbol{\nabla}} \times \vec{\mathbf{E}} \cdot \hat{\mathbf{n}}\, \mathrm{d}A = \int \left(-\frac{\partial \vec{\mathbf{B}}}{\partial t}\right) \cdot \hat{\mathbf{n}}\, \mathrm{d}A$$

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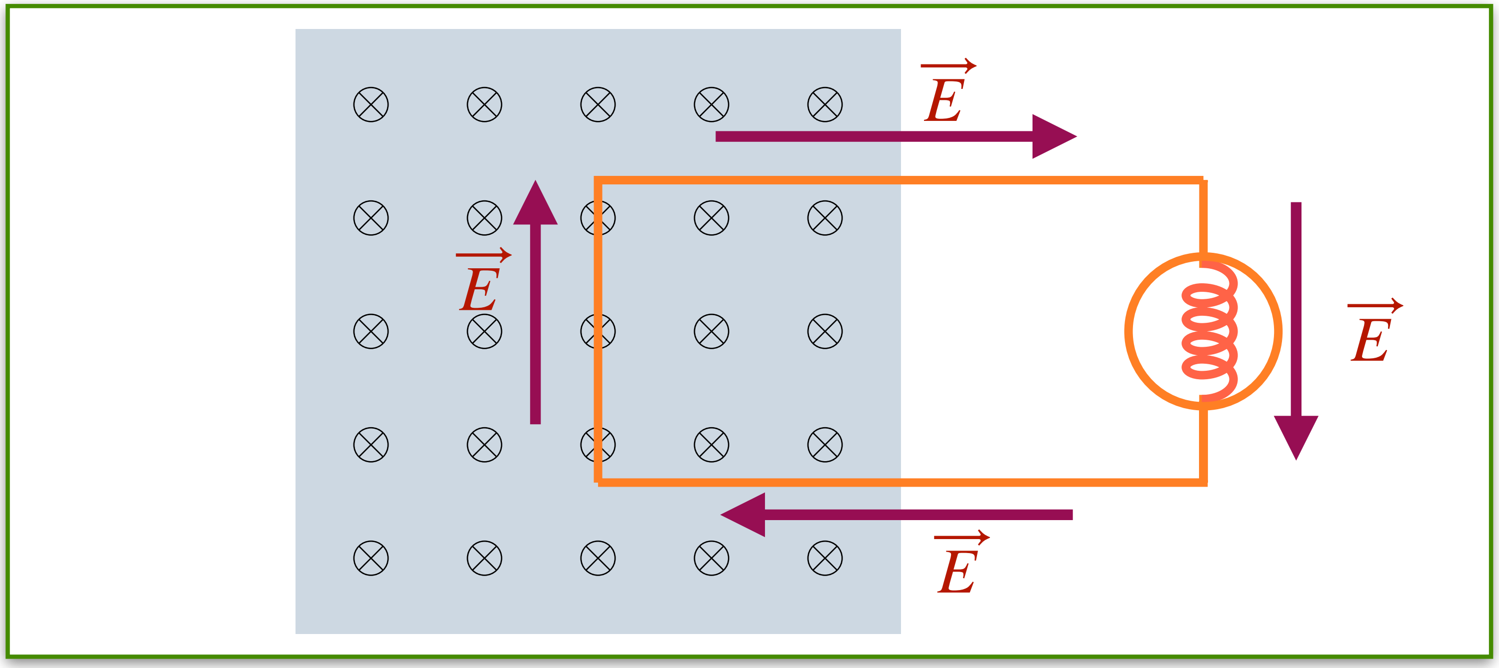

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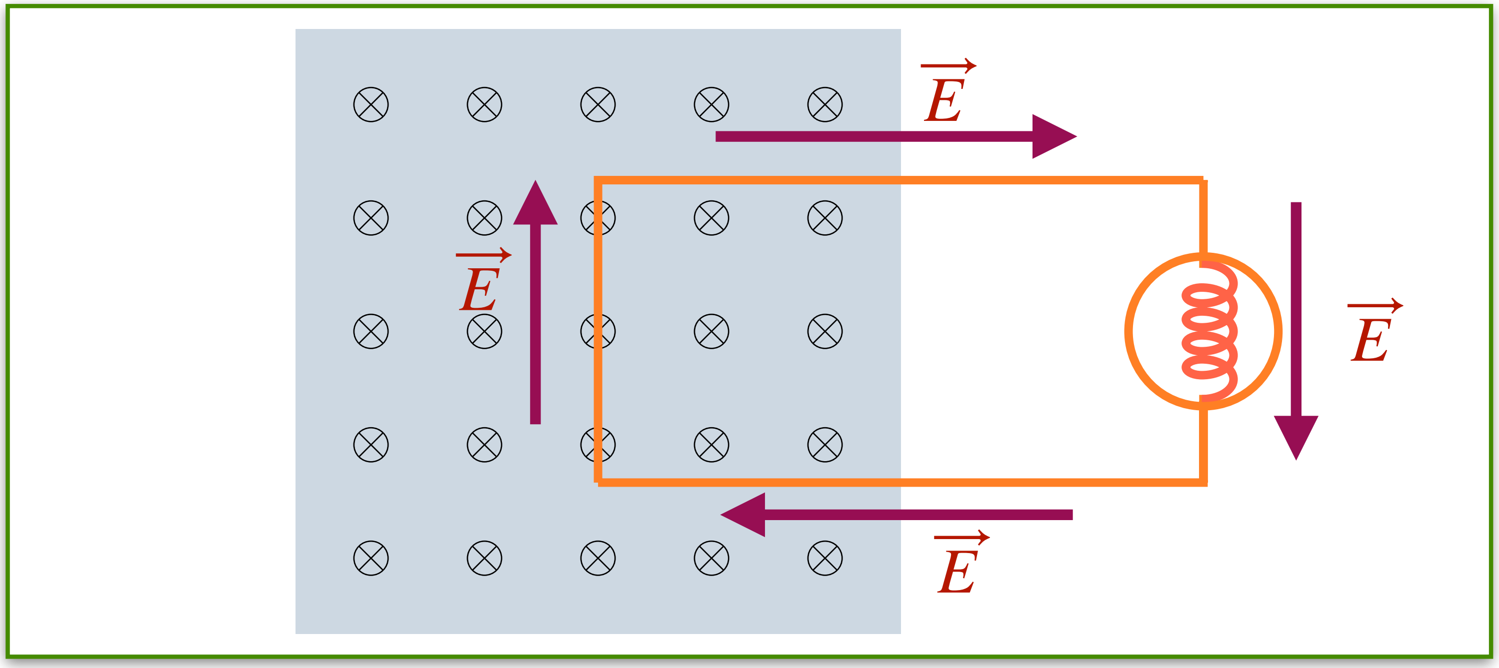

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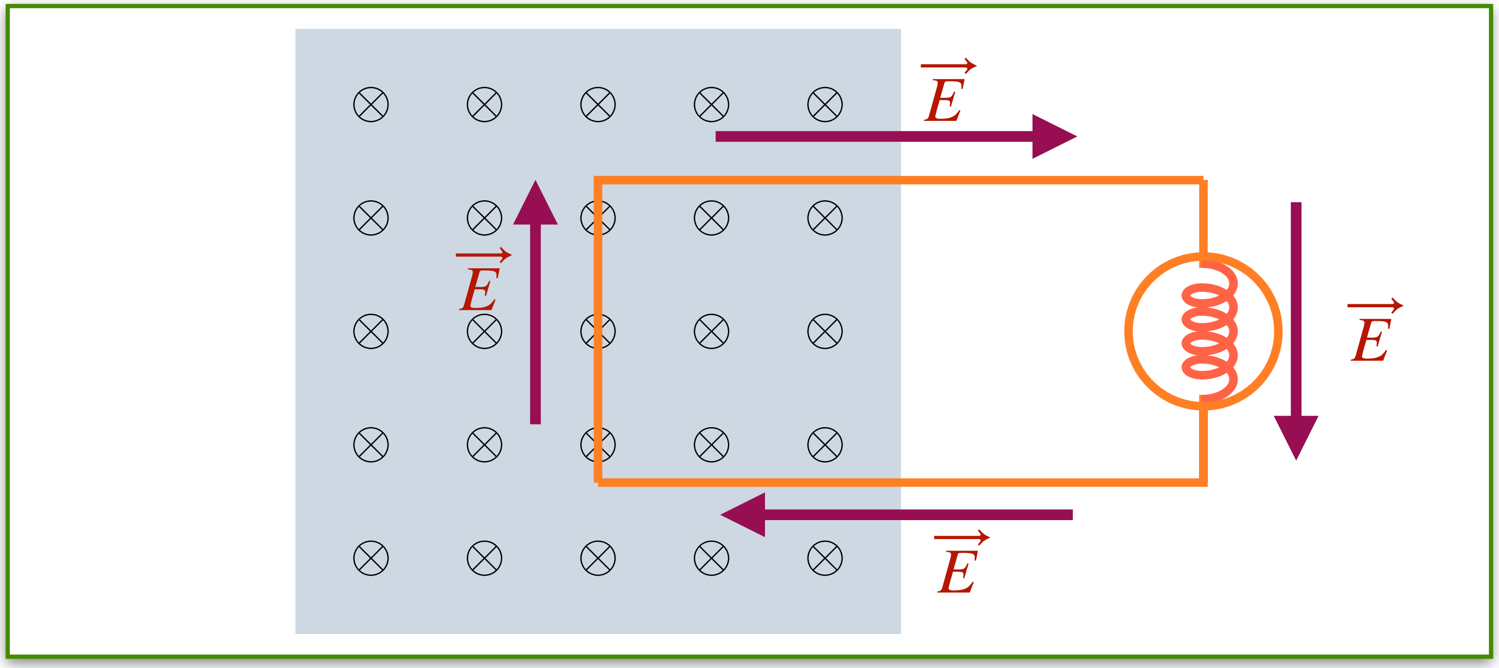

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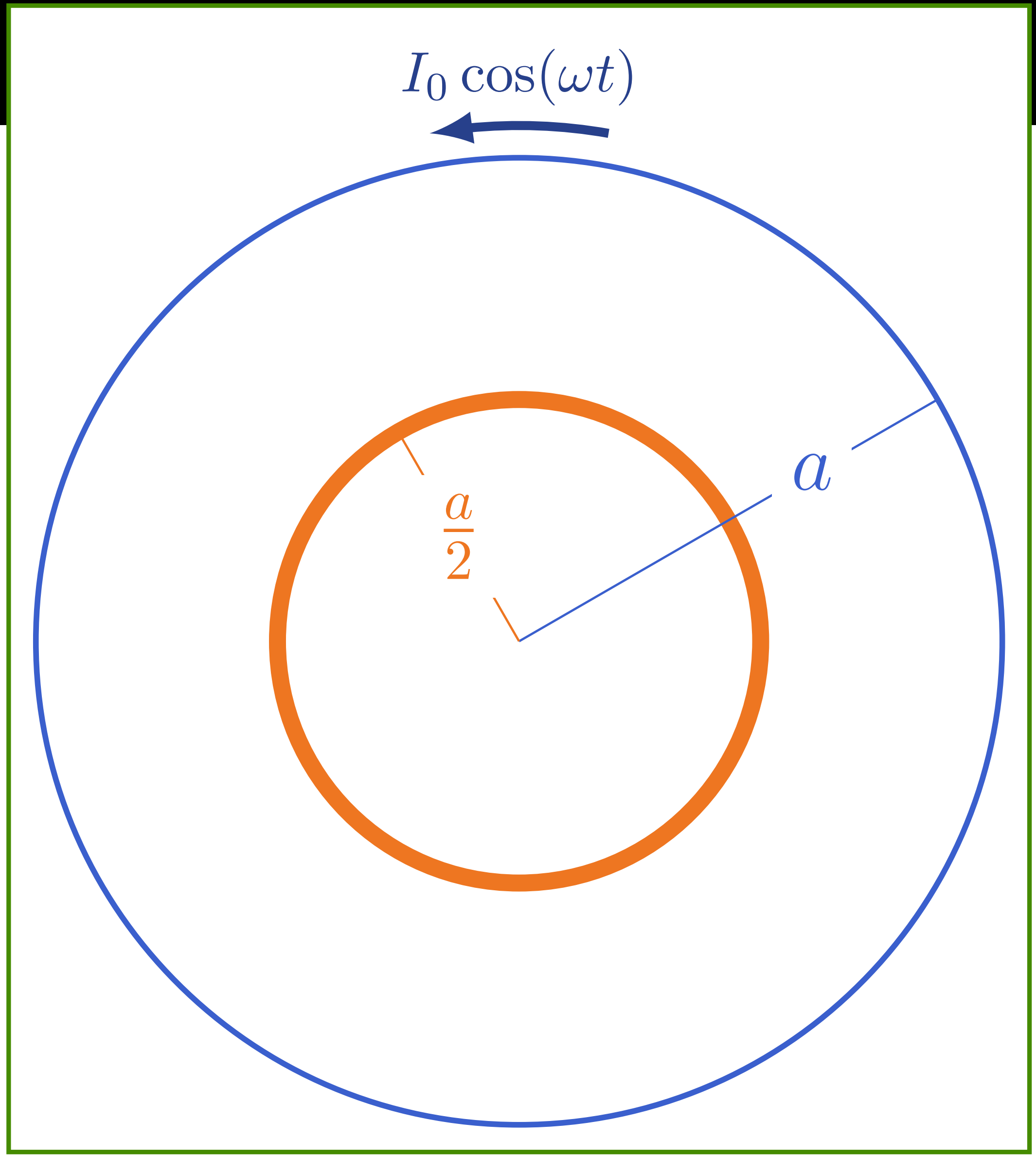
Pratique o que aprendeu



Eletrodinâmica

$$\vec{\nabla} \cdot \vec{\mathbf{E}} = \frac{\rho}{\epsilon_0}$$

$$\vec{\nabla} \cdot \vec{\mathbf{B}} = 0$$

$$\vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}}$$

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

Eletrodinâmica

$$\vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}}$$

Eletrodinâmica

$$\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$$

$$\vec{\nabla} \cdot \vec{\nabla} \times \vec{B} = \mu_0 \vec{\nabla} \cdot \vec{J}$$

Eletrodinâmica

$$\vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}}$$

$$\vec{\nabla} \cdot \vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\nabla} \cdot \vec{\mathbf{J}}$$

$$0 = \mu_0 \left(-\frac{\partial \rho}{\partial t} \right)$$

Eletrodinâmica

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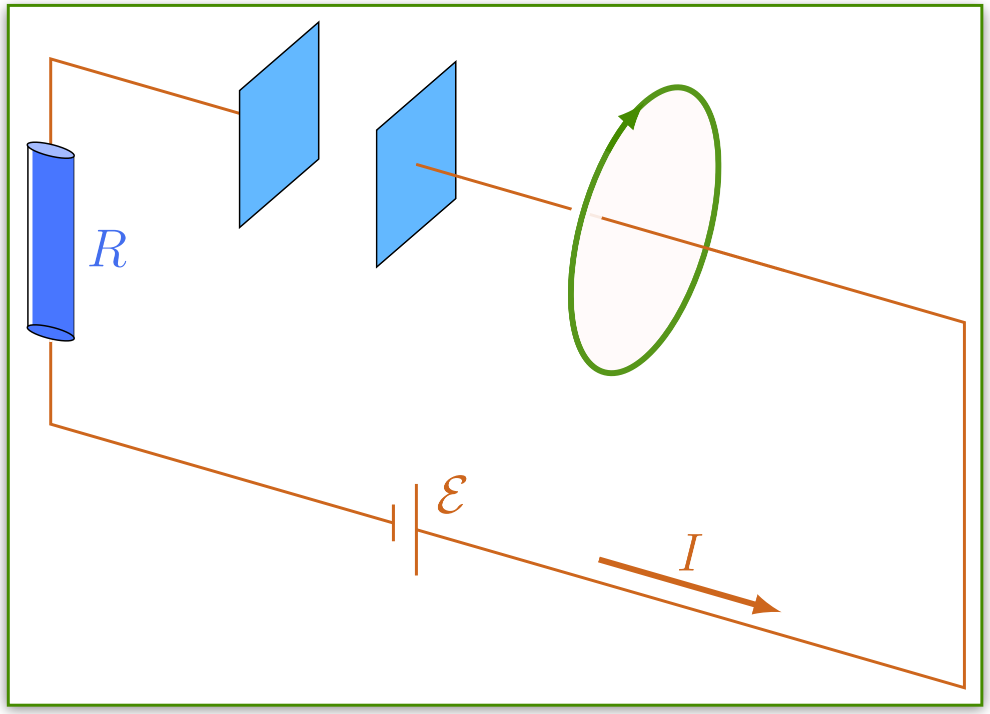

$$\vec{\nabla} \cdot \vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\nabla} \cdot \vec{\mathbf{J}}$$

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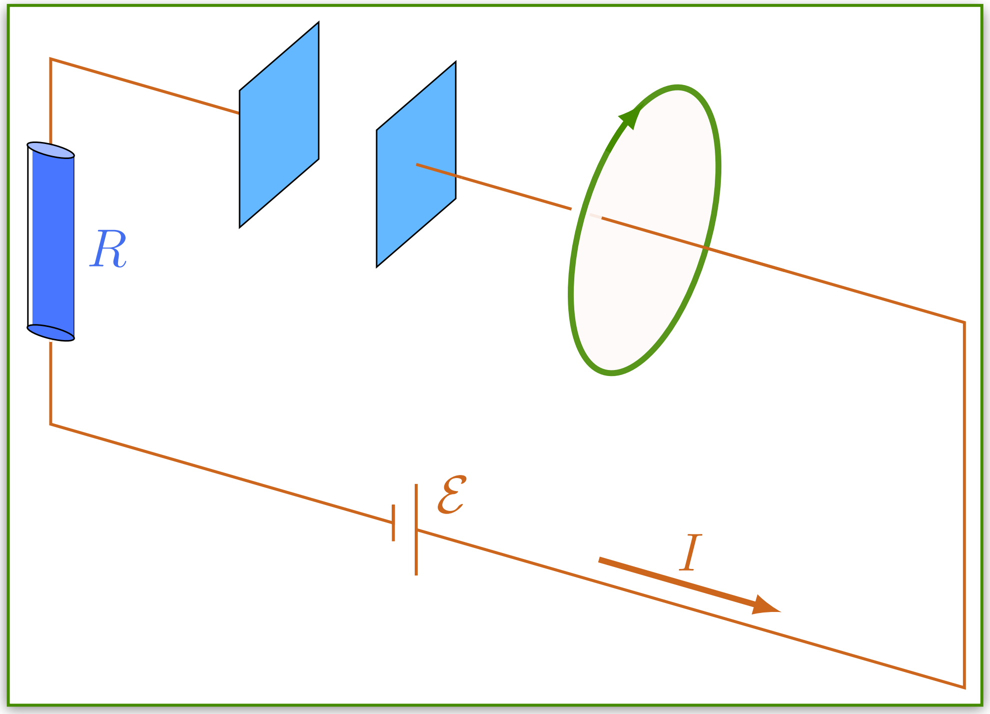

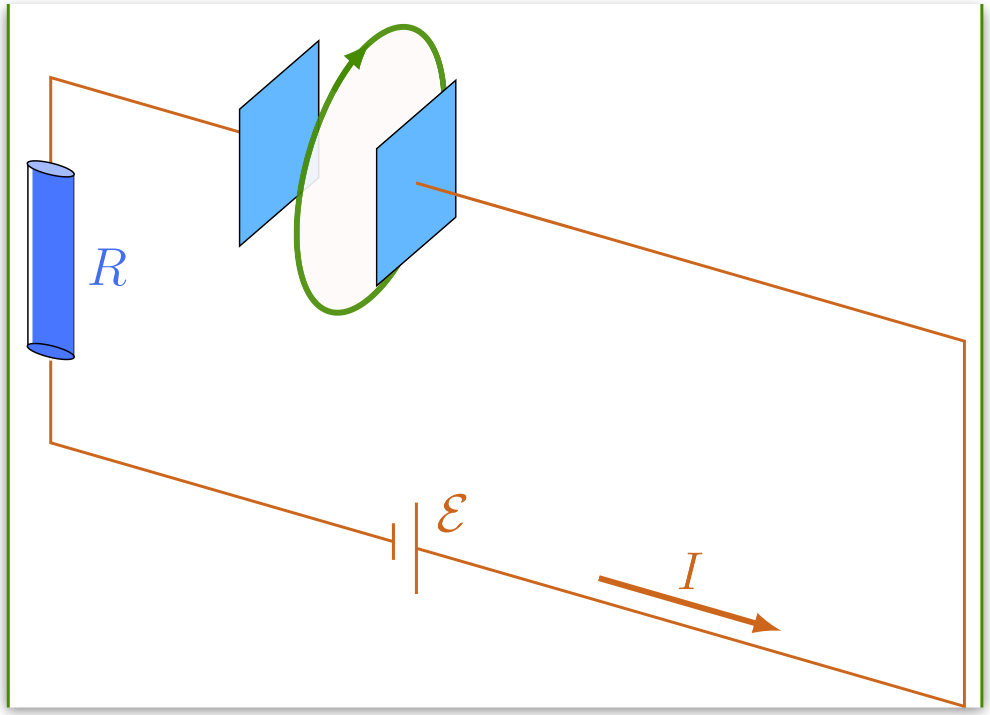

Eletrodinâmica

$$\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$$

$$\vec{\nabla} \times \vec{B} = \mu_0 \vec{J} + \vec{X}$$

Eletrodinâmica

$$\vec{\mathbf{\nabla}} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}} + \vec{\mathbf{X}}$$

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$$\vec{\boldsymbol{\nabla}} \cdot \vec{\boldsymbol{\nabla}} \times \vec{\mathbf{B}} = \mu_0 \vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{J}} + \vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{X}}$$

Eletrodinâmica

$$\vec{\nabla} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}} + \vec{\mathbf{X}}$$

$$\underbrace{\vec{\nabla} \cdot \vec{\nabla} \times \vec{\mathbf{B}}}_{0} = \mu_0 \underbrace{\vec{\nabla} \cdot \vec{\mathbf{J}}}_{-\frac{\partial \rho}{\partial t}} + \vec{\nabla} \cdot \vec{\mathbf{X}}$$

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$$\vec{\nabla} \cdot \vec{\mathbf{X}} = \mu_0 \frac{\partial \rho}{\partial t}$$

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$$\vec{\nabla} \cdot \vec{\mathbf{X}} = \mu_0 \frac{\partial \rho}{\partial t}$$

$$\vec{\nabla} \cdot \vec{\mathbf{X}} = \mu_0 \frac{\partial (\epsilon_0 \vec{\nabla} \cdot \vec{\mathbf{E}})}{\partial t}$$

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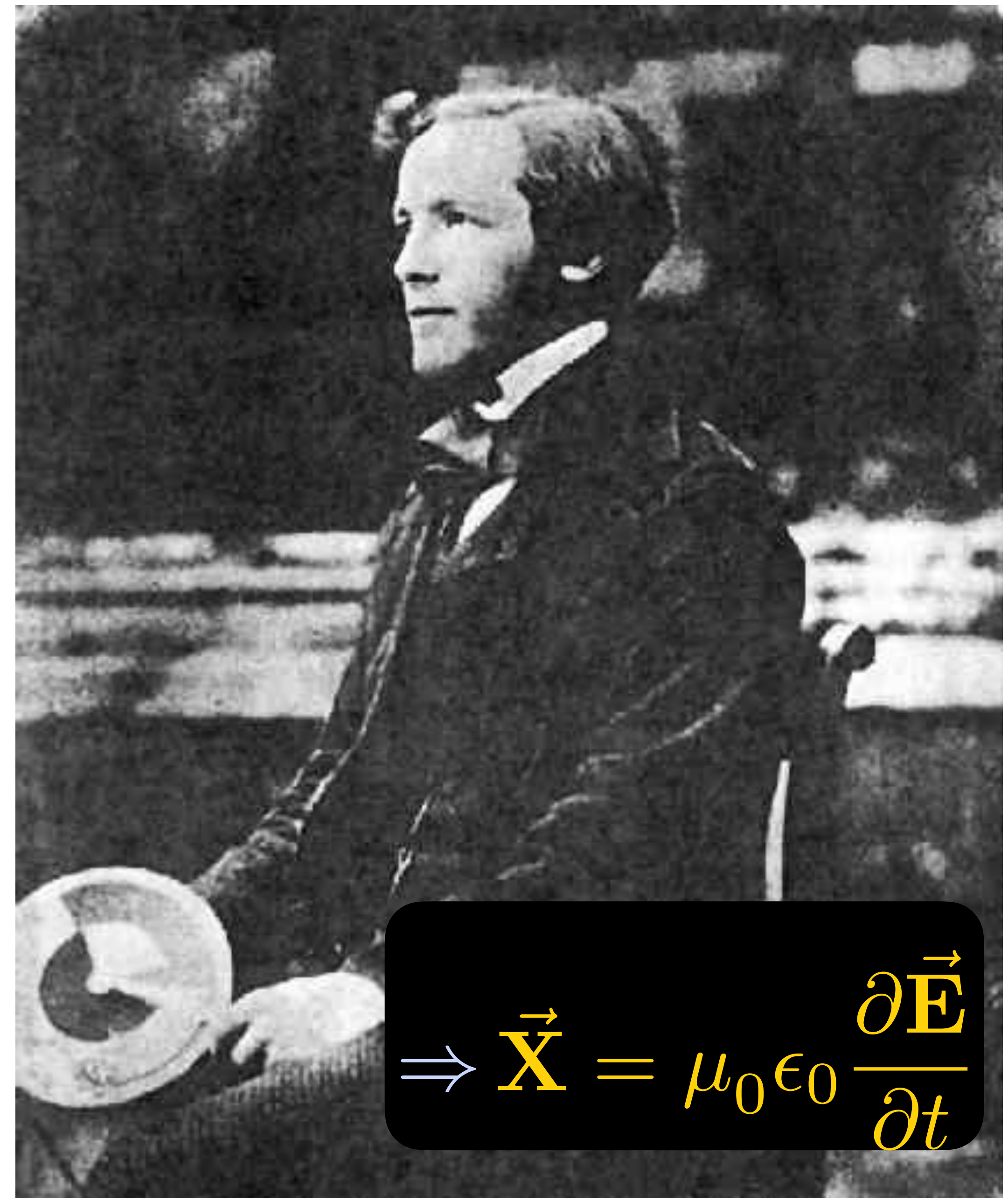
$$\vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{X}} = \mu_0 \frac{\partial \rho}{\partial t}$$

$$\vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{X}} = \mu_0 \frac{\partial (\epsilon_0 \vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{E}})}{\partial t}$$

$$\vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{X}} = \vec{\boldsymbol{\nabla}} \cdot \Big(-\mu_0 \epsilon_0 \frac{\partial \vec{\mathbf{E}}}{\partial t} \Big)$$

$$\Rightarrow \quad \vec{\mathbf{X}} = \mu_0 \epsilon_0 \frac{\partial \vec{\mathbf{E}}}{\partial t}$$



Eletrodinâmica

$$\vec{\nabla} \times \vec{B} = \mu_0 \left(\vec{J} + \epsilon_0 \frac{\partial \vec{E}}{\partial t} \right)$$

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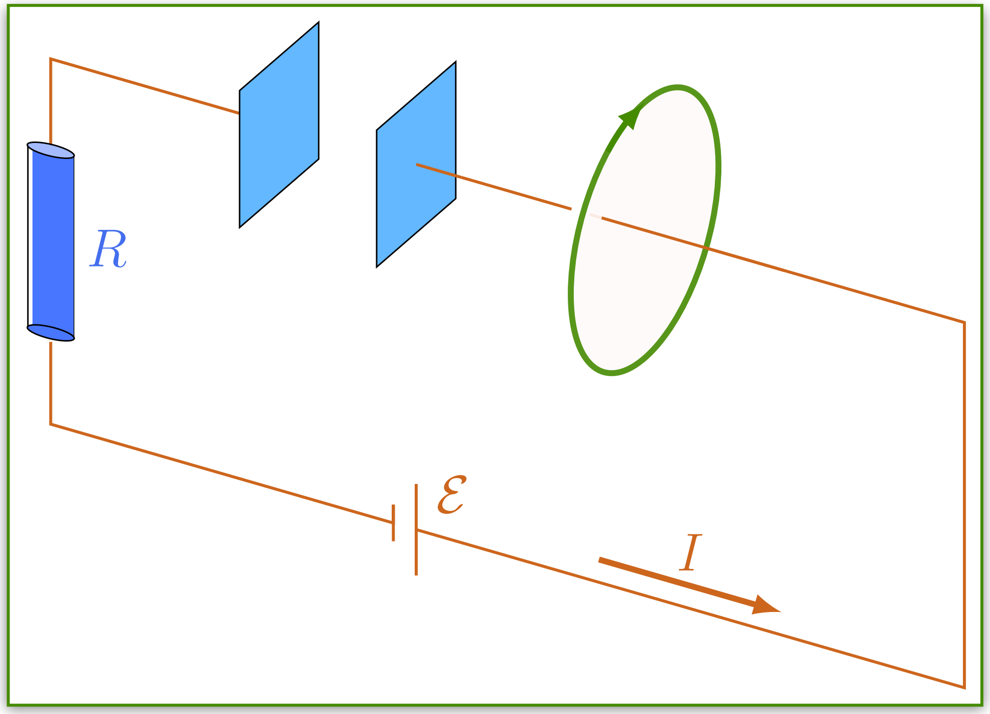

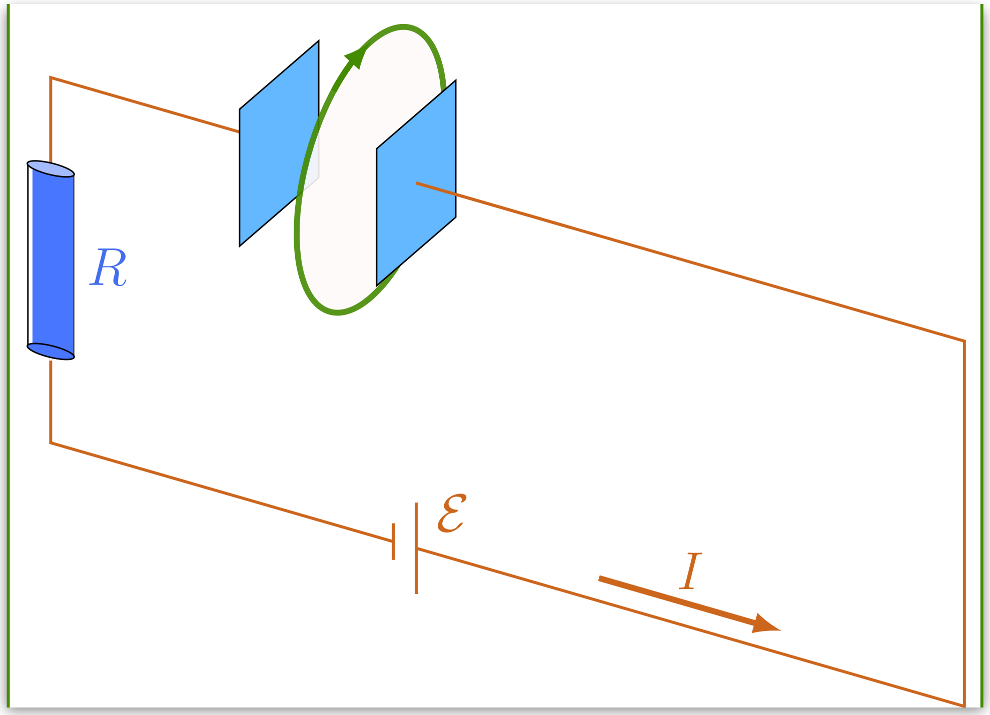

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