Física III

Aula *online 27/04/2020*

Corrente elétrica

Pontas

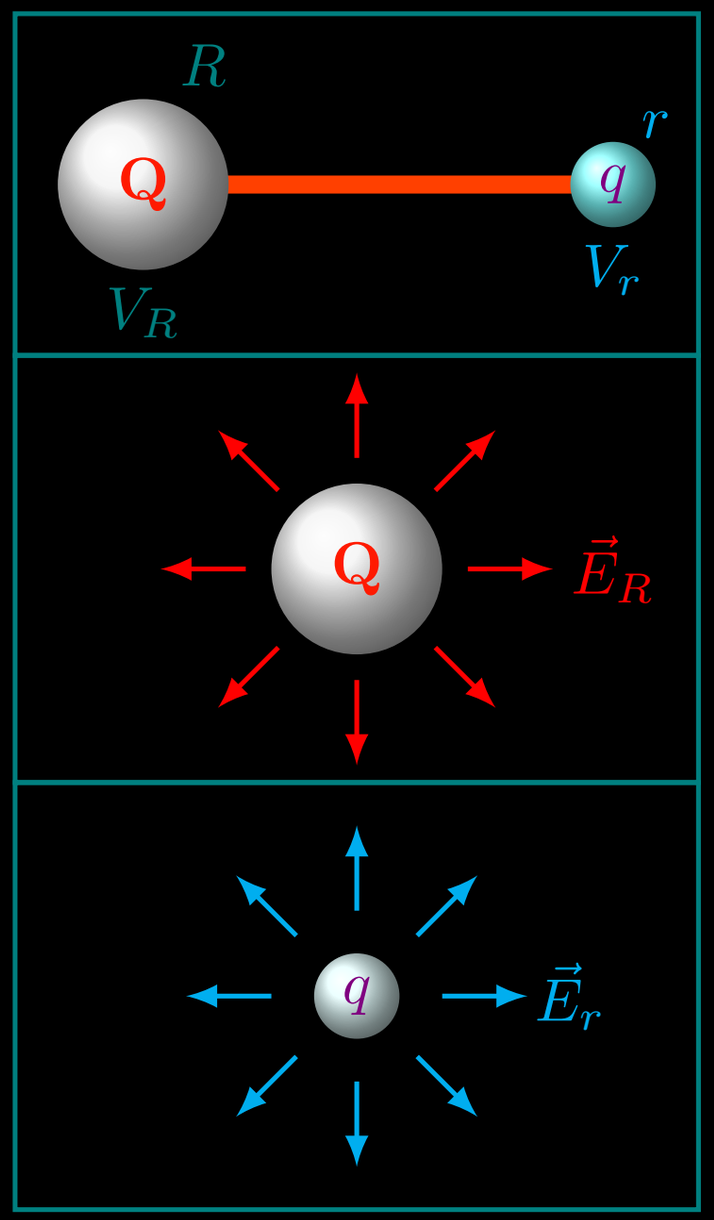
$$V_R = \frac{1}{4\pi\epsilon_0}\frac{Q}{R}$$

$$V_r = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$$

$$V_R = V_r$$

$$E_R = \frac{V_R}{R}$$

$$E_r = \frac{V_r}{r}$$



Pontas

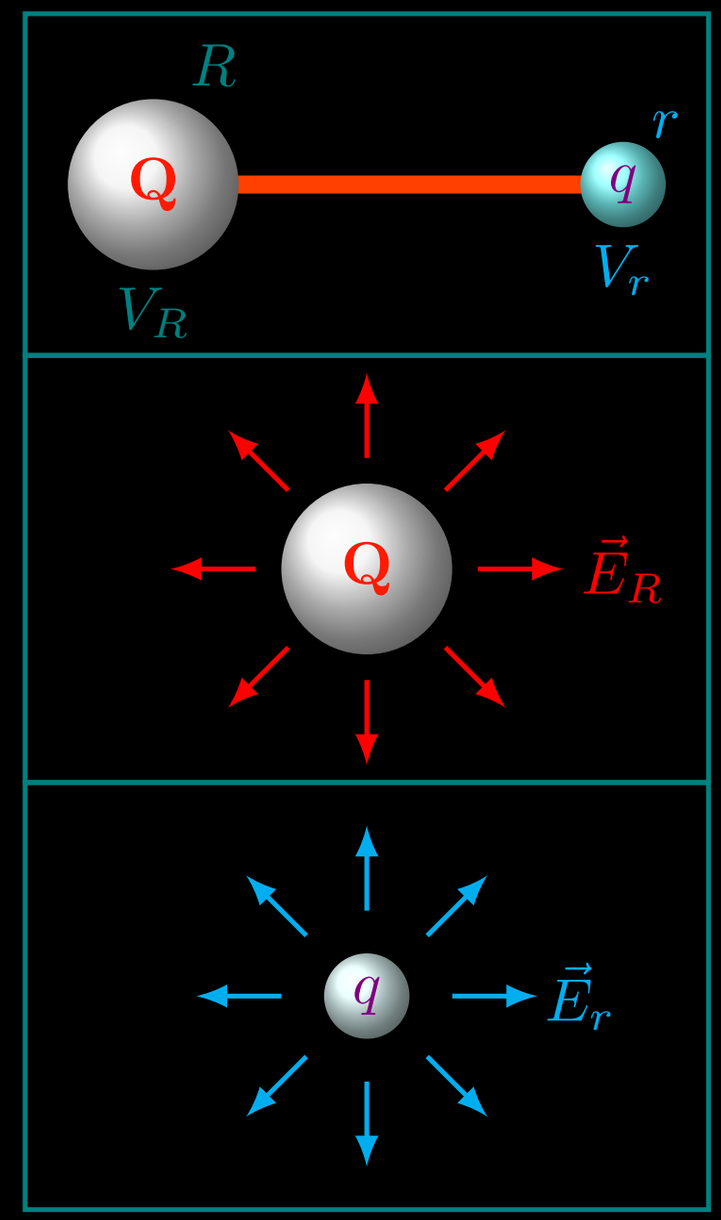
$$V_R = \frac{1}{4\pi\epsilon_0}\frac{Q}{R}$$

$$V_r = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$$

$$V_R = V_r$$

$$E_R = \frac{V_R}{R}$$

$$E_r = \frac{V_r}{r} \quad \Rightarrow \quad E_r = \frac{R}{r}E_R$$



Pontas

$$E_r = \frac{R}{r} E_R$$

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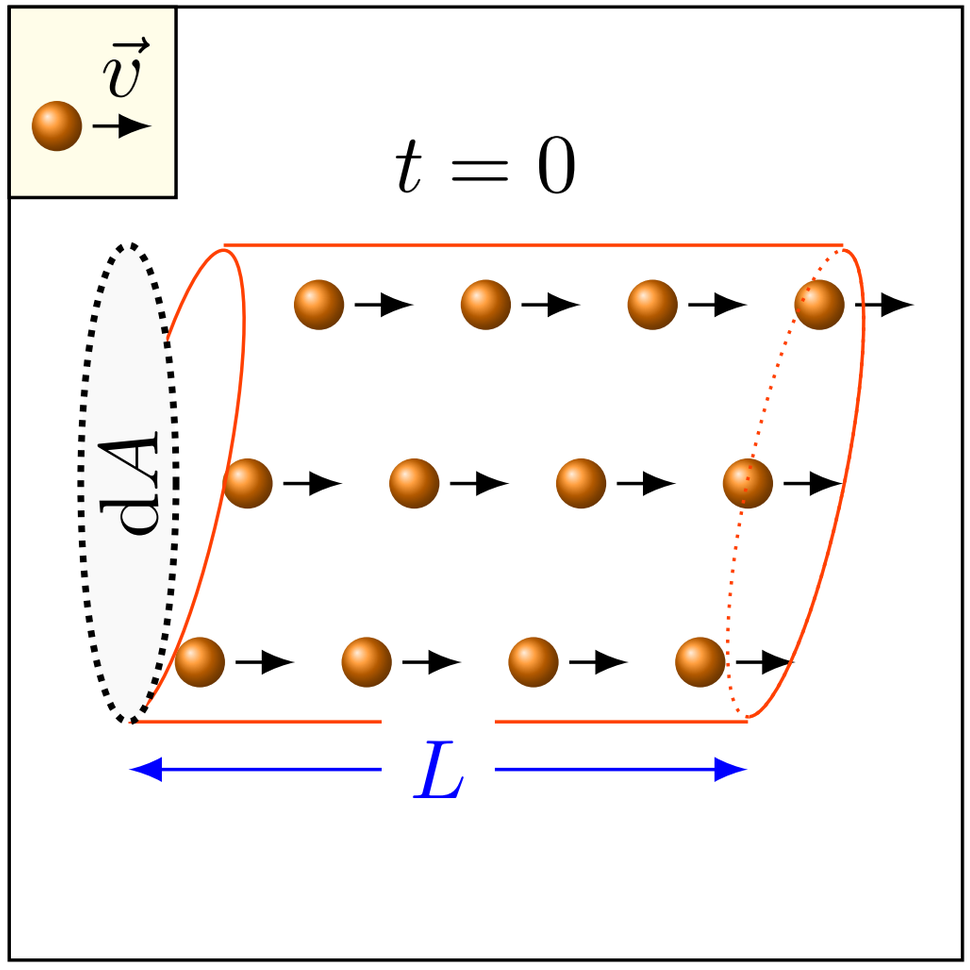
Dinâmica da condução

$$I = \frac{dq}{dt}$$

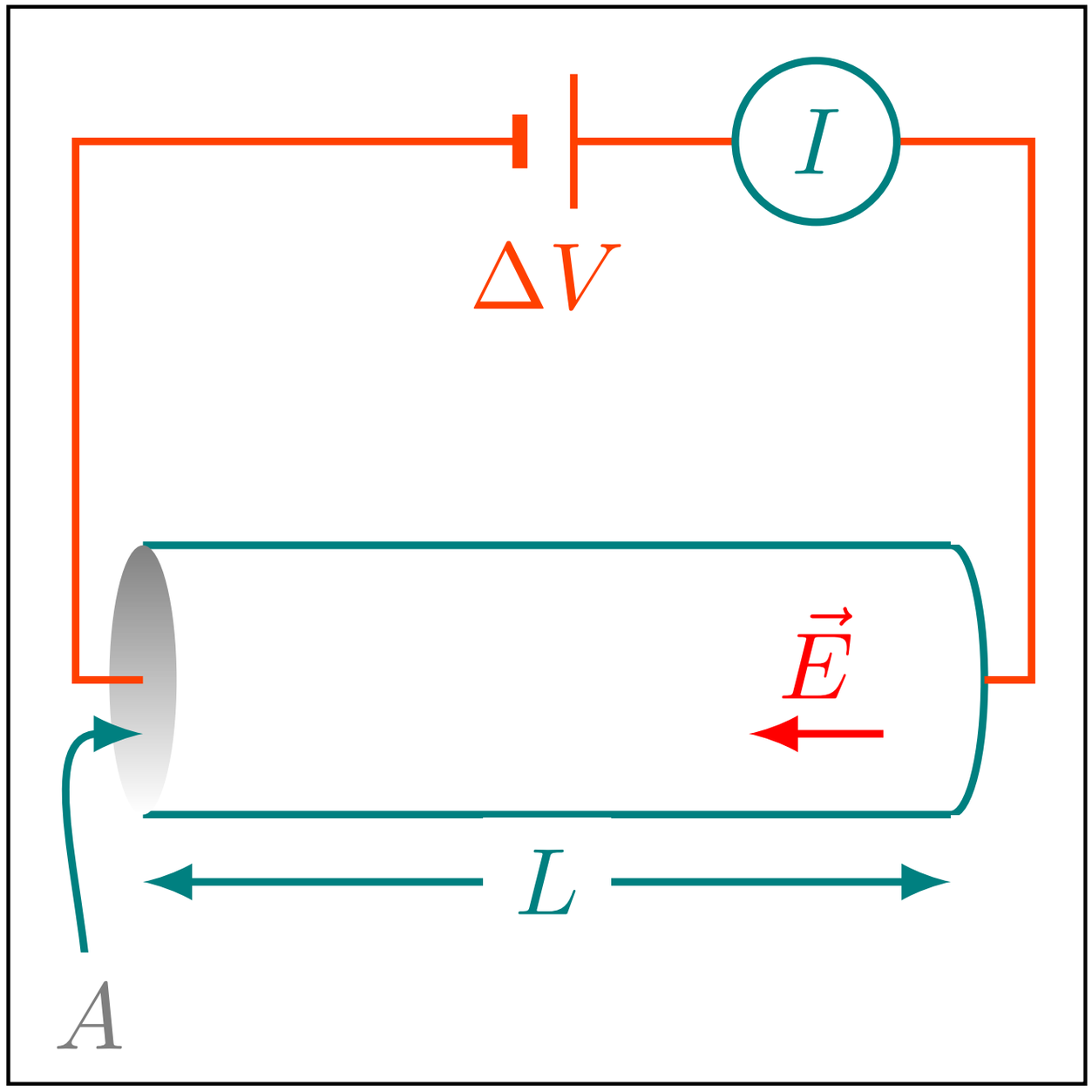
$$dI = \vec{j} \cdot \hat{n}\, \mathrm{d}S$$

$$\vec{j} = \rho \overrightarrow{v}$$



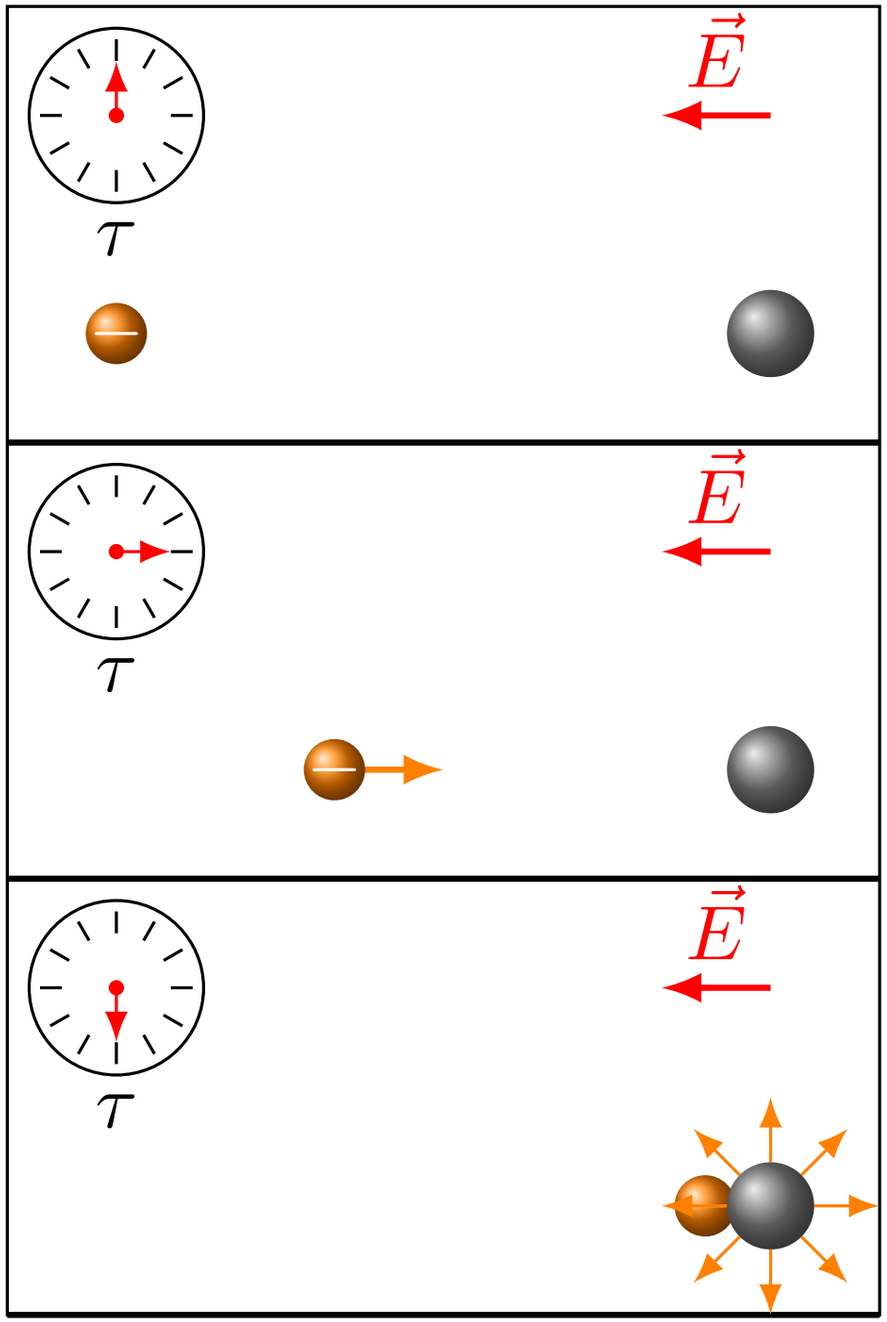
Dinâmica da condução

$$\Delta V = RI$$



Modelo de Drude

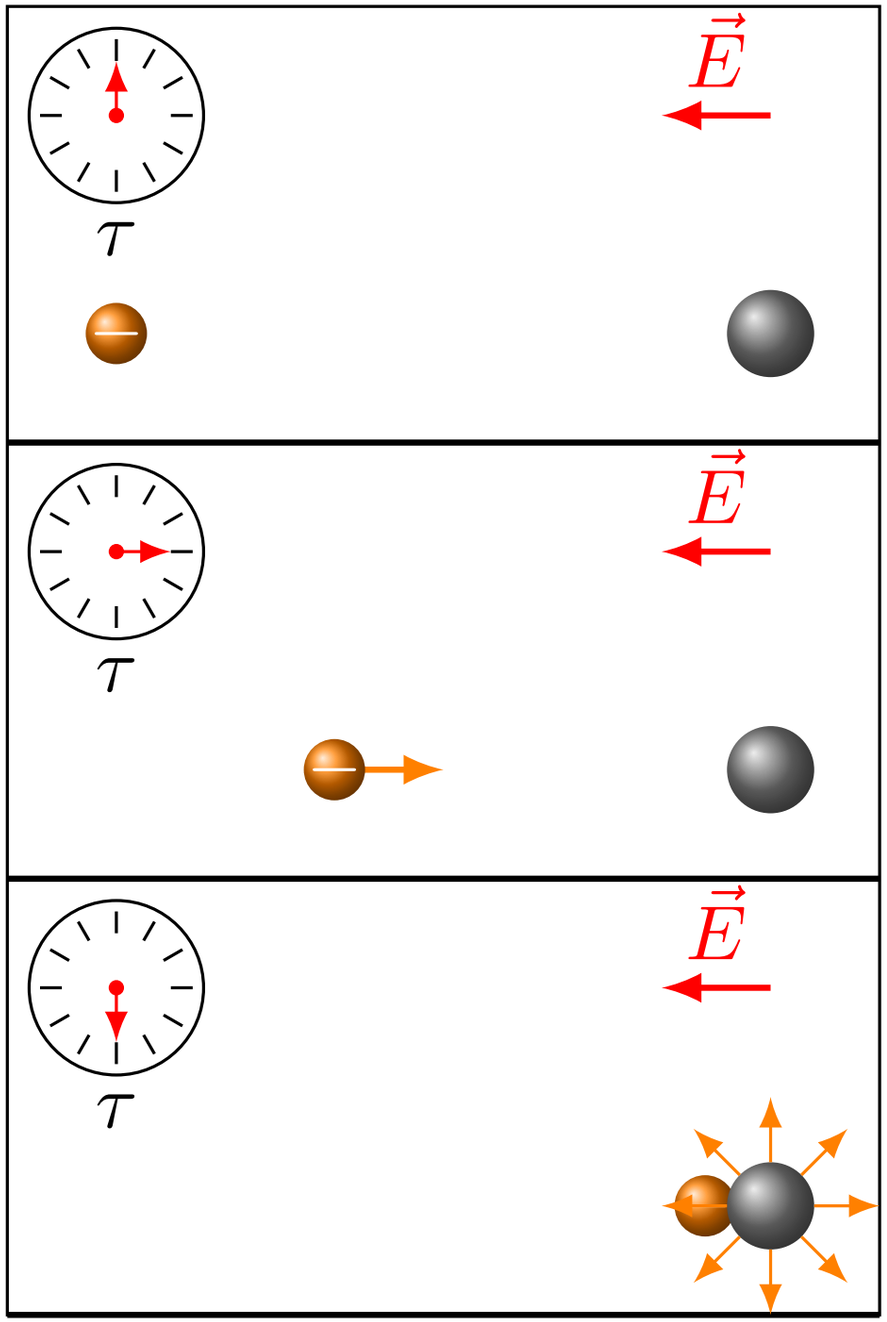
$$\vec{F} = q\vec{E}$$



Modelo de Drude

$$\vec{F} = q\vec{E}$$

$$\vec{a} = \frac{q\vec{E}}{m}$$

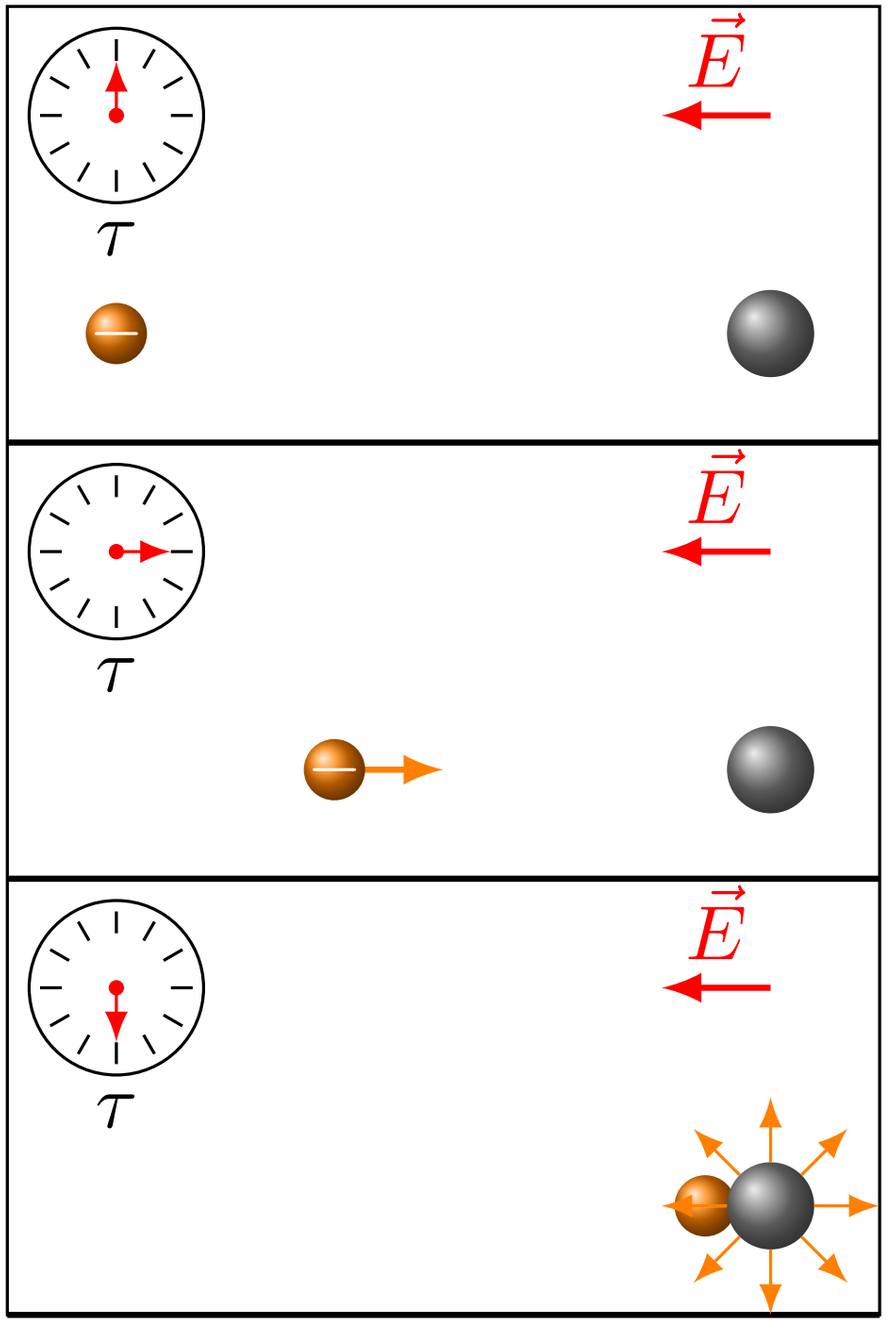


Modelo de Drude

$$\vec{F} = q\vec{E}$$

$$\vec{a} = \frac{q\vec{E}}{m}$$

$$\vec{v} = \vec{a}\,t$$



Modelo de Drude

$$\vec{F} = q\vec{E}$$

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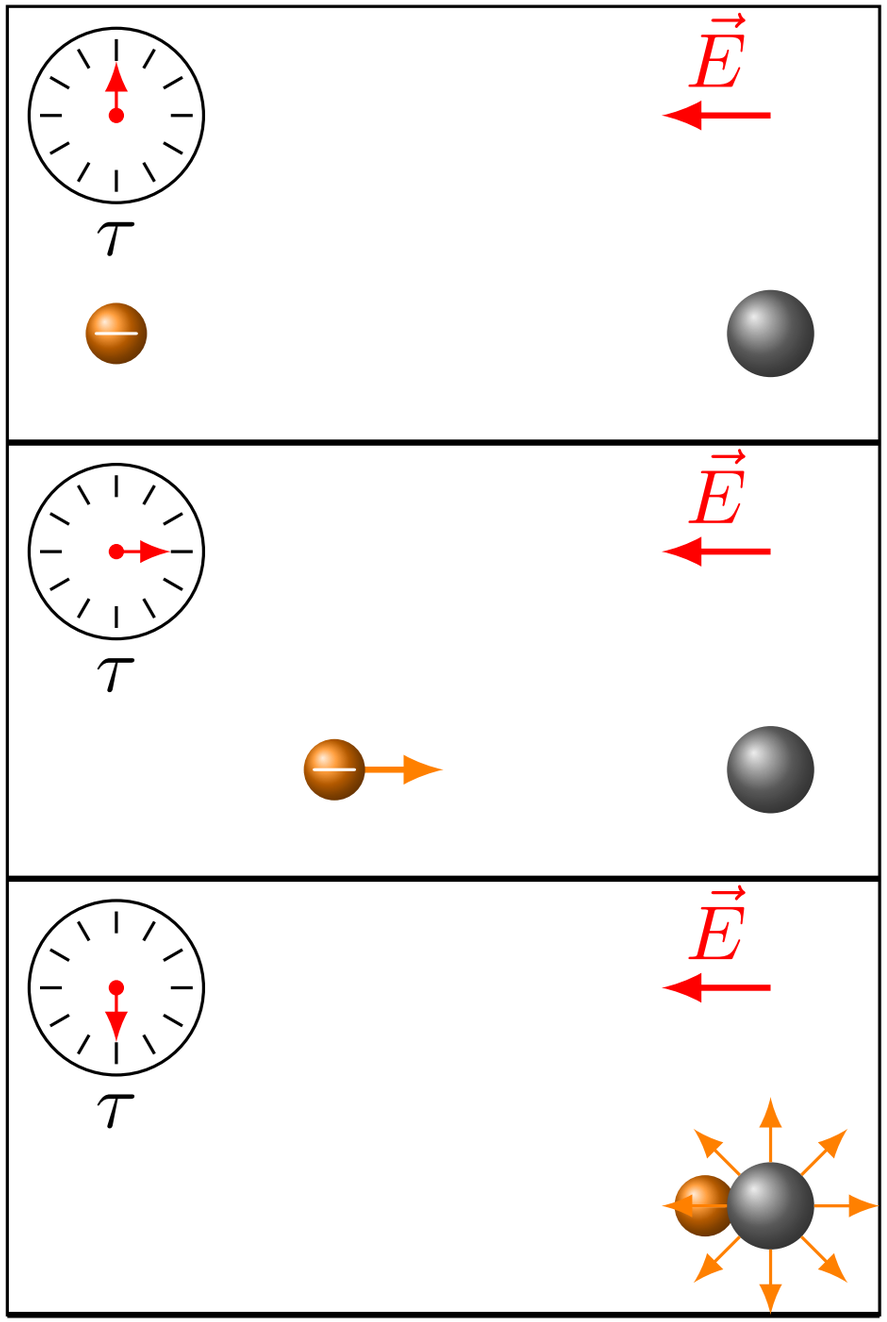
$$\vec{v} = \vec{a}\,t$$

$$v = \frac{qE}{m}t \qquad (0 < t < \tau)$$



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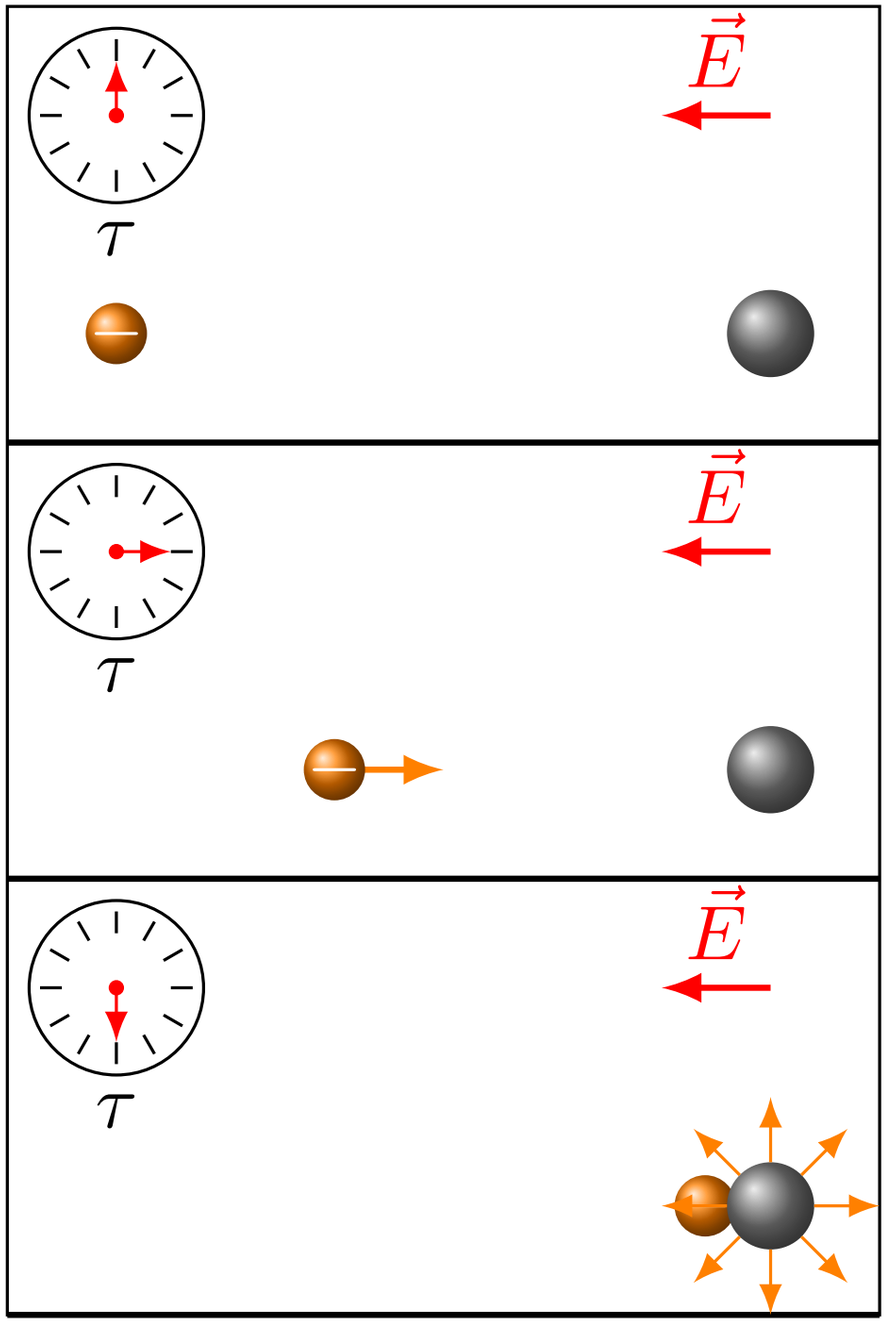

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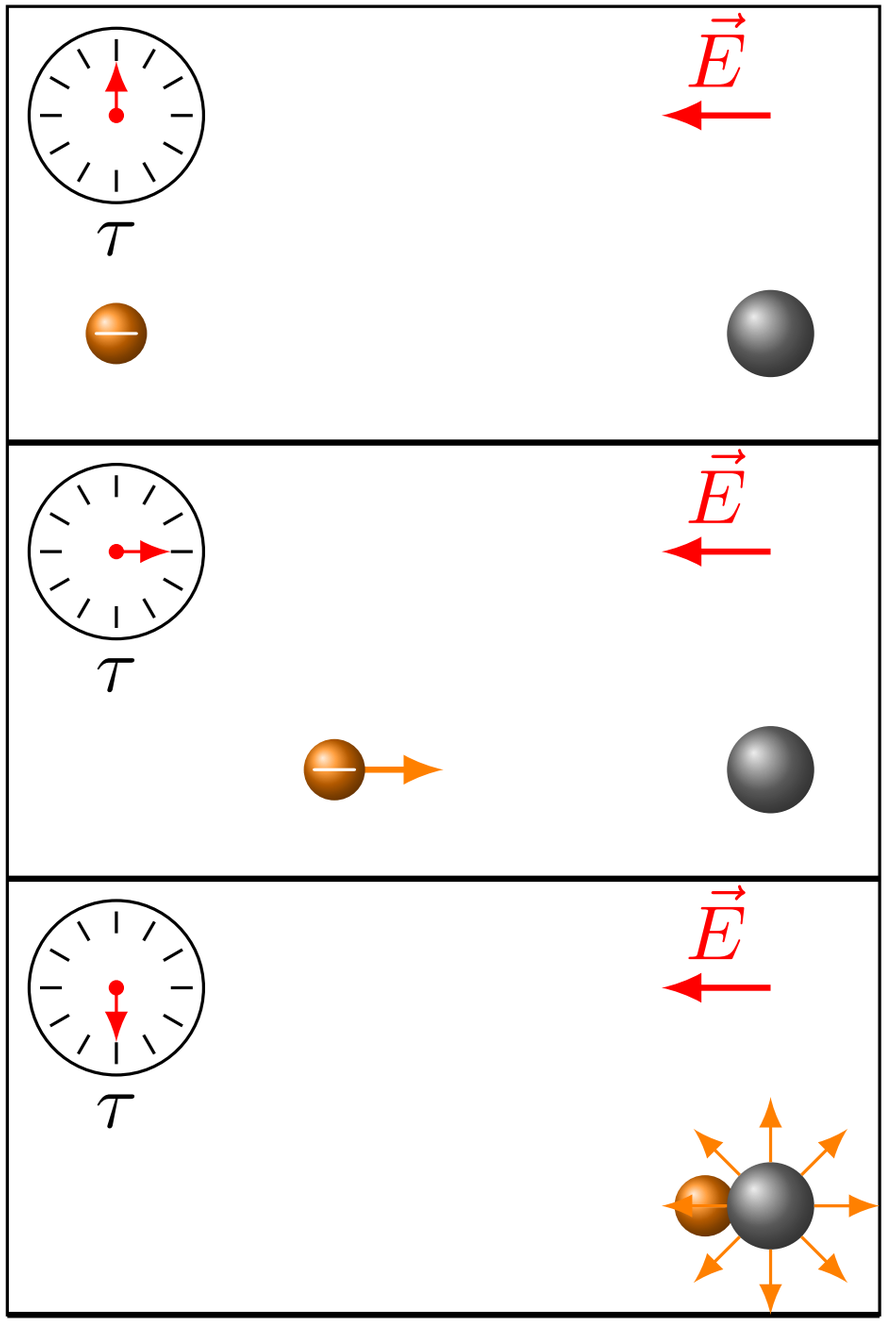

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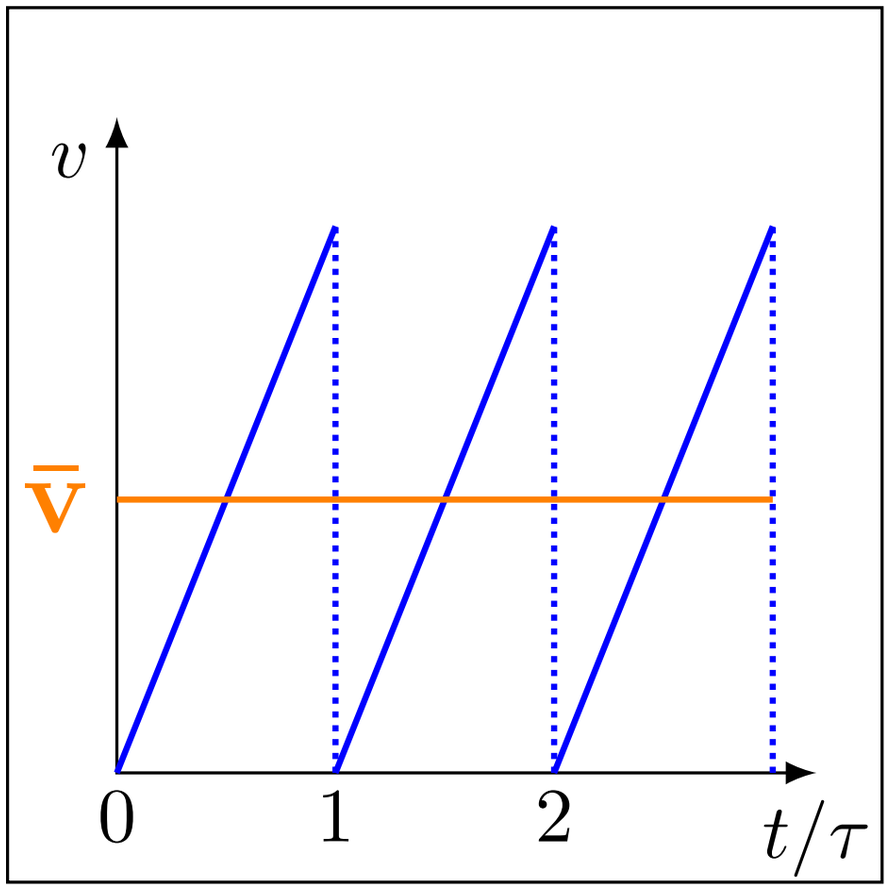
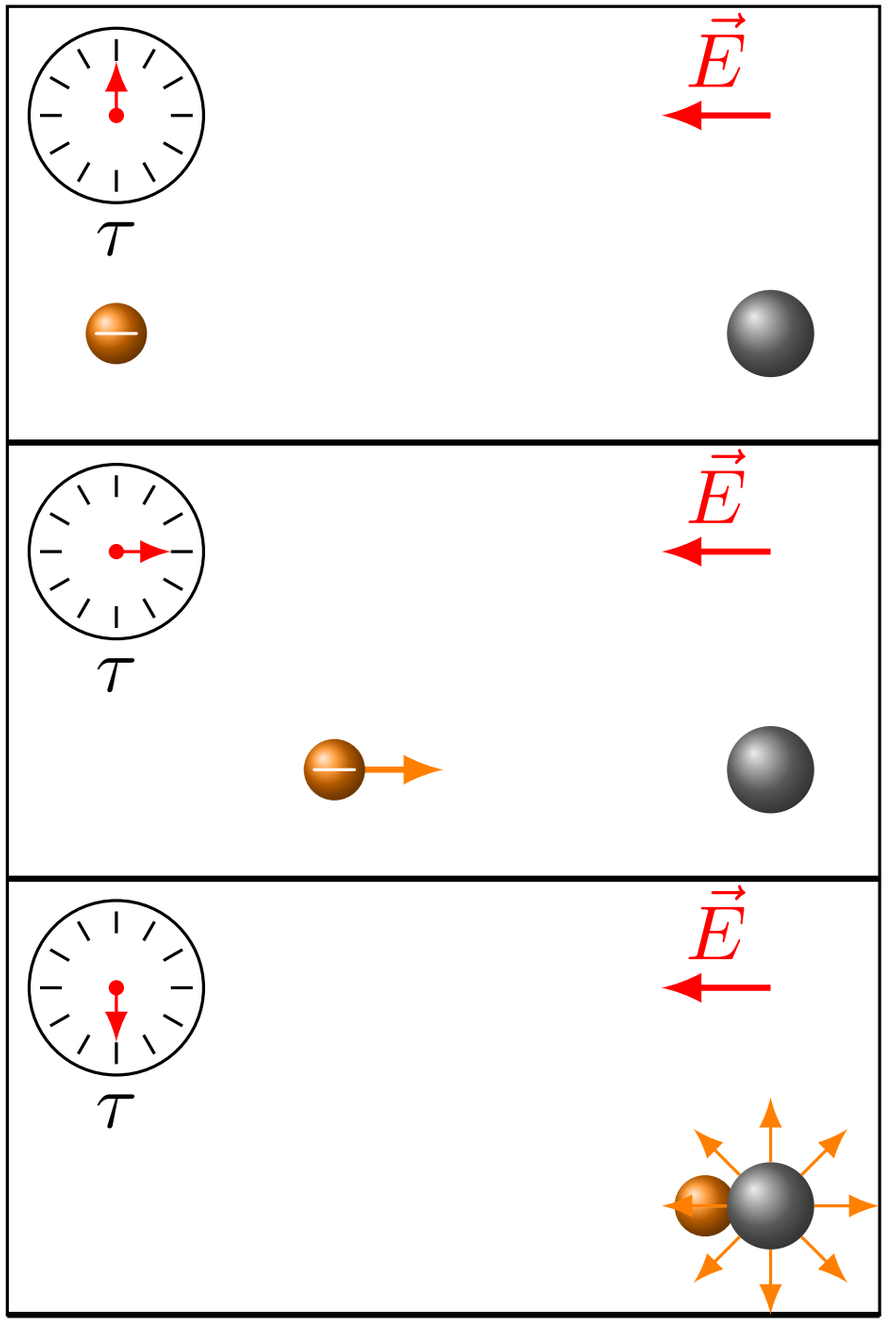
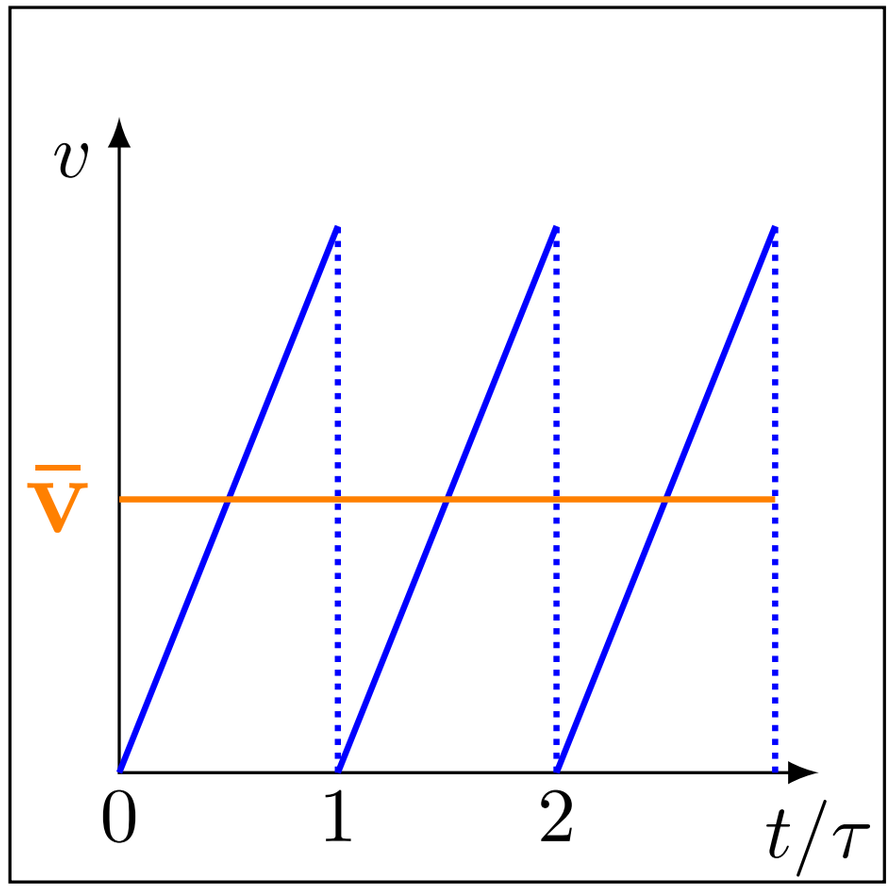




Modelo de Drude

$$v = \frac{qE}{m} t \qquad (0 < t < \tau)$$

$$\bar{\mathbf{v}} = \frac{qE}{m} \frac{\tau}{2}$$

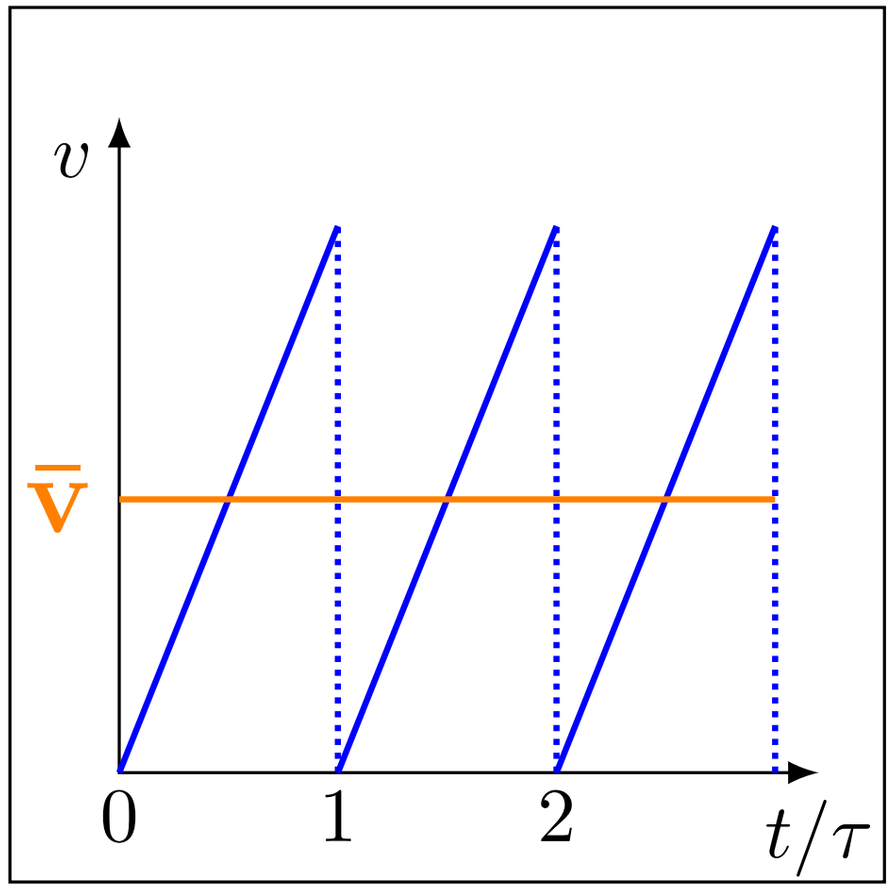


Modelo de Drude

$$v = \frac{qE}{m} t \qquad (0 < t < \tau)$$

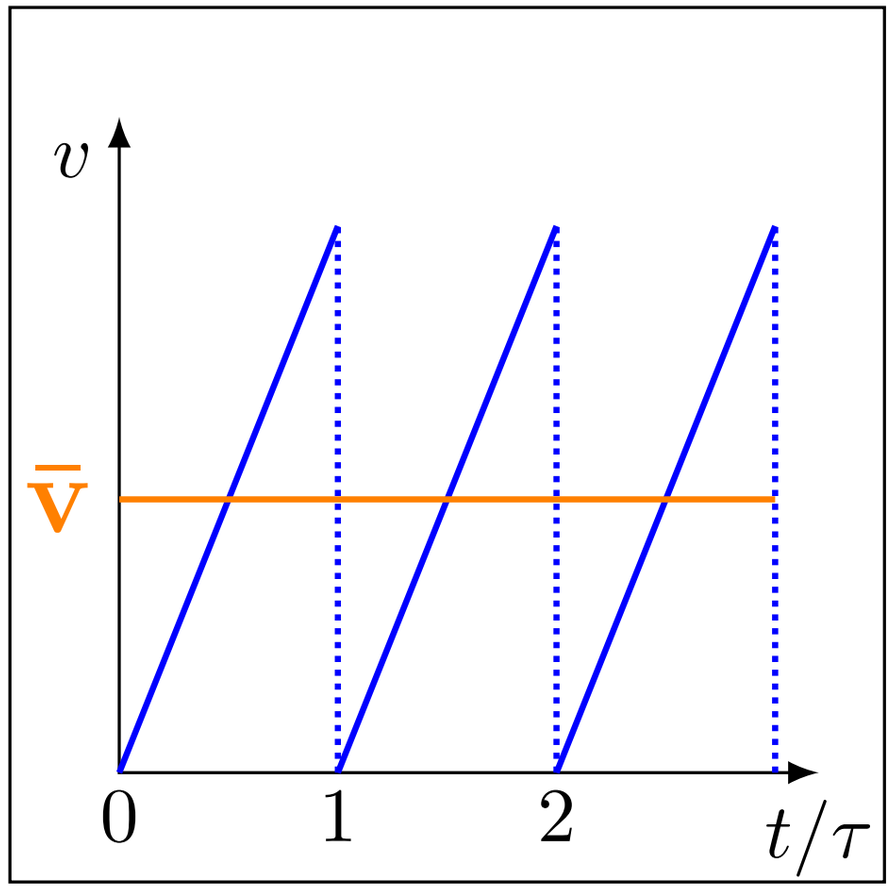
$$\bar{\mathbf{v}} = \frac{qE}{m} \frac{\tau}{2}$$

$$\vec{j} = \rho \vec{\mathbf{v}}$$



Modelo de Drude

$$v = \frac{qE}{m} t \qquad (0 < t < \tau)$$



$$\bar{\mathbf{v}} = \frac{qE}{m}\frac{\tau}{2}$$

$$\vec{j} = \rho \vec{\mathbf{v}}$$

$$j = \rho \frac{qE}{m}\frac{\tau}{2}$$

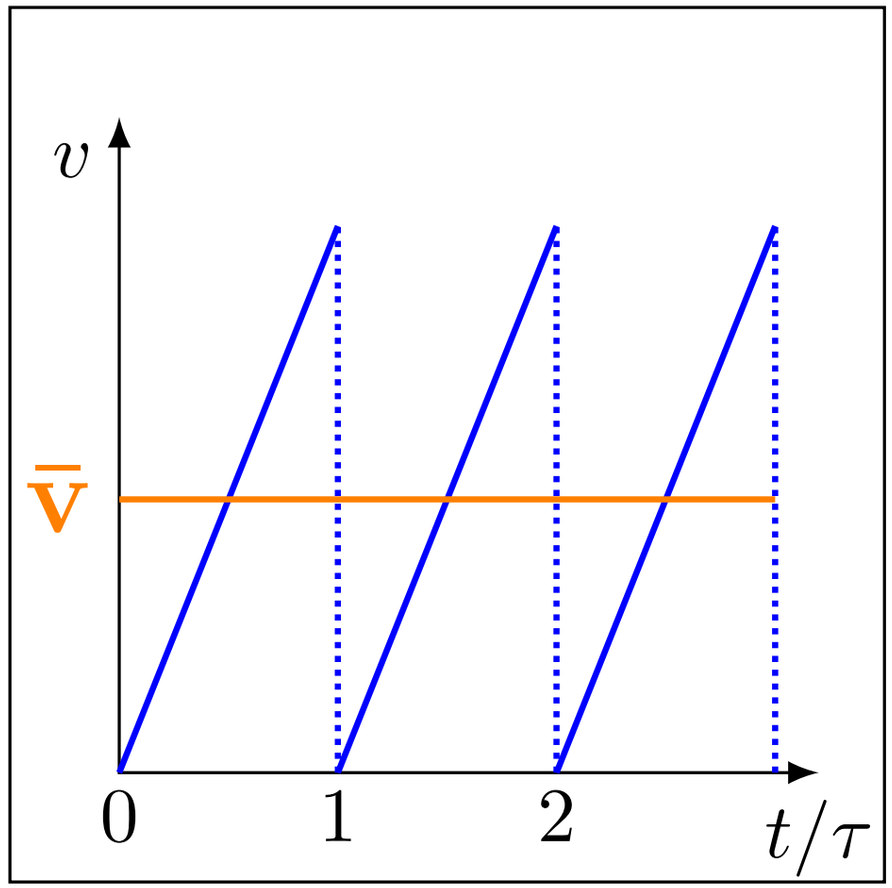
Modelo de Drude

$$v = \frac{qE}{m} t \qquad (0 < t < \tau)$$

$$\bar{\mathbf{v}} = \frac{qE}{m} \frac{\tau}{2}$$

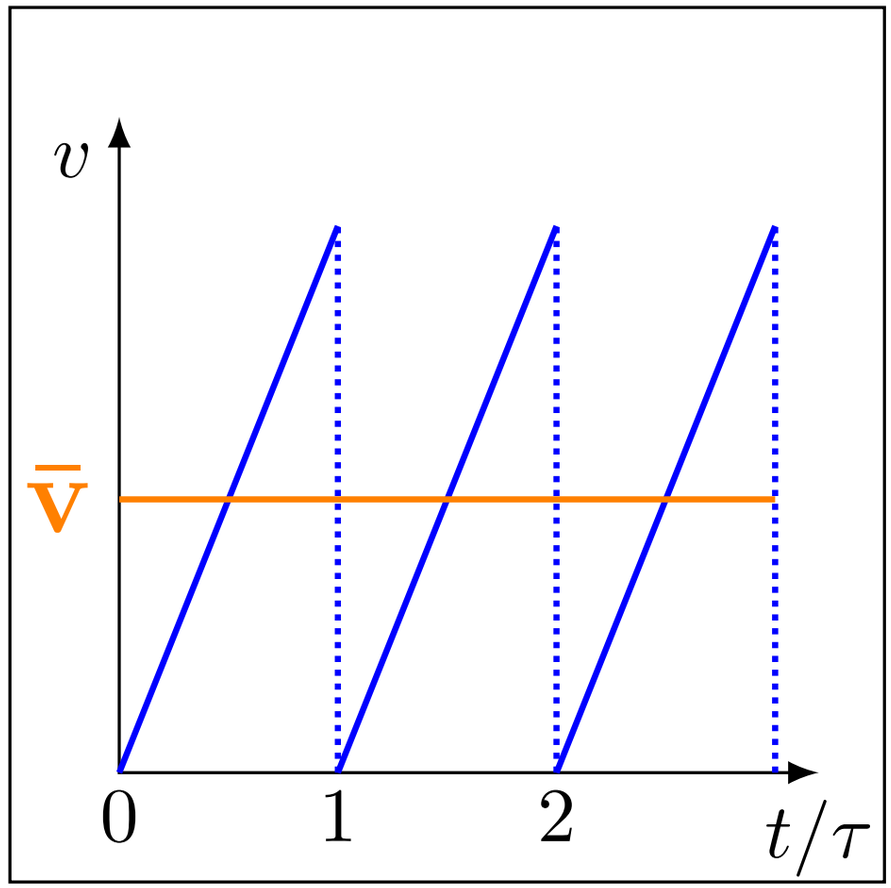
$$\vec{j} = \rho \vec{\mathbf{v}}$$

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$



Modelo de Drude

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

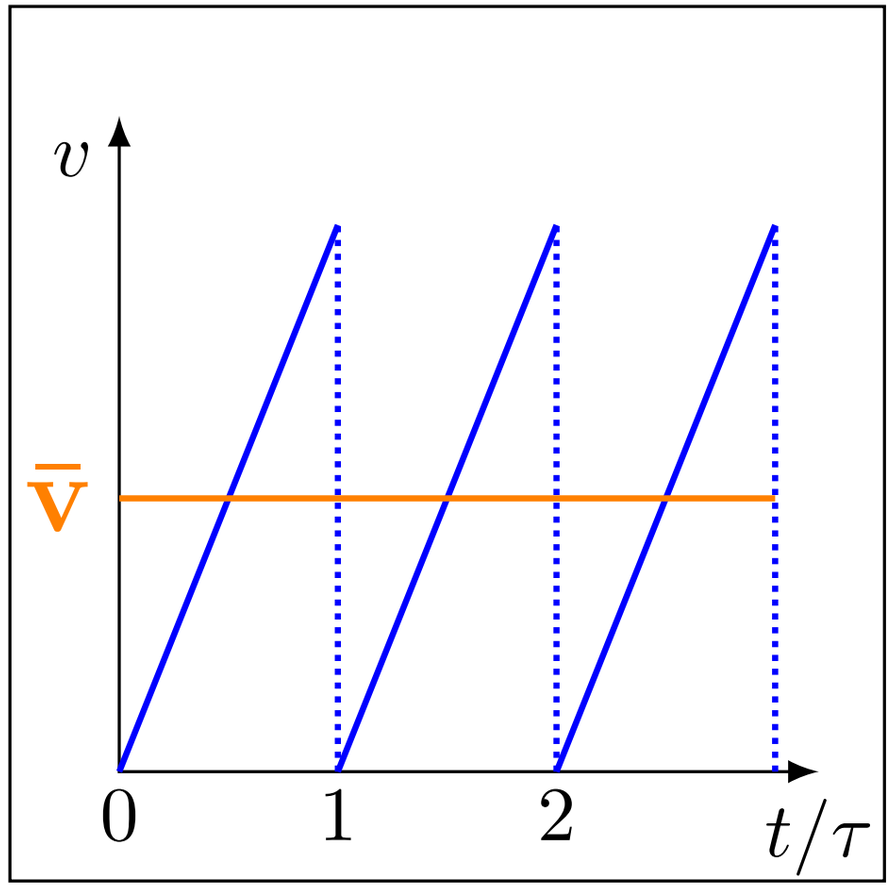


Modelo de Drude

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

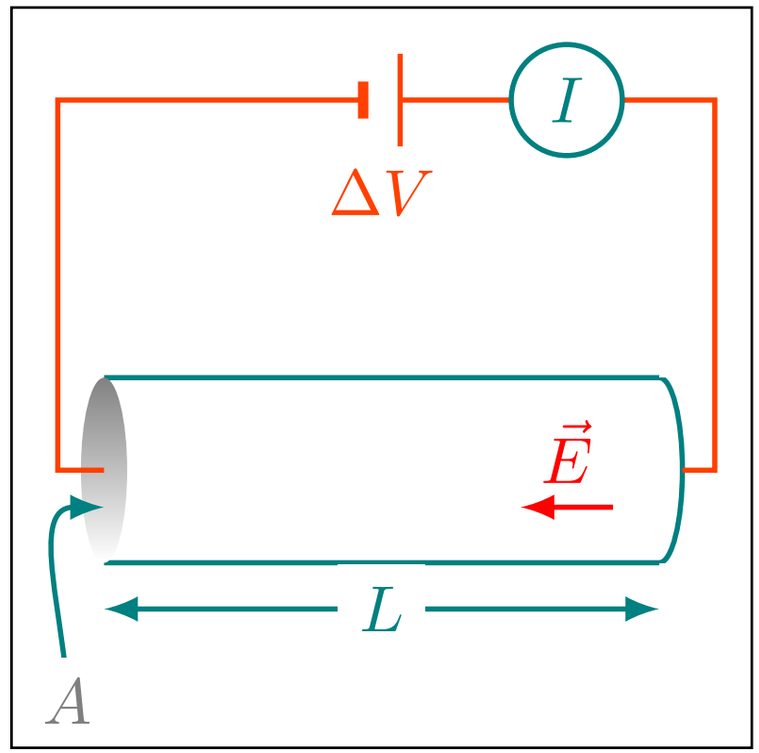
$$j = \sigma E$$

Material	σ(S/m)
Cu	6×10^{7}
Fe	1×10^{7}
Água pura	5×10^{-6}
Borracha	1×10^{-14}



Lei de Ohm

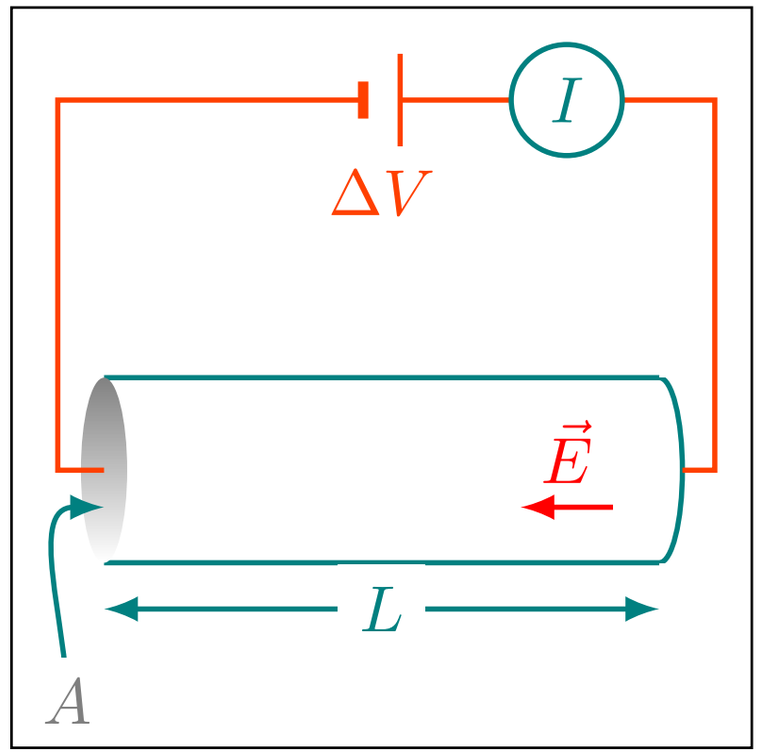
$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$



Lei de Ohm

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

$$I = jA$$

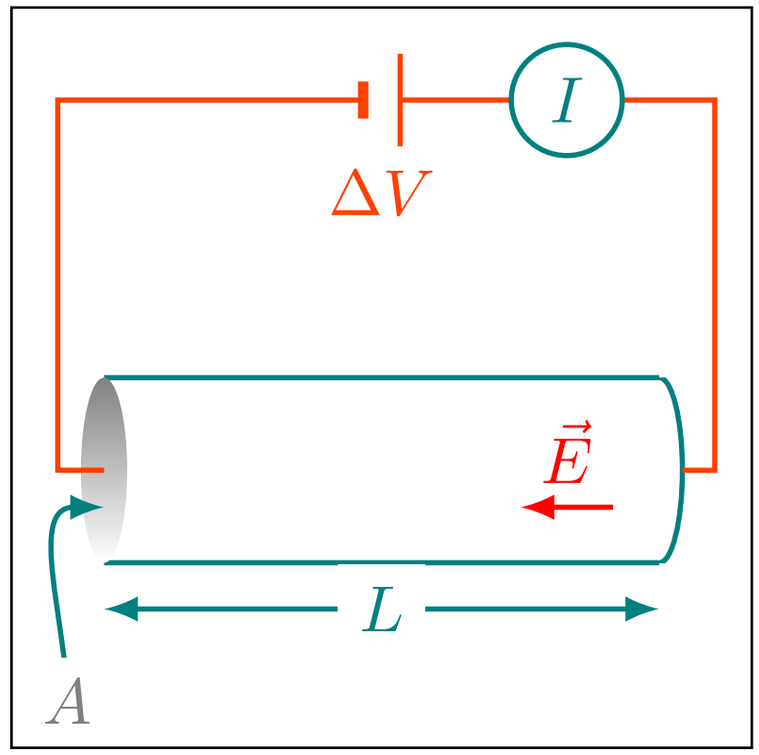


Lei de Ohm

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

$$I = jA$$

$$I = \rho \frac{qE}{m} \frac{\tau}{2} A$$



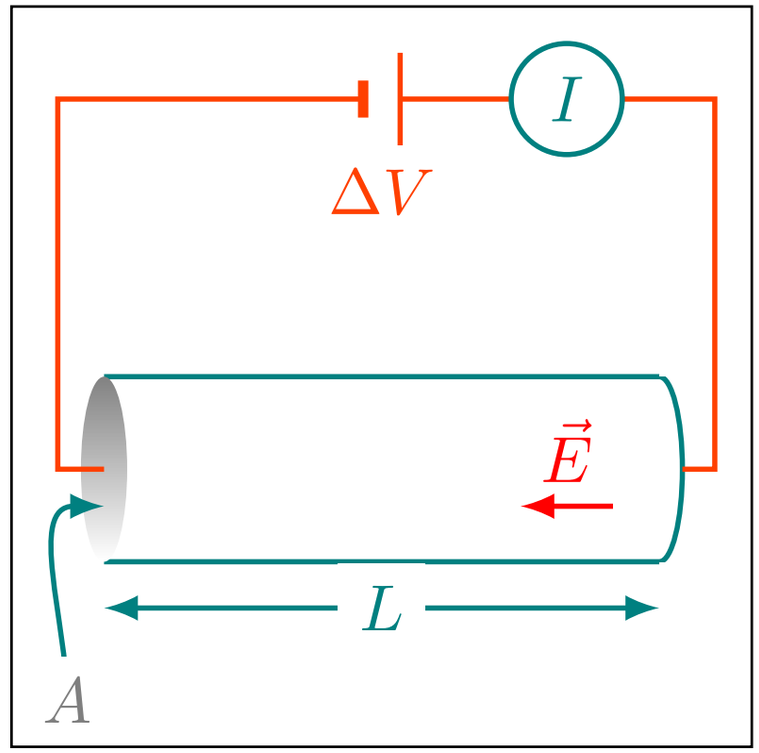
Lei de Ohm

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

$$I = jA$$

$$I = \rho \frac{qE}{m} \frac{\tau}{2} A$$

$$\Delta V = EL \Rightarrow E = \frac{\Delta V}{L}$$



Lei de Ohm

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

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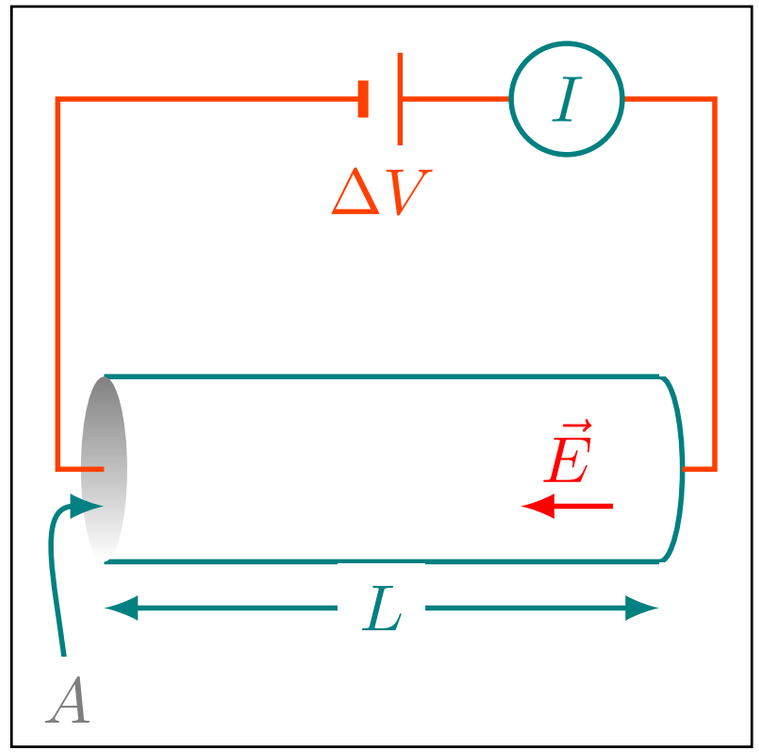
$$I = \rho \frac{qE}{m} \frac{\tau}{2} A$$

$$\Delta V = EL \Rightarrow E = \frac{\Delta V}{L}$$



$$I = \left(\frac{\rho q \tau A}{2mL} \right) \Delta V$$

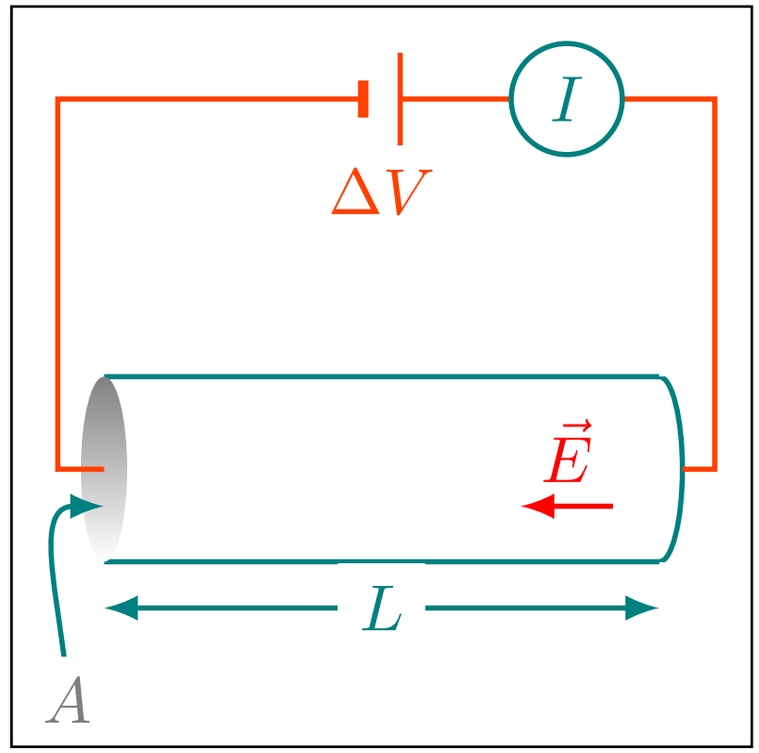
Lei de Ohm

$$j = \rho \frac{qE}{m} \frac{\tau}{2}$$

$$I = jA$$

$$I = \rho \frac{qE}{m} \frac{\tau}{2} A$$

$$\Delta V = EL \Rightarrow E = \frac{\Delta V}{L}$$



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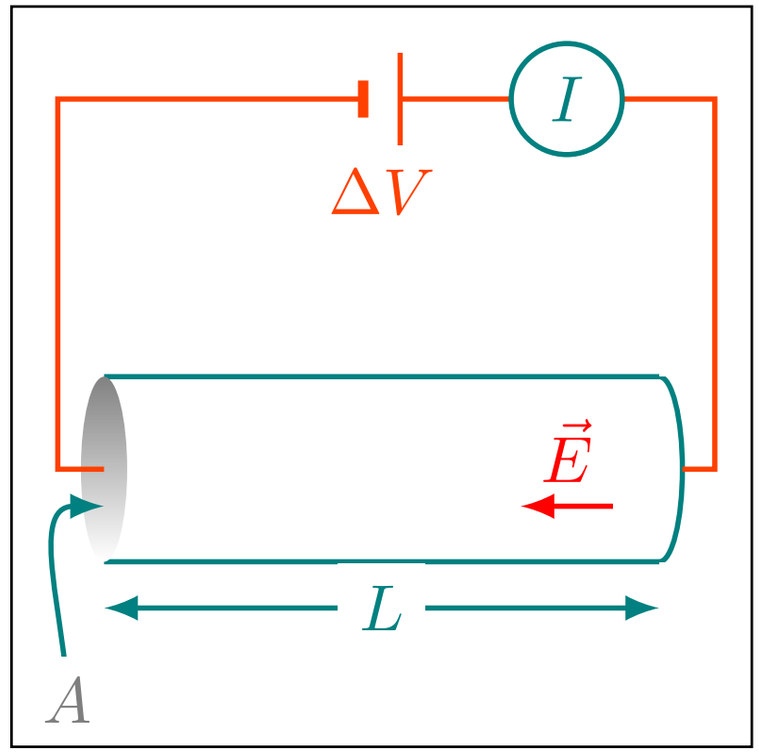
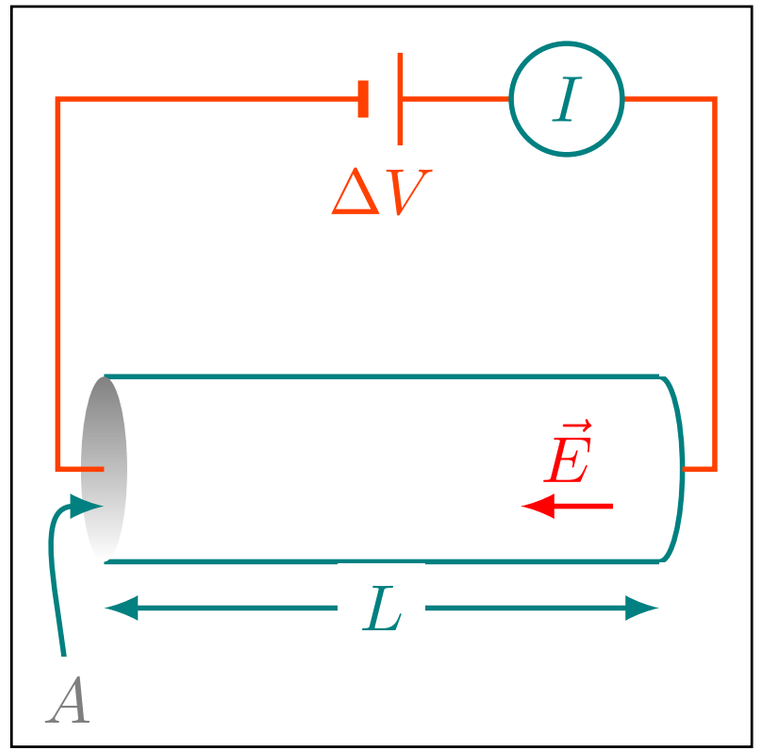


Lei de Ohm

$$I = \left(\frac{\rho q \tau A}{2mL} \right) \Delta V$$

$$I = \frac{\Delta V}{R}$$



Lei de Ohm

$$I = \left(\frac{\rho q \tau A}{2mL} \right) \Delta V$$

$$I = \frac{\Delta V}{R}$$

$$\Rightarrow R = \frac{2m}{\rho q \tau} \frac{L}{A}$$

$$U[R] = \Omega \qquad (1\mathrm{S} \equiv \Omega^{-1})$$