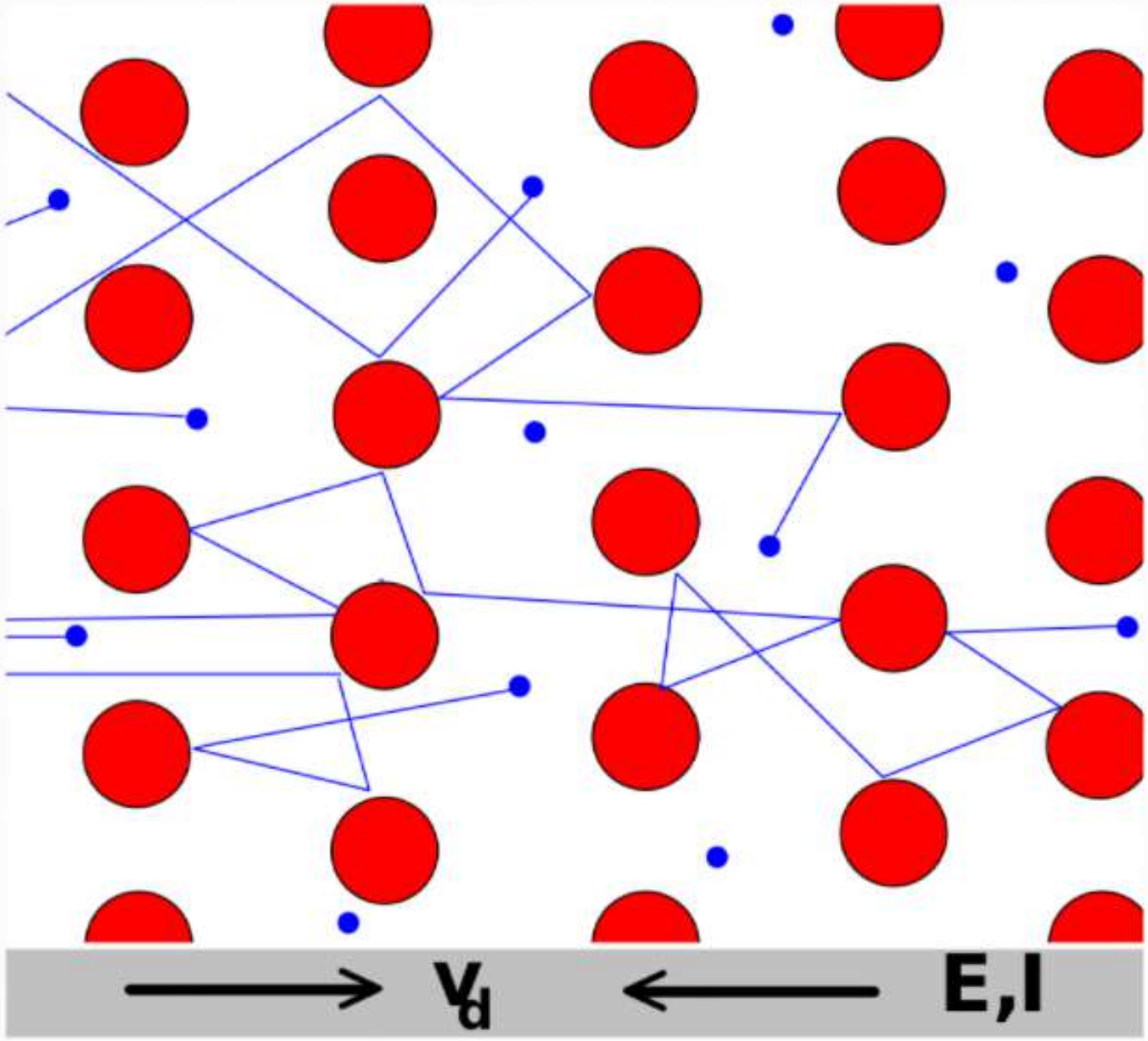
ESONERO 13/11

- PRESENZA 13:30
- ONLINE 16:00



$\sim$ 1 elettrone per atomo

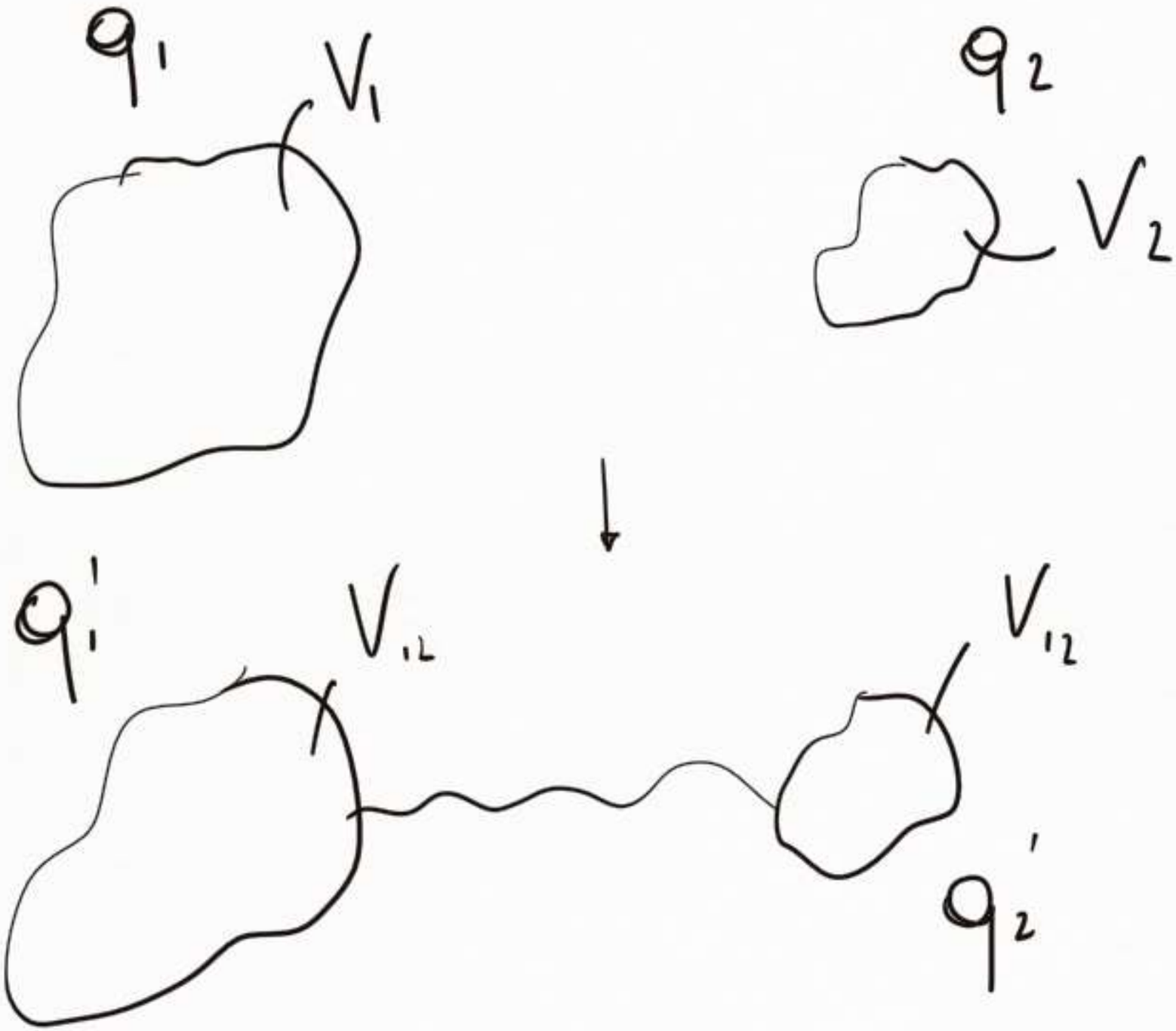
$\Downarrow$

$n \sim 10^{28}\ m^{-3}$

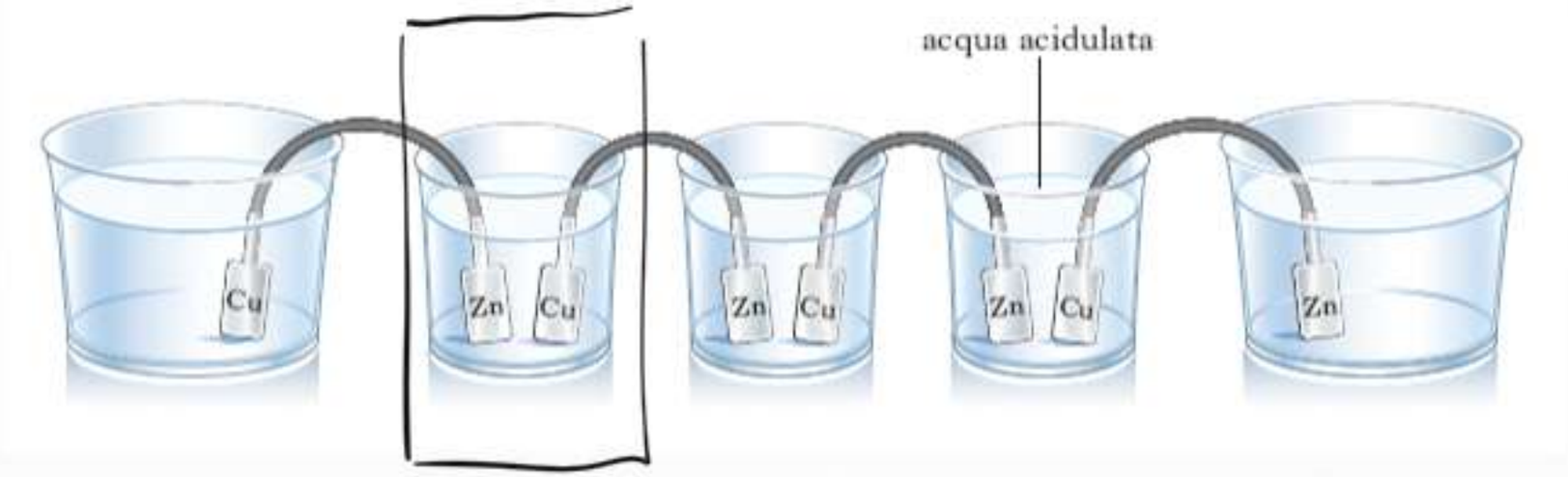
$\downarrow$

$e = 1.609 \cdot 10^{-19}\ C$

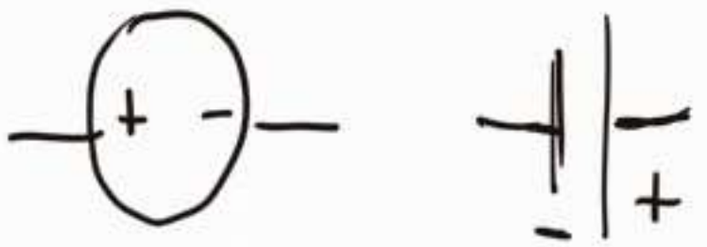
$q \sim 10^{9}\ C$

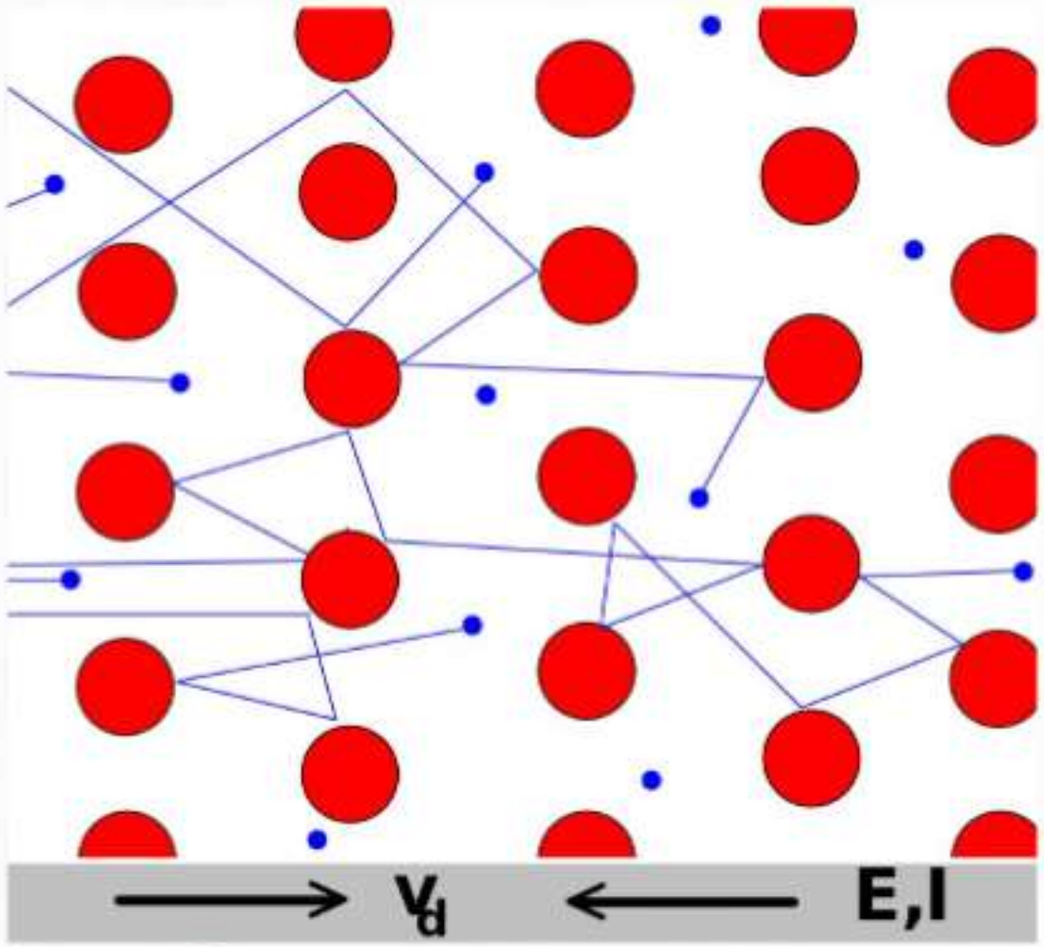

q_1
V_1
q_2
V_2
q_1'
V_{12}
V_{12}
q_2'

GENERATORE DI TENSIONE / POTENZIALE / FORZA ELETTROMOTRICE



$V_S, V_Z, V_R \Rightarrow V_Z - V_S = \Delta V_{ZS}, V_R - V_S = \Delta V_{RS}$

$\boxed{\Delta V} = \Delta V_{ZS} - \Delta V_{RS} \neq 0,$ 



$v \approx 10^6 \, m/s$, $l \sim 10^{-8} \, m$

$\tau = \frac{l}{v}$

$\frac{1}{N} \sum_i \vec{v}_i = 0$ SENZA CAMPO

$\vec{F}_e = -e\vec{E}$

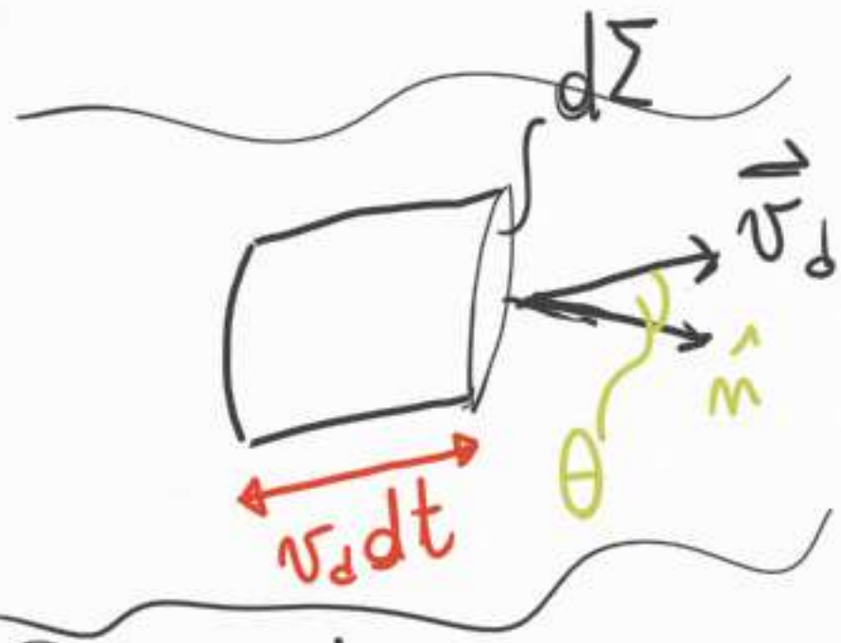
$\vec{v}_i^{(i)}$, $\vec{v}_i^{(f)} = \vec{v}_i^{(i)} - \frac{e\vec{E}}{m}\tau$ $\Rightarrow$ $\frac{1}{N}\sum_i \vec{v}_i^{(f)} = \frac{1}{N}\sum_i \vec{v}_i^{(i)} -$

$- \frac{e\vec{E}\tau}{m}$ $\Rightarrow$ $\vec{v}_d \equiv -\frac{e\vec{E}\tau}{m}$ V. DI DERIVA

$$E \sim 10^{-2}\frac{V}{m}, \quad m = 9.1 \cdot 10^{-31} Kg \Rightarrow$$

$$v_d \approx 10^{-4}\frac{m}{2} \approx 10^{-10} v$$

$$\frac{\Delta q}{\Delta t} \equiv i_m, \quad \lim_{\Delta t \to 0} \frac{\Delta q}{\Delta t} = \frac{dq}{dt} \equiv i \qquad \boxed{[i] = \frac{C}{s} = A}$$



n, $dq = -en\,d\tau$

$d\tau = v_d dt\, d\Sigma \cos\theta \Rightarrow$

$dq = -en\, v_d \cos\theta\, dt\, d\Sigma \Rightarrow$

$di = \frac{dq}{dt} = -en\, v_d \cos\theta\, d\Sigma = -en\, \vec{v}_d \cdot \hat{n}\, d\Sigma \Rightarrow$

$i = \int_\Sigma di = -\int_\Sigma en\, \vec{v}_d \cdot \hat{n}\, d\Sigma = \int_\Sigma \vec{J} \cdot \hat{n}\, d\Sigma$, $\vec{J} \equiv -ne\vec{v}_d$

DENSITÀ DI CORRENTE

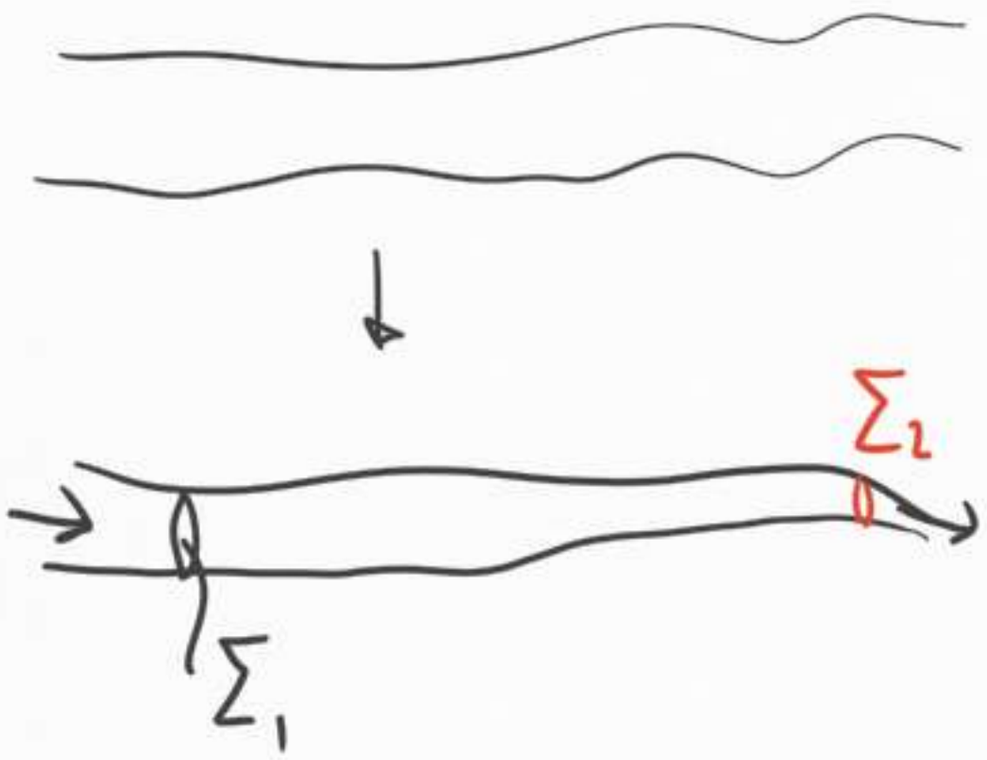
$$\vec{J} = -ne\vec{v}_d = \underbrace{\frac{ne^2\tau}{m}}_{\sigma}\vec{E} = \sigma\vec{E}$$ LEGGE DI OHM

σ

CONDUTTIVITÀ ELETTRICA

$$\vec{E} = \rho\vec{J} \quad , \rho = \frac{1}{\sigma}$$ RESISTIVITÀ

STAZIONARIETA'



$$i_1 = i_2 \,, \quad i = \int_\Sigma \vec{J} \cdot \hat{n} \, d\Sigma = J\Sigma$$

$$J_1 \Sigma_1 = J_2 \Sigma_2 \Rightarrow$$

$$\frac{J_1}{J_2} = \frac{\Sigma_2}{\Sigma_1}$$

$$\Delta V = V_A - V_B \,,$$

$$\vec{E} = \rho J = \rho \frac{i}{\Sigma} \Rightarrow$$

$$\Delta V = \int_A^B \vec{E} \cdot d\vec{s} = \int_A^B \frac{\rho i}{\Sigma(h)} dh = \left(\int_A^B \frac{\rho}{\Sigma(h)} dh \right) i \equiv R\, i$$

$$R \equiv \int_A^B \frac{\rho}{\Sigma(h)} dh$$ RESISTENZA ELETTRICA

$$\boxed{R = \frac{\rho h}{\Sigma}}$$ SEZIONE COSTANTE

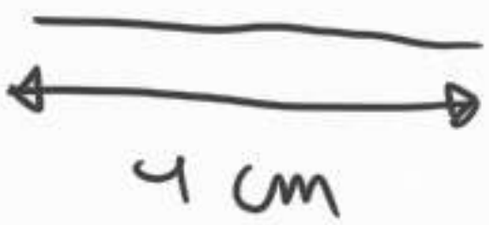
$$\Delta V = Ri \quad , \quad [R] = \frac{V}{A} = \Omega \text{ OHM}$$

$$dW = \Delta V \, dq = \Delta V \, i \, dt \quad \Rightarrow$$

$$P = \frac{dW}{dt} = \Delta V i = R i^2 = \frac{\Delta V^2}{R}$$

EFFETTO JOULE

$$[P] = \frac{J}{s} = W$$

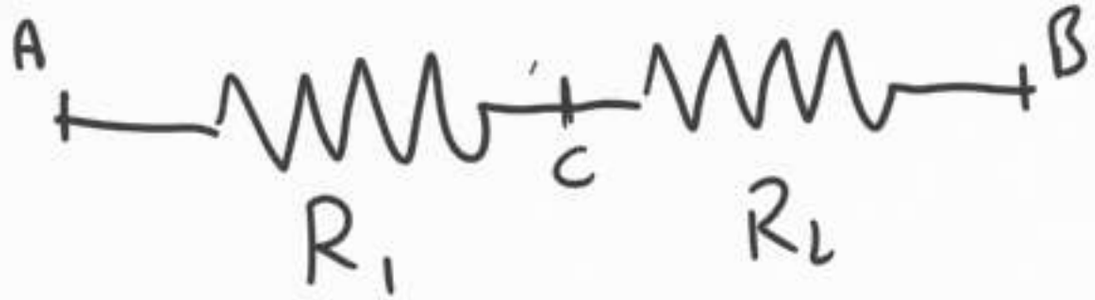


FILO DI RAME DI $D = 1\ mm$

$R \cong 2 \cdot 10^{-4}\ \Omega$

RESISTORI

RESISTENZE



$\Delta V = V_A - V_B$

$\Delta V_1 = R_1 i$

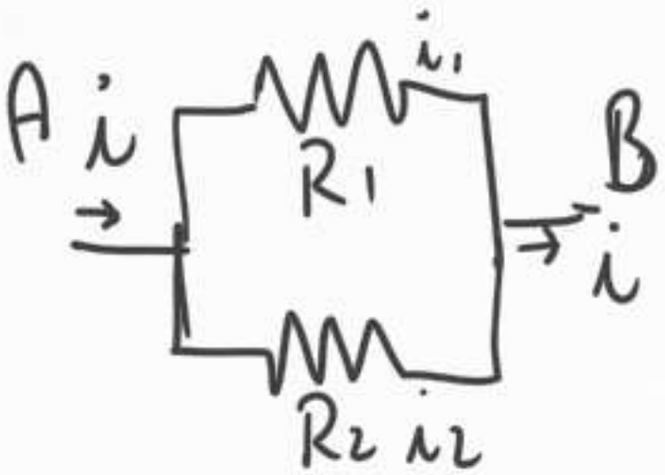
$\Delta V_2 = R_2 i$

$\Rightarrow \Delta V = V_A - V_B = V_A - V_C + V_C - V_B =$

$= \Delta V_1 + \Delta V_2 = R_1 i + R_2 i =$

$= (R_1 + R_2) i \Rightarrow$

$\Delta V = R_{eq} i \quad , \quad R_{eq} = R_1 + R_2$



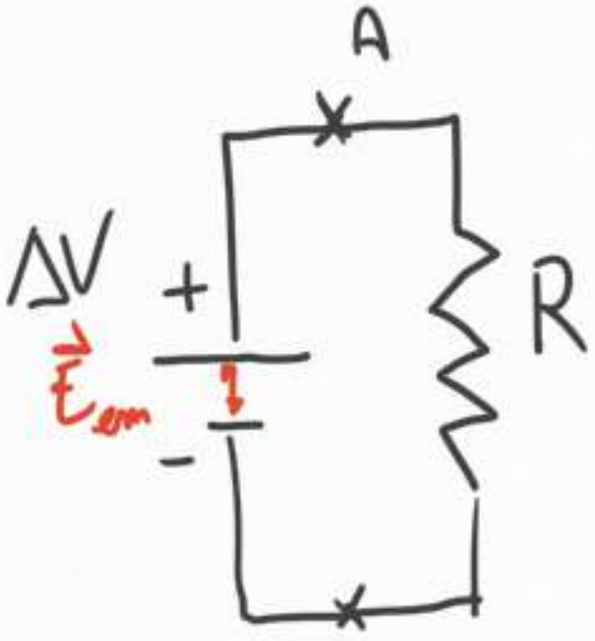
$$\Delta V = R_1 i_1 = R_2 i_2 \Rightarrow$$

$$i_1 = \frac{\Delta V}{R_1}, \quad i_2 = \frac{\Delta V}{R_2} \Rightarrow$$

$$i = i_1 + i_2 = \Delta V \left(\frac{1}{R_1} + \frac{1}{R_2}\right) \equiv \frac{\Delta V}{R_{eq}}$$

$$\boxed{\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}}$$

FORZA ELETTROMOTRICE

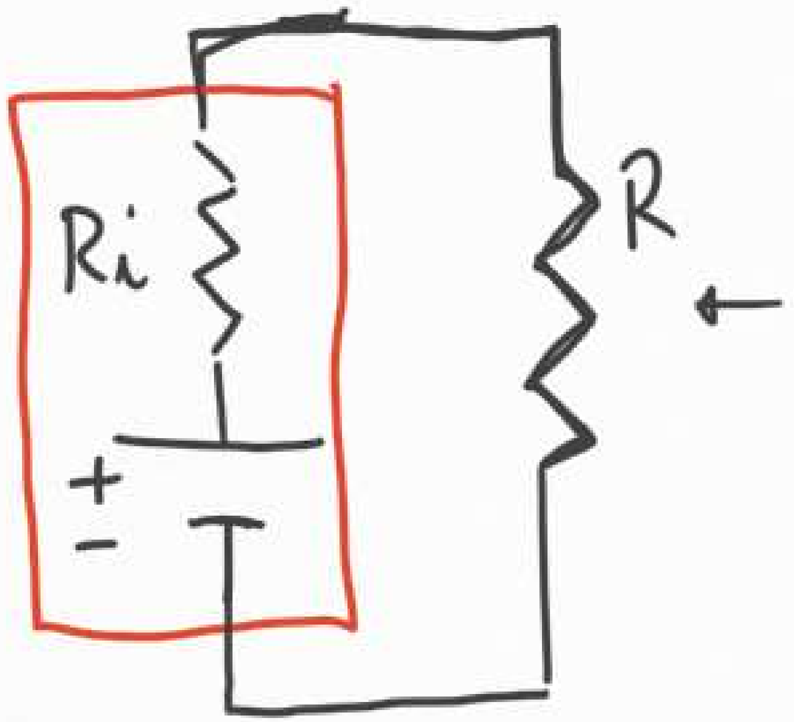


$$\Delta V = V_A - V_B = \int_A^B \vec{E} \cdot d\vec{s} = Ri$$

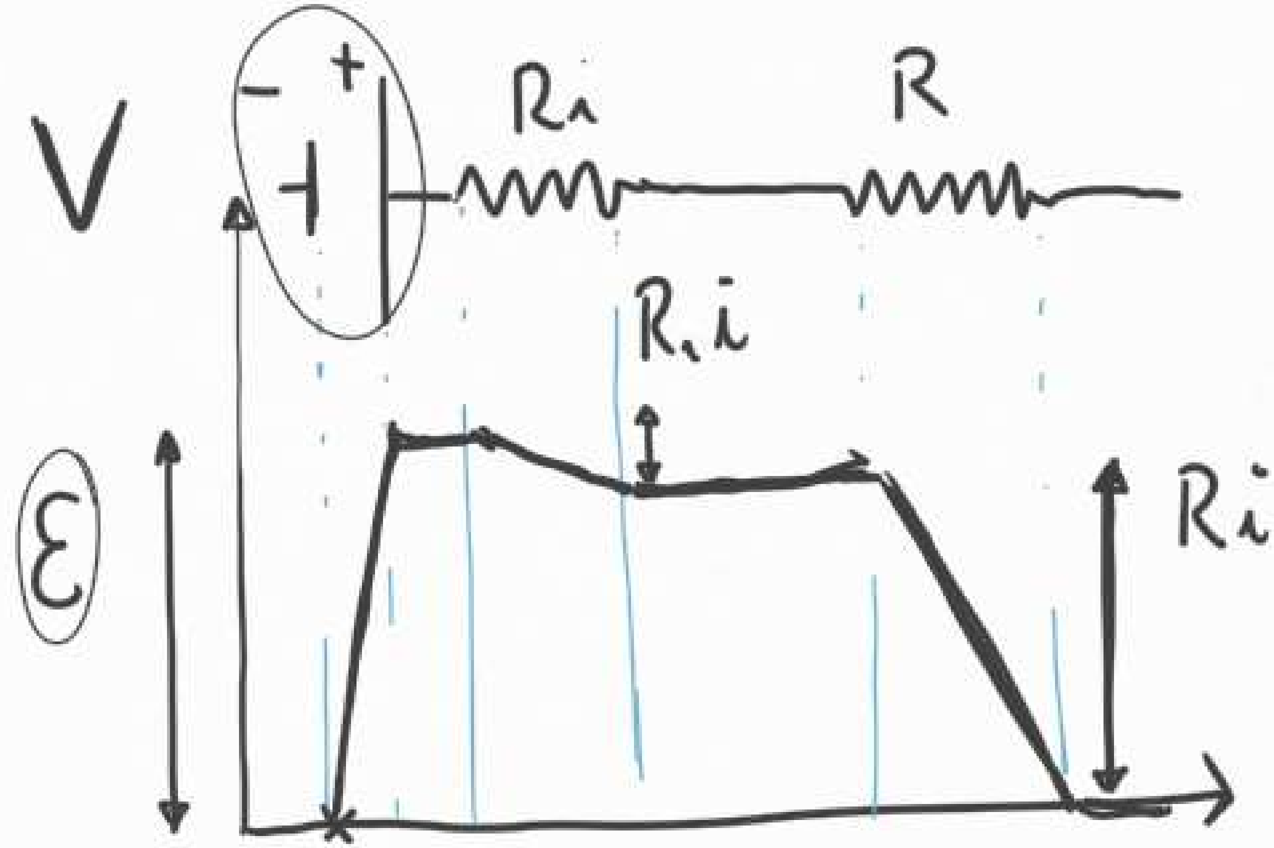
$$\Delta V = \oint \vec{E} \cdot d\vec{s} = R_T i \neq 0$$

$\vec{E}_{em}$, $\underbrace{\oint \vec{E}_m \cdot d\vec{s} = \mathcal{E}}$ FORZA ELETTROMOTRICE

$$[\mathcal{E}] = V$$



Ri
+
−
R



V
−
+
Ri
R
Ri
Ɛ
Ri