Università
degli Studi
di Padova

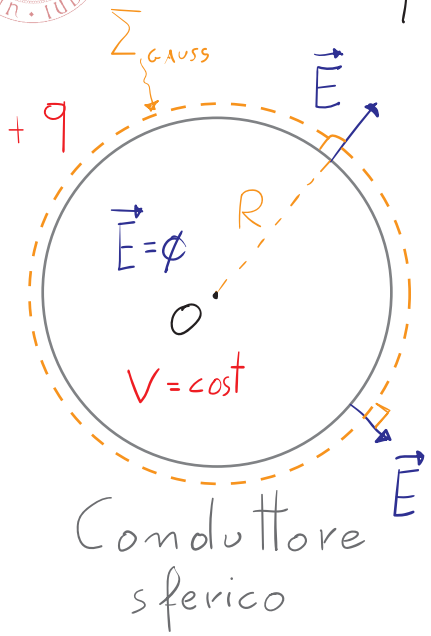
Fisica 1

Lezione 45: Conduttori 2

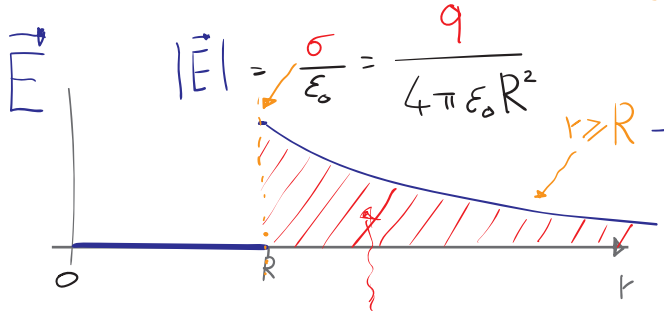
Prof. Giubilato

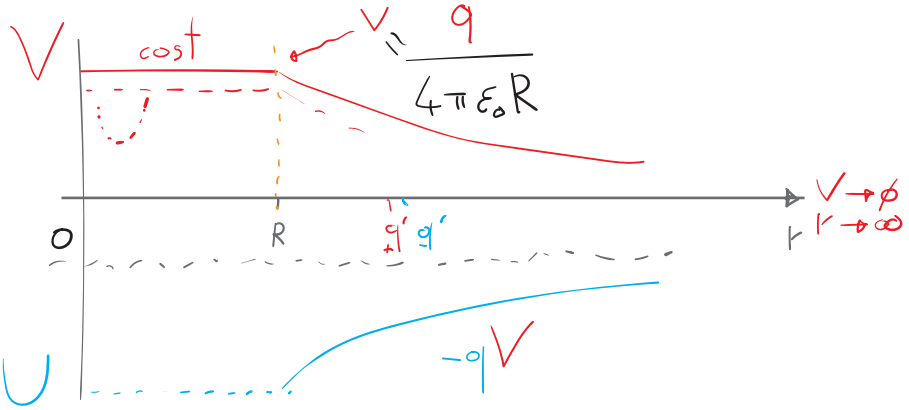
Sfera carica

$q = \underbrace{4\pi R^2}_{\text{Superficie}}\,\sigma \qquad \sigma = \dfrac{q}{4\pi R^2}$ (cost)



Conduttore sferico



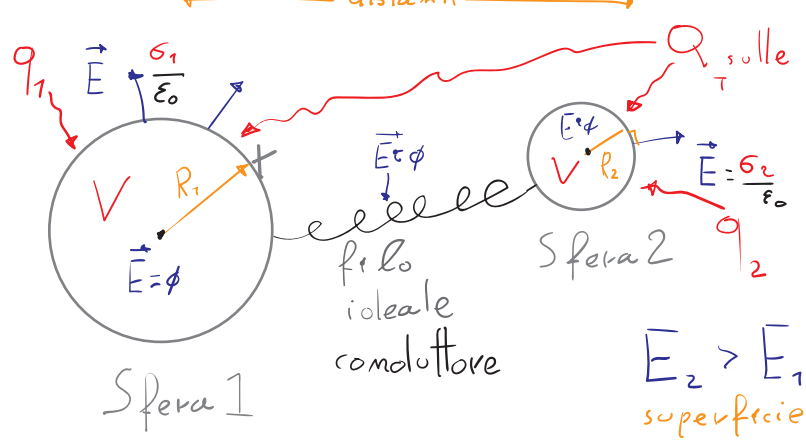


$$\Phi_{\Sigma}(\vec{E}) = \underbrace{\oint_{\Sigma} \vec{E}\cdot d\vec{\Sigma}}_{\text{Th.}} = |\vec{E}| \underbrace{\iint_{\Sigma} d\Sigma}_{\text{Superficie sfera}} = 4\pi R^2 E \xrightarrow{\text{Gauss}} \frac{q}{\varepsilon_0} \Rightarrow E = \frac{q}{4\pi\varepsilon_0 R^2}$$

($\vec{E} \parallel d\vec{\Sigma} \Rightarrow \cos = 1$)

Sfere conduttrici

$d \gg R_1, R_2$ — distanti



$E_2 > E_1$

superficie

Unico conduttore $\Rightarrow V = \text{cost}$

$Q_T = q_1 + q_2$

$V = \text{cost}$

$q_1 \neq q_2$

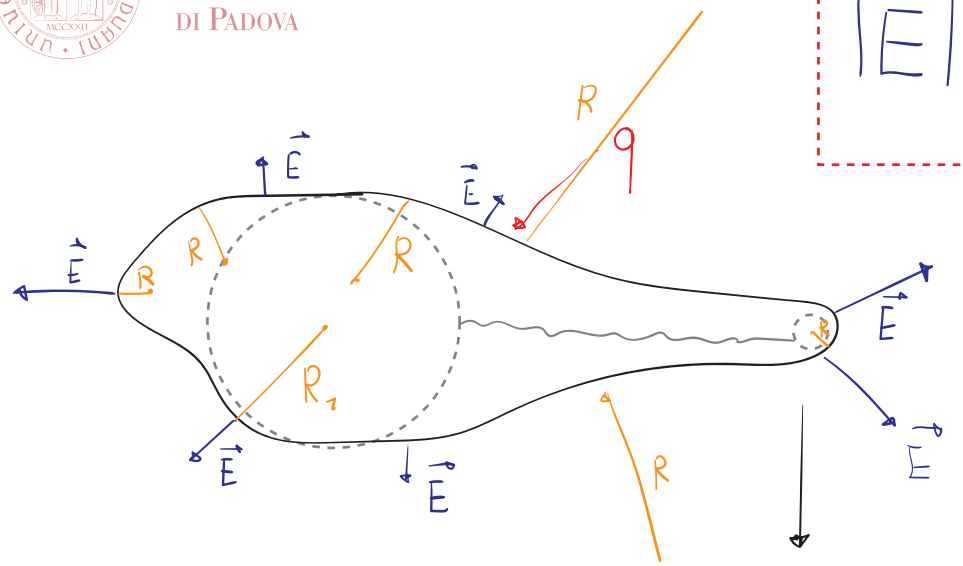
$$V = \frac{q_1}{4\pi\varepsilon_0 R_1} = \frac{q_2}{4\pi\varepsilon_0 R_2}$$

$$\Downarrow$$

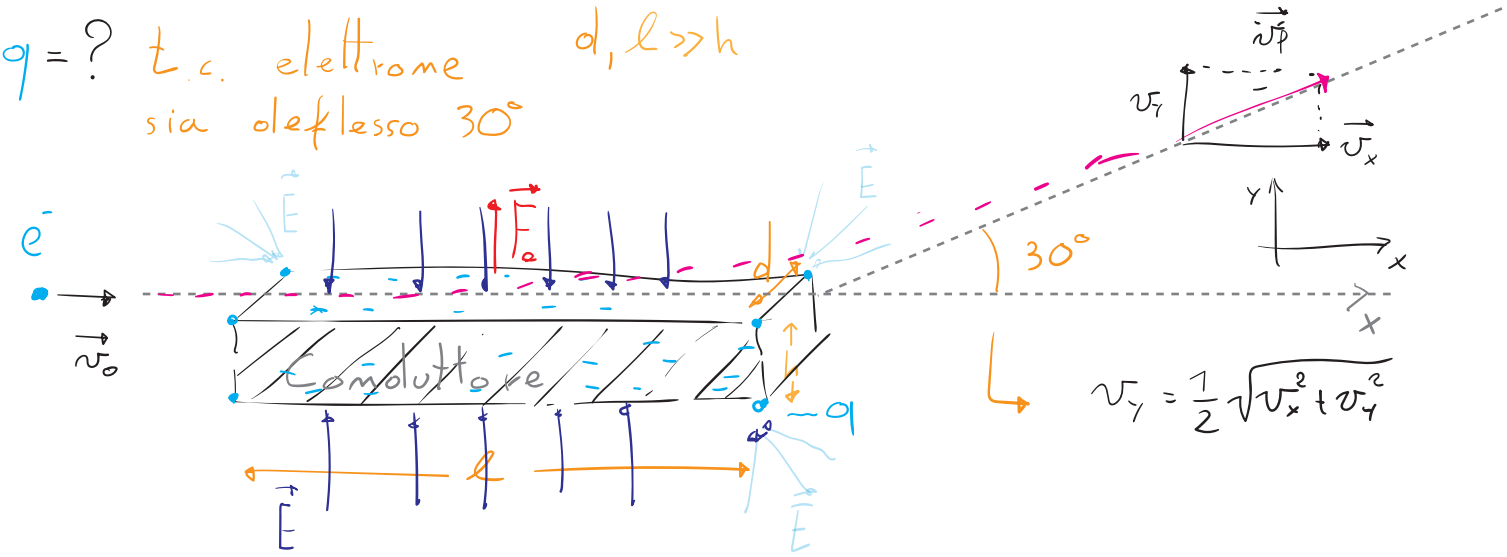
$$\frac{q_1}{q_2} = \frac{R_1}{R_2}$$

$$\frac{\sigma_1 4\pi R_1^2}{\sigma_2 4\pi R_2^2} = \frac{R_1}{R_2} \Rightarrow \boxed{\frac{\sigma_1}{\sigma_2} = \frac{R_2}{R_1}}$$

$|\vec{E}|$ maggiore dove R minore



$q = ?$ t.c. elettrone sia deflesso 30° $d, \ell \gg h$



$$v_y = \frac{1}{2}\sqrt{v_x^2 + v_y^2}$$

$F_x = 0 \Rightarrow v_x = v_0$

$$= \frac{q}{2\ell d}$$

$$F_y = F_e = q_0 E = q_0 \frac{\sigma}{\varepsilon_0} = q_0 q \frac{1}{2\varepsilon_0 \ell d} \qquad a_e = \frac{F_e}{m_e} = \frac{q_0}{m_e} q \frac{1}{2\varepsilon_0 \ell d}$$

$$v_y = a_e t = a_e \frac{\ell}{v_x} = \frac{q_0}{m_e} q \frac{1}{2\varepsilon_0 \ell d} \frac{\ell}{v_x} = \frac{q_0}{m_e} q \frac{1}{2\varepsilon_0 d v_x}$$

$$v_y = \frac{1}{2}\sqrt{v_x^2 + v_y^2} = \frac{q_0}{m_e} q \frac{1}{2\varepsilon_0 d v_x}$$