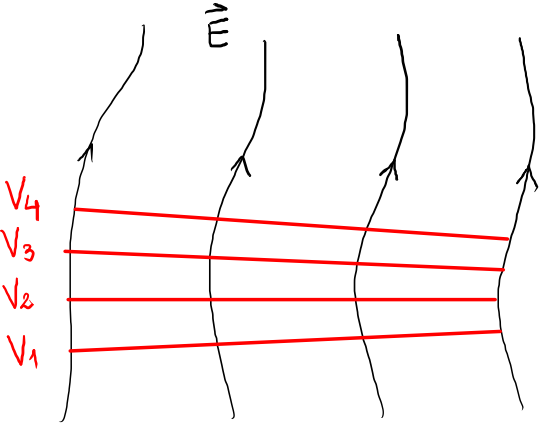
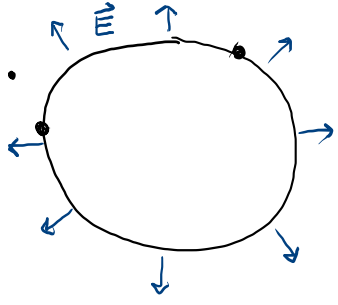
EQUIPOTENCIALES

$$\Delta U = q\,\Delta V$$



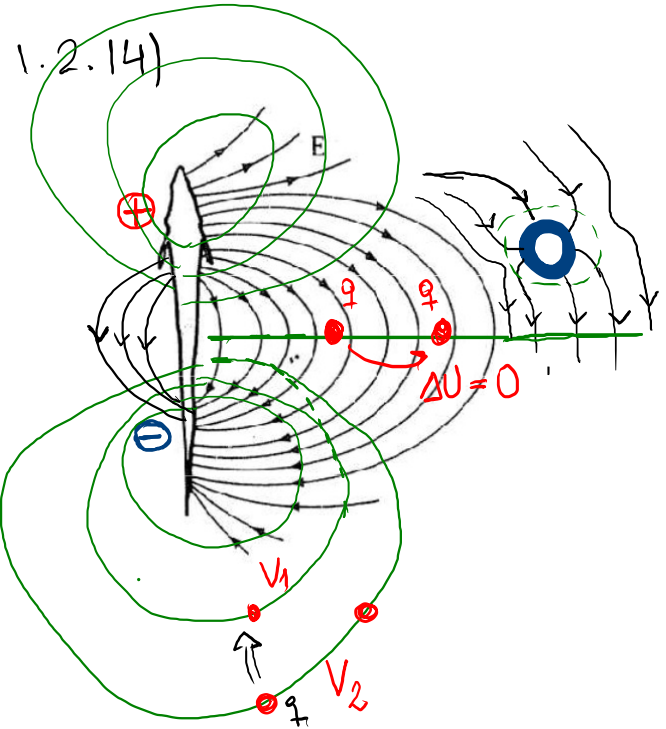
↳ superficies de potencial constante

↳ $\perp$ a $\vec{E}$

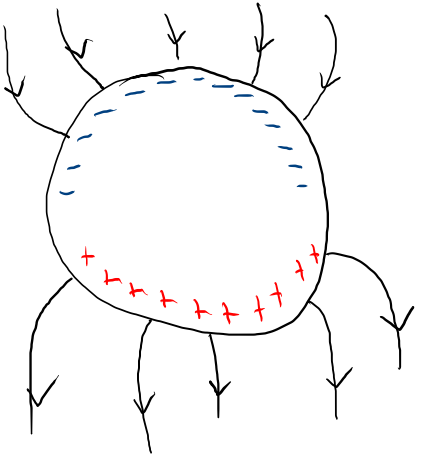
- Si me muevo sobre ellas, $\Delta U = 0$
- Solo se intersectan si $V_1 = V_2$
- 

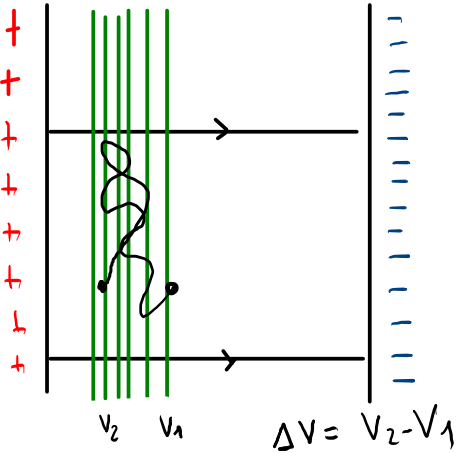
Conductores en equilibrio son equipotenciales

1.2.14)



$\Delta U = q \Delta V$

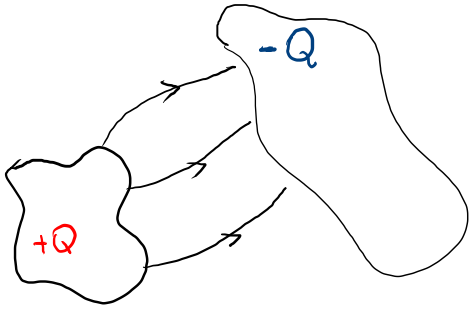


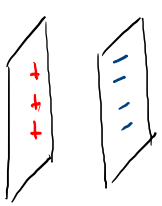


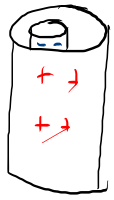
$\Delta V = V_2 - V_1$

$\Delta U = q \Delta V$

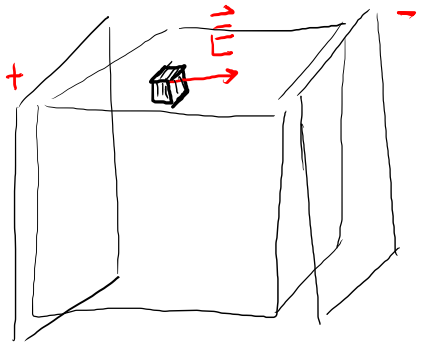
CAPACITORES







$$C = \frac{\varepsilon A}{d}$$



$$\rho = \frac{M}{V} \rightarrow M = \rho \, Vol$$

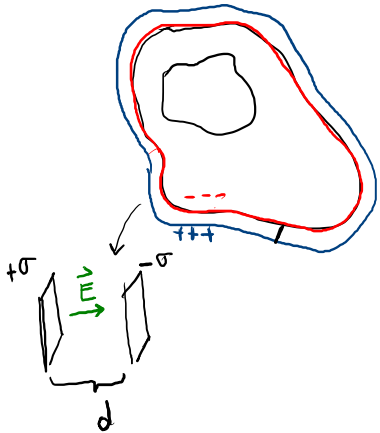
↝ CAPACITANCIA: $C \overset{def}{\equiv} \frac{Q}{\Delta V}$

↝ Almacena energía ($\Delta V \equiv V$): $U = \frac{CV^2}{2} = \frac{Q^2}{2C} = \frac{QV}{2}$

densidad de energía: $u = \varepsilon_0 E^2/2$

$u = \varepsilon E^2/2 \rightarrow U = u \cdot Vol$

1.2.8



$\Delta V = ?$

$C = \frac{\varepsilon_0 A}{d}$

$\sigma = \pm 0.50 \times 10^{-3}\ C/m^2$

$d = 5,0\ nm = 5,0 \times 10^{-9}\ m$

medio es aire $\varepsilon_{aire} \approx \varepsilon_0$

$\varepsilon_0 = 8.85 \times 10^{-12}\ \frac{C^2}{Nm^2}$

a) ¿E? como placas paralelas

$$E = \frac{\sigma}{\varepsilon_0} = \frac{(0.50 \times 10^{-3}\ C/m^2)}{8.85 \times 10^{-12}\ C^2/Nm^2} = 5.6 \times 10^7\ \frac{N}{C}$$

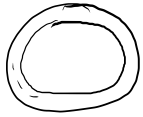
b) en un capacitor de p. p: $\Delta V = E \cdot d$

$= 0,28\ V$

c) ¿U?

$Q = \sigma \cdot A$

$U = \frac{QV}{2}$



$V = 1,0 \times 10^{-16}\ m^3 = \frac{4}{3}\pi r^3 \Rightarrow r = \sqrt[3]{\frac{3V}{4\pi}}$

$A = \text{Sup esfera} = 4\pi r^2$

$r = 2,88 \times 10^{-6}\ m$

$r \Rightarrow A = 4\pi r^2 \Rightarrow Q = \sigma A \Rightarrow U = \frac{QV}{2} = \frac{4\pi r^2 \sigma V}{2}$

$= 2\pi r^2 \sigma V$

$V = 0,282\ V$

$r = 2,88 \times 10^{-6}\ m$

$\sigma = \pm 0.50 \times 10^{-3}\ C/m^2$

$U = 7,3 \times 10^{-15}\ J$

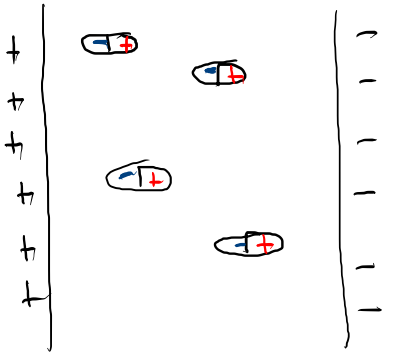
(d) $K = 5,4$

$\varepsilon_0 \rightarrow K \cdot \varepsilon_0 = 5,4 \times 8.85 \times 10^{-12} \ldots$

constante dieléctrica $K \equiv \frac{\varepsilon}{\varepsilon_0} = \frac{C}{C_0}$

$\varepsilon = K \varepsilon_0$

$C = \frac{K \varepsilon_0 A}{d} = \frac{\varepsilon A}{d}$



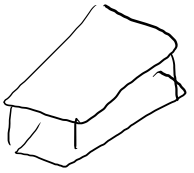
$U = u \cdot Vol$

$\rightarrow A \cdot d$

$= 4\pi r^2 \cdot d$

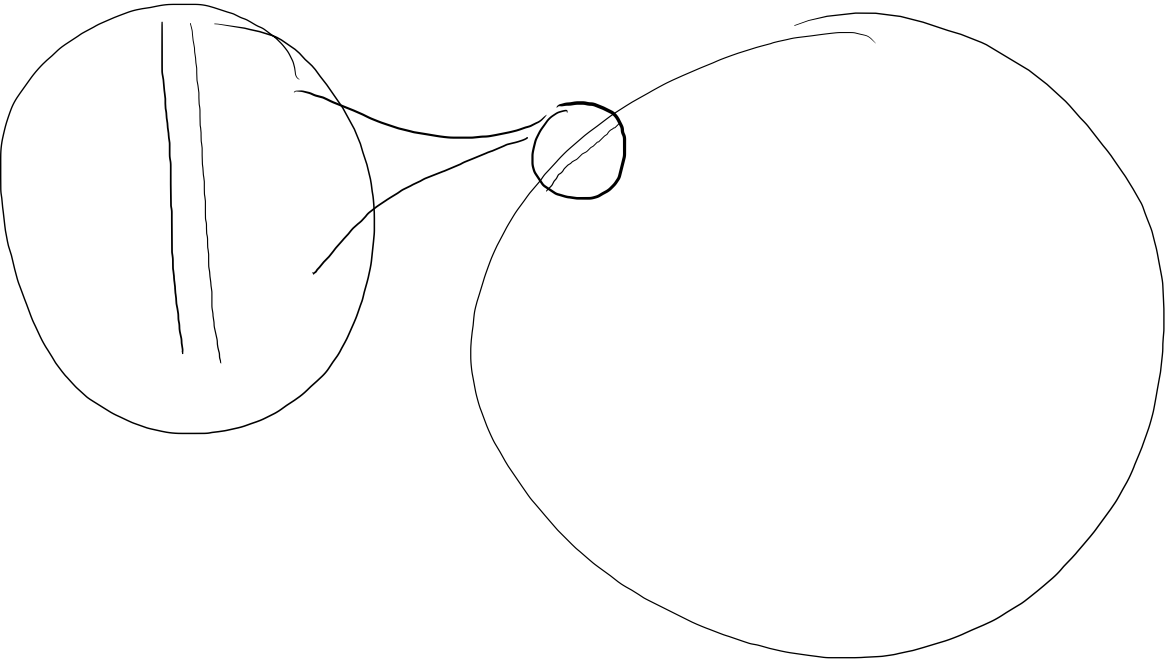
$\frac{\varepsilon_0 \cdot E^2}{2} \times$

$= 7{,}3 \times 10^{-15}\ J$

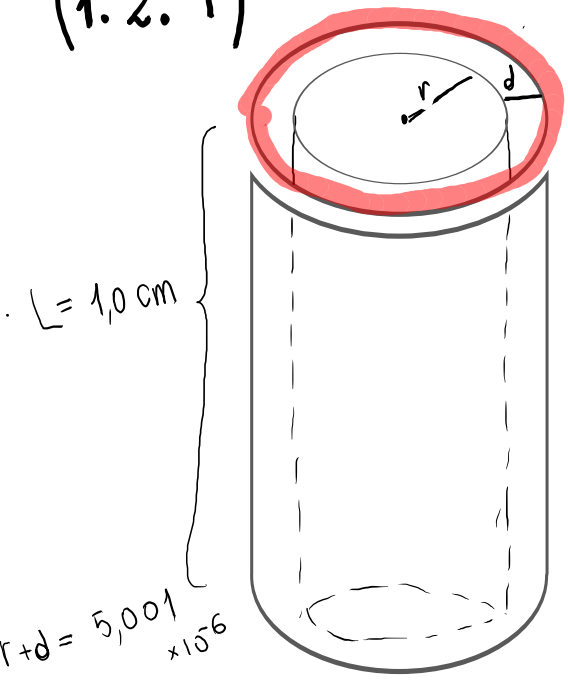


$k = 1.00022$

$\varepsilon \simeq \varepsilon_0$



(1.2.9)



$r = 5{,}0 \times 10^{-6}\ m$

$d = 1{,}0 \times 10^{-9}\ m$

$L = 1{,}0 \times 10^{-2}\ m$

$K_e = \frac{1}{4\pi\varepsilon_0}$ $\quad K_e = \frac{1}{4\pi K \varepsilon_0}$

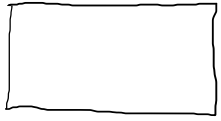
$\frac{1}{2K_e} = \frac{1}{2 \cdot \frac{1}{4\pi\varepsilon_0}} = \frac{4\pi\varepsilon_0}{2} = 2\pi\varepsilon_0$

- Cilíndrico:

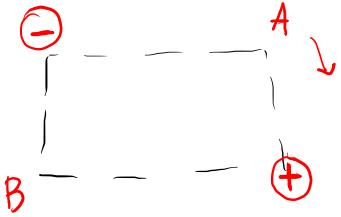
$$C = \frac{2\pi\varepsilon_0 L}{\ln\left(\frac{r+d}{r}\right)} = 2{,}8 \times 10^{-9}\ F$$

- Placas paralelas

$$C = \frac{\varepsilon_0 A}{d} = \left[\frac{\varepsilon_0}{d} \cdot 2\pi r L\right]$$

$A' =$  $L = 2\pi r L = 2.8 \times 10^{-9}\ F$

$2\pi r = \pi \cdot D$



-2.34

$V_A = k_e \left(\frac{q_2}{d_2} - \frac{q_1}{d_1} \right)$ $\quad 8{,}99 \times 10^9$

$V_B = -7.8 \times 10^5$

$k_e \left[\frac{-5}{5} + \frac{2}{15} \right]$

1 → 2
→ 3
→ 4
2 → 3
→ 4
3 → 4

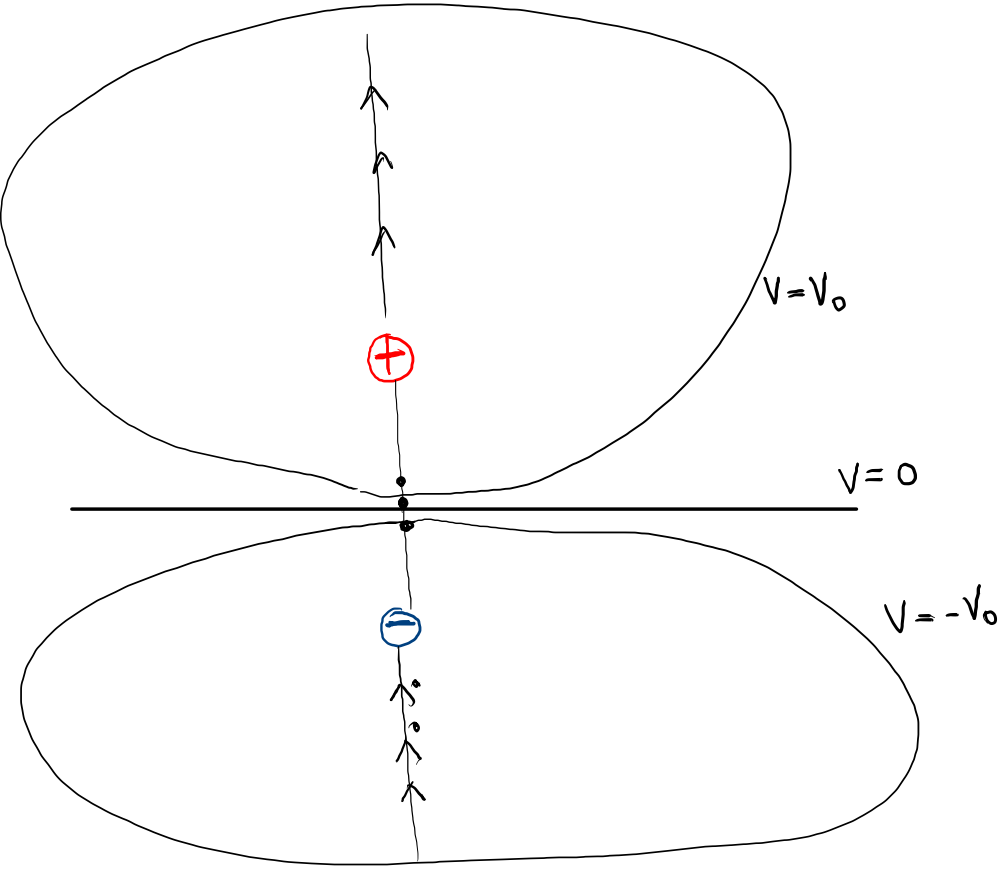
$\frac{q_3 q_1}{d_1} + \frac{q_3 q_2}{d_2}$.

$0{,}17 - (-2.34)$

$W_{el} = -\Delta U = -W_{ext}$

$0 - \Delta k = W_{el} + W_{ext}$

$$U = k_e \cdot \sum_{i<j} \frac{q_i q_j}{r_{ij}}$$


V = V0
V = 0
V = -V0