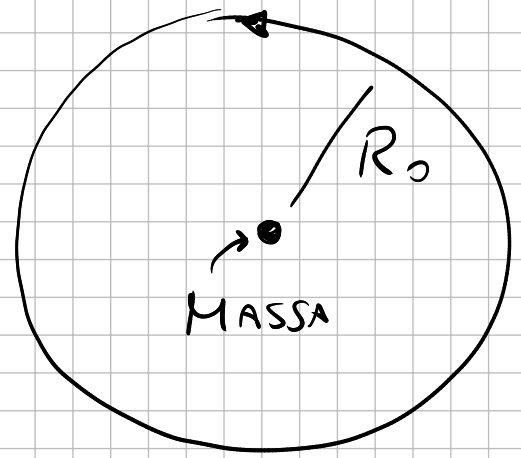
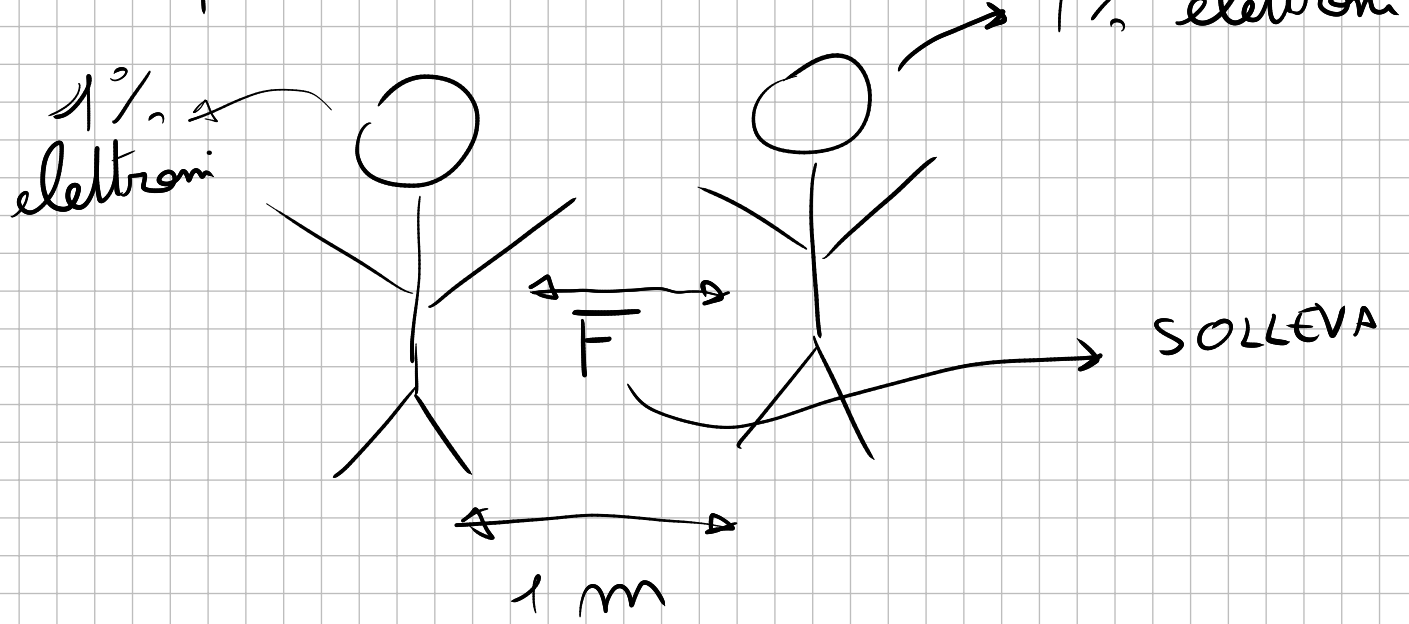
$1\ \text{Å} \sim 10^{-10}\ m$ ATOMO

$10^{-15}\ m$ NUCLEO

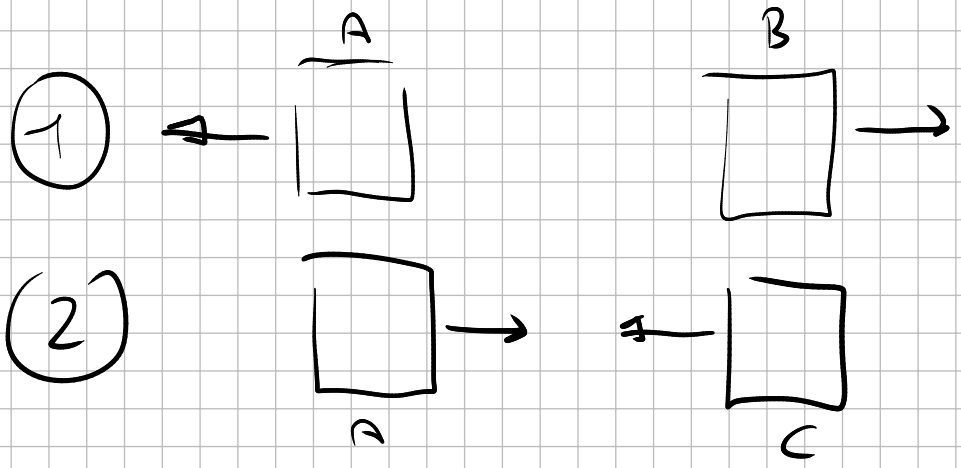


m_e massa elettrone

$m_p \sim 2000\ m_e$



SOLLEVA LA TERRA!



→ DUE TIPI DI CARICHE ELETTRICHE

1. CARICHE DELLO STESSO TIPO
2. CARICHE DI TIPO DIVERSO

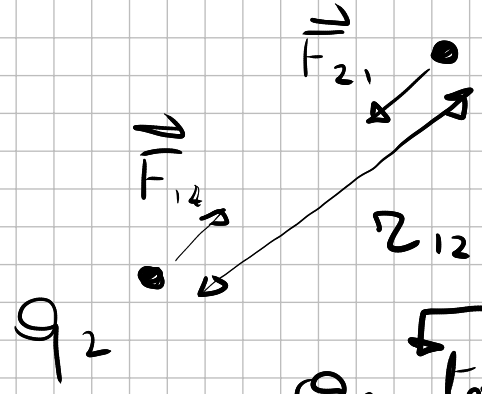
LA MAGGIOR PARTE DEI CORPI HA CARICA 0 → NEUTRO

C (COULOMB), è sempre multiplo di $e = |q_e| = |q_p| = 1.602 \cdot 10^{-19}$ C

oggetti carichi hanno $|q| \sim 10^{-7} \text{ C} \div 10^{-9}$ C $\Rightarrow$

$N_e \sim 10^{10} \div 10^{12}$ elettroni/protoni "spaiati"

CFR. con $N_A \sim 10^{23}$



① $\vec{F}_{12}$ e $\vec{F}_{21}$ sono dirette lungo la congiungente

② q_1 e q_2 sono uguali se $\vec{F}_{13} = \vec{F}_{23}$

③ se $\vec{F}_{13} = -\vec{F}_{23} \Rightarrow q_1 = -q_2$

④ $F_{12} = |\vec{F}_{12}| \propto \frac{1}{r_{12}^2}$

$$\vec{F}_{12} = K \frac{q_1 q_2}{r_{12}^2} \hat{r}_{12}, \qquad \vec{r}_{12} = (\vec{r}_1 - \vec{r}_2)$$

$$\hat{r}_{12} = \frac{\vec{r}_{12}}{r_{12}}$$

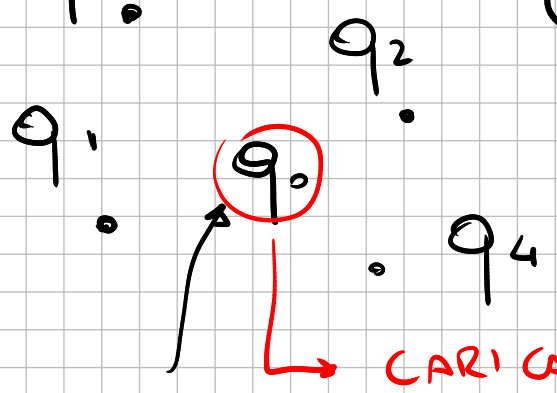
LEGGE DI COULOMB

$$\vec{F} = K \frac{q_1 q_2}{r^2} \hat{r} \quad , \quad [F] = [K] \frac{[q]^2}{[r]^2} = [K] \frac{C^2}{m^2} = N \Rightarrow$$

$$[K] = \frac{N m^2}{C^2} \quad , \quad K = \frac{1}{4\pi\varepsilon_0} \quad , \quad [\varepsilon_0] = \frac{C^2}{N m^2}$$

$$\varepsilon_0 = 8.8542 \cdot 10^{-12} \frac{C^2}{N m^2}$$ COSTANTE DIELETTRICA DEL VUOTO

CAMPO ELETTRICO



se tutte le cariche sono immobili

↓

REGIME DI ELETTROSTATICA

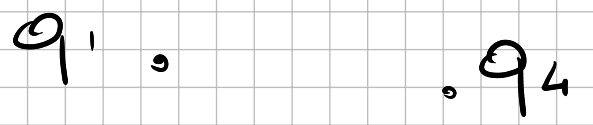
PRINCIPIO DI SOVRAPPOSIZIONE

$$\vec{F}_{TOT} = \frac{q_0}{4\pi\varepsilon_0} \sum_{i=1}^{N} \frac{q_i}{\vec{r}_{0i}} \hat{r}_{0i}$$

$$F_{TOT} \propto q_0 \Rightarrow \vec{E} \equiv \frac{\vec{F}_{TOT}}{q_0}$$

CAMPO ELETTROSTATICO

$$\vec{E} = \lim_{q_0 \to 0} \frac{\vec{F}_{TOT}}{q_0}$$

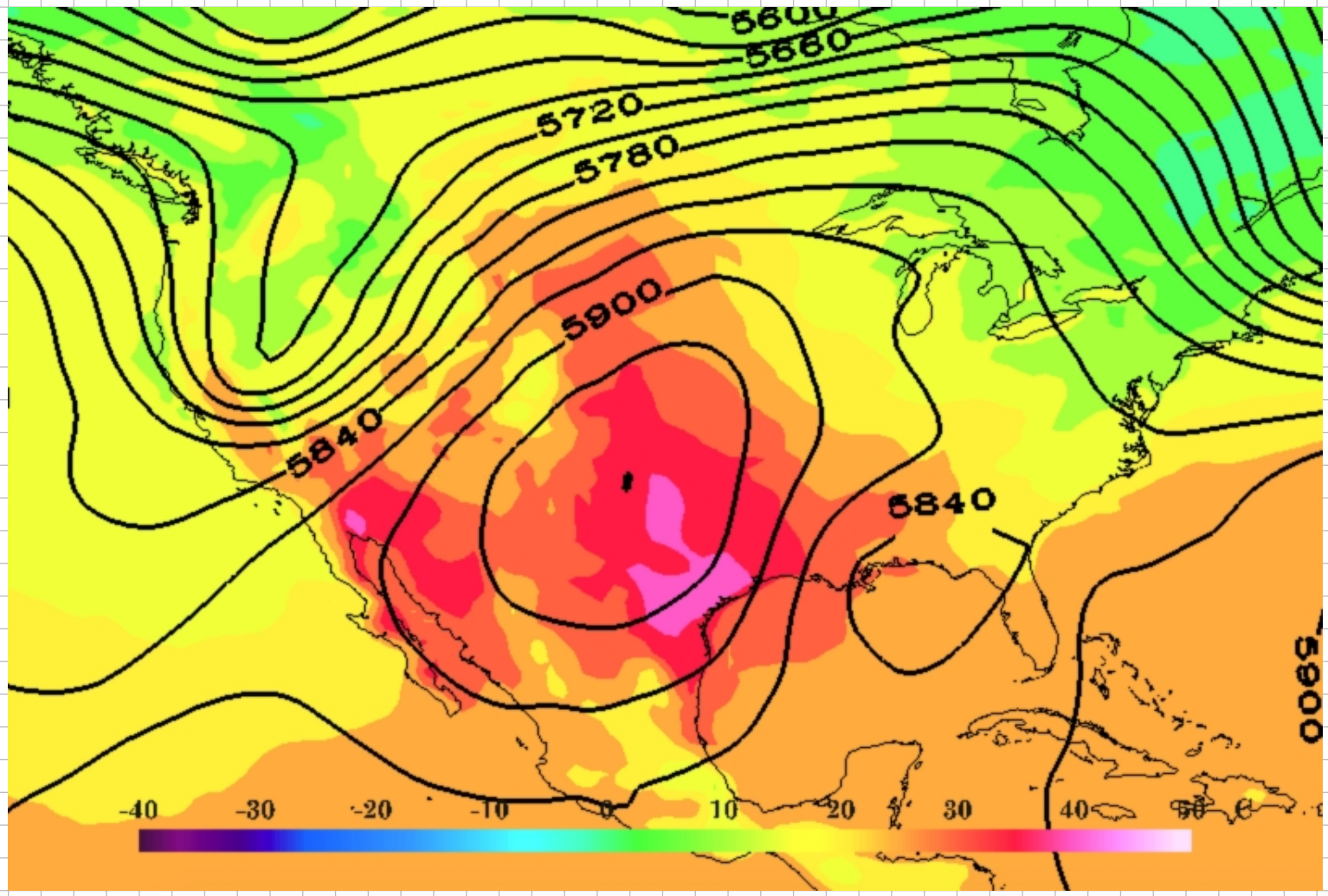


$$\vec{E} = \frac{\vec{F}_{TOT}}{q_0} \longrightarrow \vec{F}_{TOT} = q_0 \vec{E}$$

$$\vec{E} = (E_x, E_y, E_z) \quad \text{CAMPO VETTORIALE}$$

$$[E] = \frac{N}{C} = \frac{V}{m}$$

CAMPI SCALARI / VETTORIALI



$P = P(x, y)$

CAMPO SCALARE:

$(x, y) \longrightarrow P$

CAMPO VETTORIALE:

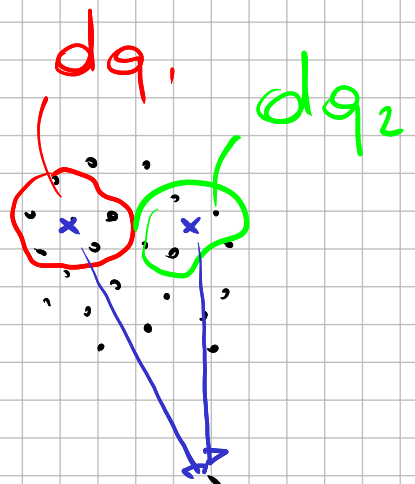
(x, y, z)

$\downarrow$

(E_x, E_y, E_z)

PRINC. DI SOVRAPPOSIZIONE - PARTE 2

$$\vec{F}_{TOT} = \frac{q_0}{4\pi\varepsilon_0} \sum_{i=1}^{N} \frac{q_i}{r_{0i}^2} \hat{r}_{0i} \quad \Rightarrow \quad \vec{E}_{TOT} = \frac{1}{4\pi\varepsilon_0} \sum_{i=1}^{N} \frac{q_i}{r_{0i}^2} \hat{r}_{0i}$$



$\vec{E}(x,y,z)$

$\vec{P} = (x,y,z)$

DISTRIBUZIONI CONTINUE

$$d\vec{E}(\vec{P}) = \frac{1}{4\pi\varepsilon_0} \frac{dq}{r^2} \hat{r}$$

$\Downarrow$ → 3 INTEGRALI TRIPLI

$$\vec{E}(\vec{P}) = \frac{1}{4\pi\varepsilon_0} \int_{(V)} \frac{dq}{r^2} \hat{r}$$

(V) → V dell'oggetto carico