CARICA ELETTRICA

⊕ ⊖

CORPO NEUTRO = uguale numero di cariche ⊕ e ⊖

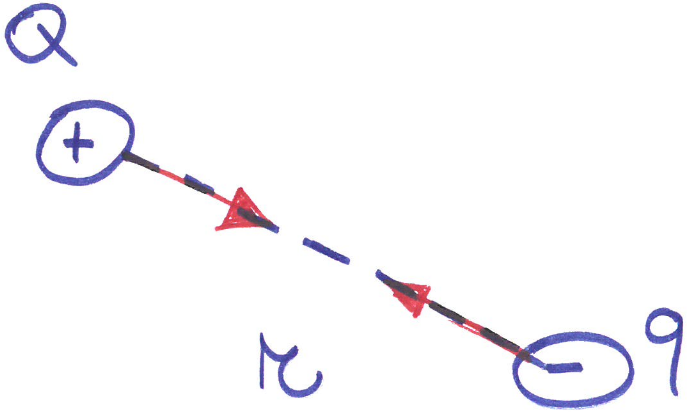
CORPO CARICO < ⊕ se ci sono più cariche ⊕
⊖ " " " " " ⊖

CONSERVAZIONE DELLA CARICA in un sistema isolato

CARICA e' QUANTIZZATA

↓ CARICA FONDAMENTALE $1{,}6 \cdot 10^{-19}$ C (COULOMB)

in natura e' un multiplo intero della carica fondamentale



Forza di Coulomb

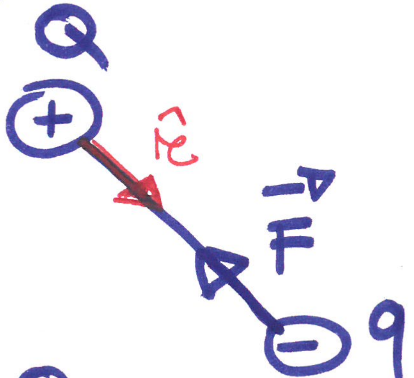
$$F = \Gamma \frac{Qq}{r^2}$$

$$\Gamma = \frac{1}{4\pi\varepsilon_0} = 8{,}9\cdot 10^{9}\ \frac{N m^2}{C^2}$$

COSTANTE DIELETTRICA NEL VUOTO

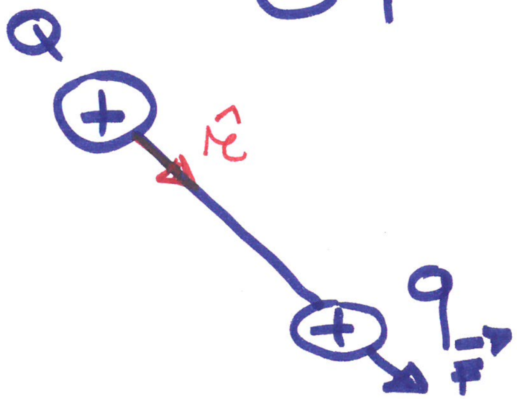
$$\vec{F} = -\Gamma \frac{Qq}{r^2}\hat{r}$$

ATTRATTIVA



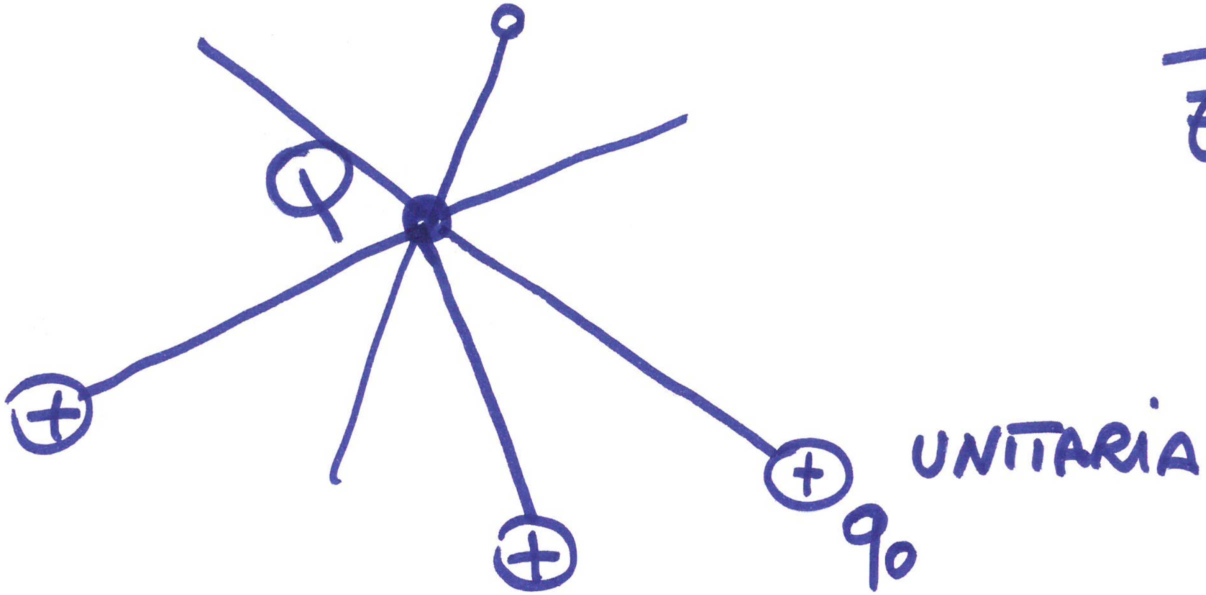
$$\vec{F} = +\Gamma \frac{Qq}{r^2}\hat{r}$$

REPULSIVA



$$\Gamma = \frac{F r^2}{Qq}$$

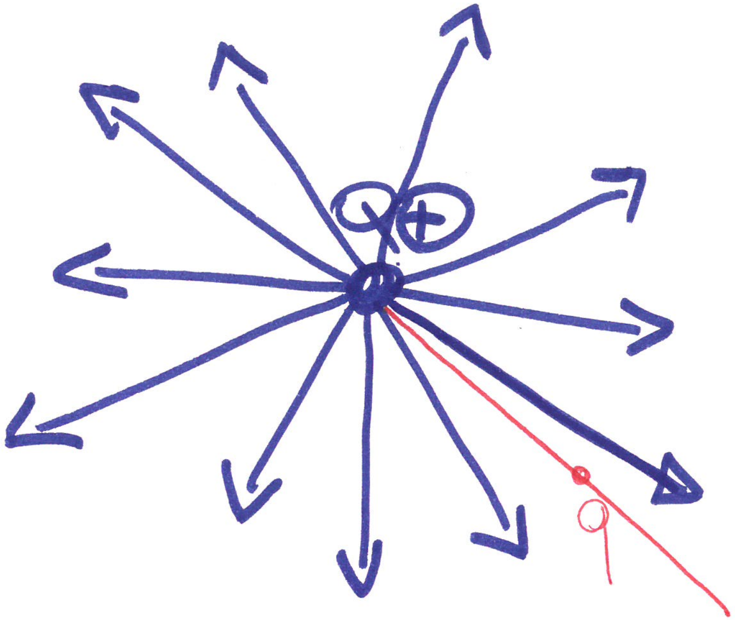
CAMPO ELETTRICO

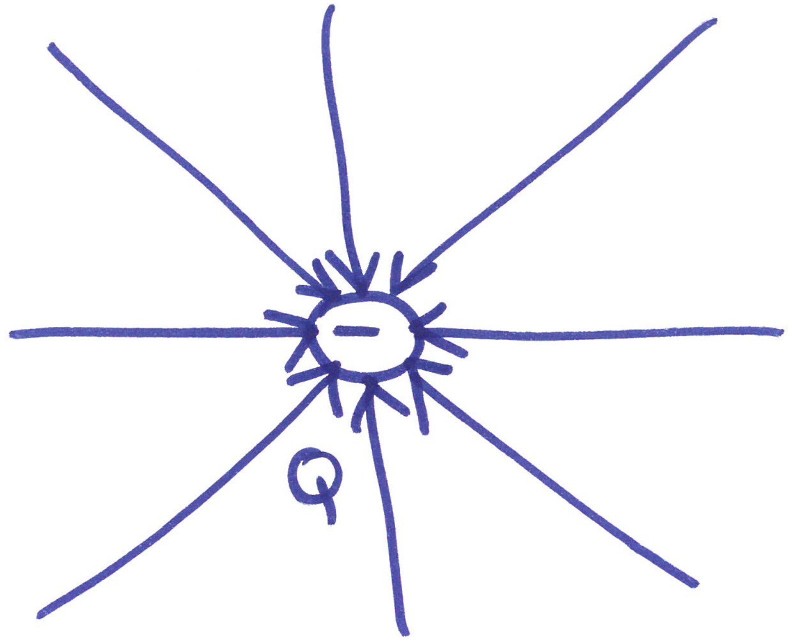


$$\vec{E} = \frac{\vec{F}}{q_0}$$

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

$$\vec{E} = \frac{\vec{F}}{q_0} = \frac{\Gamma \frac{\cancel{q_0} Q}{r^2} \hat{r}}{\cancel{q_0}} = \Gamma \frac{Q}{r^2} \hat{r}$$



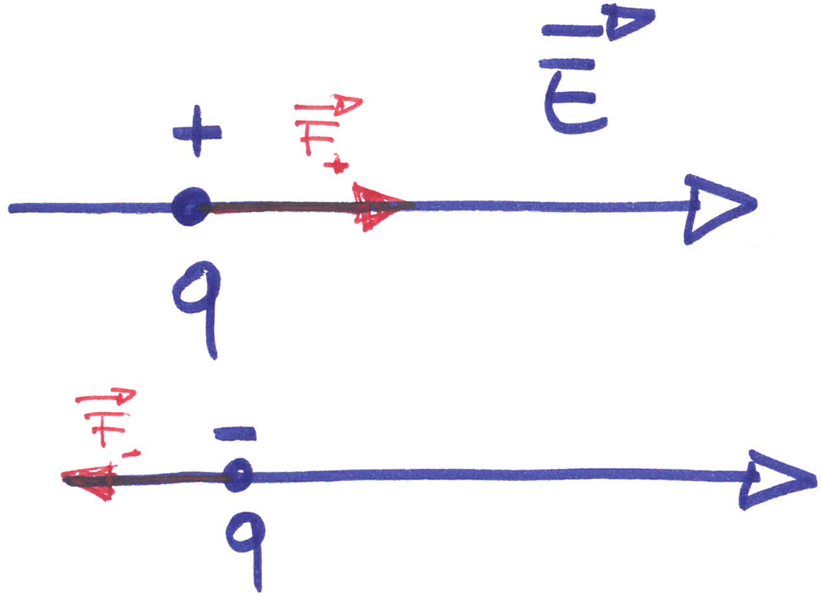


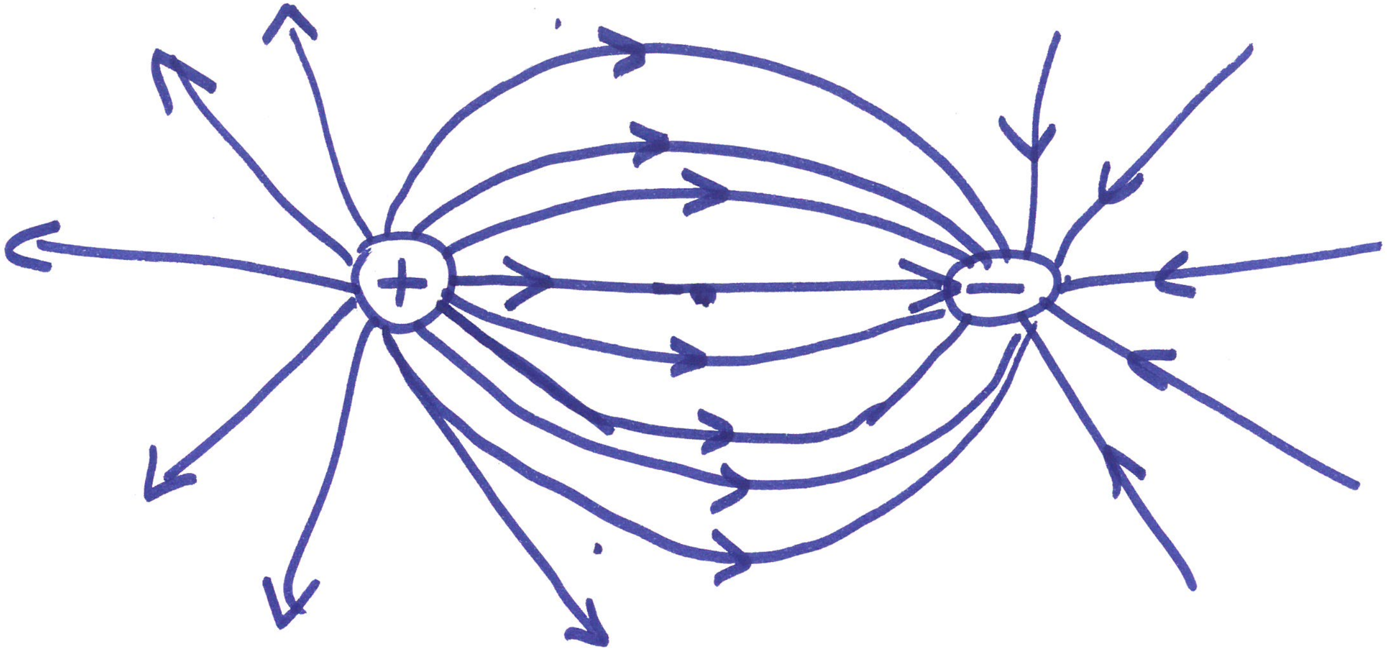
F. CENTRALE

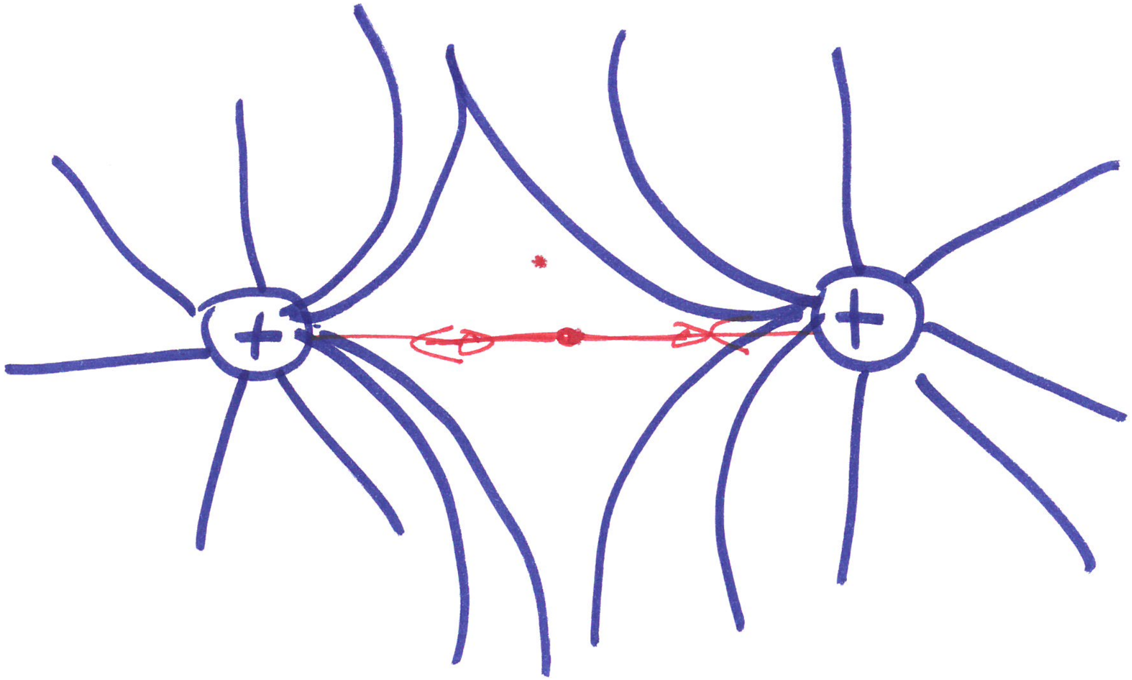
$$\vec{F} = q\vec{E}$$

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

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







F. ELETTRICA e' CENTRALE $\Longrightarrow$ e' CONSERVATIVA

$\rightarrow$ posso associarle un' EN. POTENZIALE

$$L = -\Delta U \qquad U_{in} = 0 \text{ se } F = 0$$

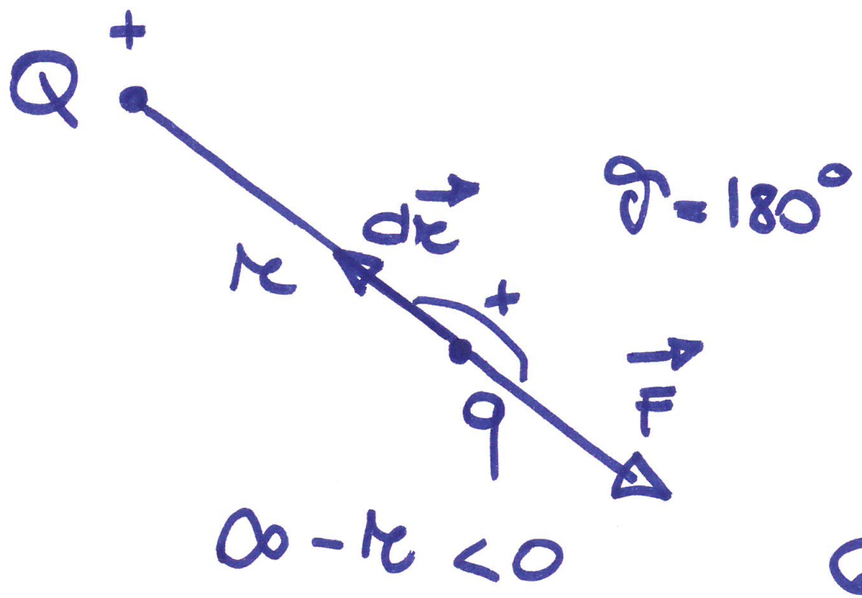
$$F = \Gamma \frac{qQ}{r^2} = 0 \text{ quando } r \rightarrow \infty$$

calcolo il lavoro per spostare la carica da ∞ a r

$$dL = \vec{F} \cdot d\vec{r}$$

$$dL = \Gamma \frac{qQ}{r^2} (-dr) \underbrace{\cos\theta}_{=-1}$$

$$= \Gamma \frac{qQ}{r^2} \cdot dr$$



$$\int_{\infty} dL = \int_{\infty} \Gamma \frac{qQ}{r^2} \, dr$$

$$L = \Gamma qQ \left(-\frac{1}{r}\right)_{\infty}^{r} = -\Gamma qQ \frac{1}{r}$$

$$L = -\Delta U = U_{in} - U_{fin} = \cancel{U_{\infty}} - U_r$$

$$L = -U_r$$

$$-\frac{\Gamma qQ}{r} = -U_r \longrightarrow \boxed{U = \frac{\Gamma qQ}{r}}$$

[JOULE]

$$V = \frac{U}{q}$$

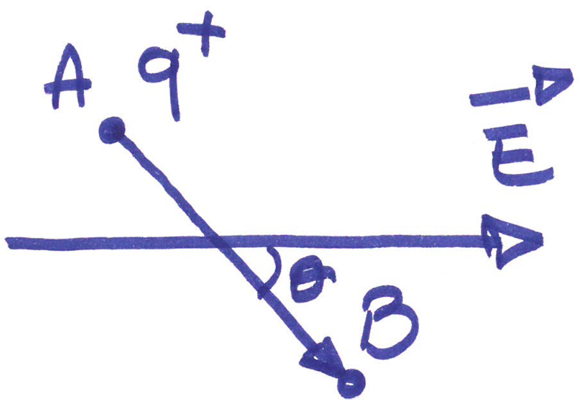
POTENZIALE ELETTRICO

$$U = qV$$

V = lavoro per spostare una carica unitaria e positiva dalla posizione r all'∞

$$\underset{\shortparallel}{\overset{V}{[VOLT]}} = \left[\frac{J}{C}\right]$$

RELAZIONE TRA E e V



Voglio spostare q^+ da A a B

$$L = \vec{F} \cdot \vec{S}$$

$$L = -\Delta U$$

$$dL = \vec{F} \cdot d\vec{s} = F_e \cdot ds \cos\theta$$

$$dL = -dU = -q\,dV$$

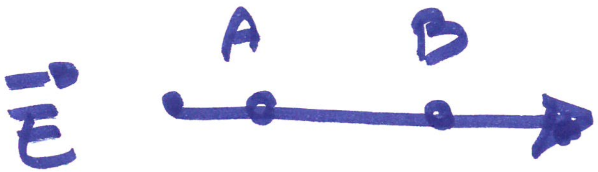
$$F_e \cdot ds \cdot \cos\theta = -q\,dV$$

$$\cancel{q} E\, ds \cos\theta = -\cancel{q}\, dV$$

$$E = -\frac{dV}{ds \cdot \cos\theta}$$

$\theta = 0$ la carica si sposta lungo la direzione del campo E

$\cos\theta = 1$



$$\boxed{E = -\frac{dV}{ds_E}}$$

indica che ds e' lungo E

modulo di E $= -\dfrac{dV}{ds_E}$ $\quad dV < 0$, $\quad ds_E > 0$

$\Rightarrow\ > 0$

$dV < 0$

$V_B - V_A < 0$

$V_B < V_A$

lungo il campo E
il potenziale diminuisce!

ELETTRONVOLT eV

$1\ eV$ = e' l'en. cinetica che acquista un elettrone sottoposto ad una differenza di potenziale di $1V$

$$\Delta E_K + \Delta U + \cancel{\Delta I} = \cancel{L_e} = 0 \quad \text{sist. isolato}$$

$\Delta I = 0$ no attrito

$$\Delta E_K + \Delta U = 0$$

$$\frac{1}{2} m v_f^2 - \cancel{\frac{1}{2} m v_i^2} + qV_f - qV_i = 0$$

$$1\ eV = \frac{1}{2} m v_f^2 = -qV_f + qV_i$$

$$\frac{1}{2} m v_f^2 = -q(V_f - V_i)$$

$$\underbrace{1\,eV} = +1{,}6\cdot 10^{-19}\,C \cdot 1\,V = \underbrace{1{,}6\cdot 10^{-19}\,J}$$

$$q = -1{,}6\cdot 10^{-19}\,C$$

$$V = \frac{U}{q}$$

$$V = \frac{J}{C} \longrightarrow J = VC$$