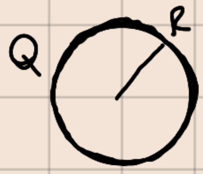
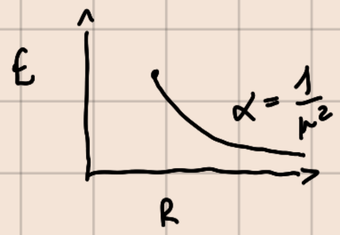
Calcolo del Potenziale



carica distribuita solo sulla superficie

$\cdot P$

$$E(r) = \begin{cases} 0 & r < R \\ \dfrac{Q}{4\pi\varepsilon_0 r^2}\,\hat{r} & r > R \end{cases}$$



$$\boxed{V(r) - V(r_{riferimento}) = -\int_{r_{rif}}^{r} \vec{E}\cdot d\vec{l}}$$

si può mettere ∞ assicurandosi che non ci siano cariche a ∞

$\left(\int E\,dl \overset{*}{=} \int E\,dr \right.$ lungo cammino radiale $\left. \right)$

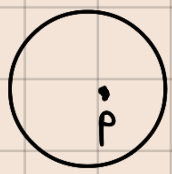
$r > R$

$$V(r) - V_{rif} = -\int_{rif}^{r} \frac{Q}{4\pi\varepsilon_0 r^2} \overset{*}{d r} = -\left(-\frac{Q}{4\pi\varepsilon_0 r}\right)\Bigg|_{rif}^{r} = \frac{Q}{4\pi\varepsilon_0}\left(\frac{1}{r} - \underbrace{\frac{1}{r_{rif}}}_{0}\right)$$

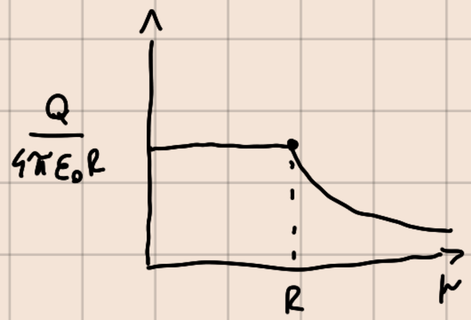
$V_{RIF} = 0$

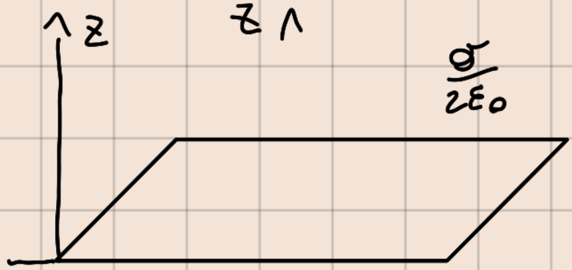
$V_{RIF} = \infty$

$r < R$



$$V(r) - \underset{\substack{\parallel \\ 0}}{V(RIF.)} = -\int_{RIF}^{R} E_{est} - \int_{R}^{r} \overbrace{E_{int}}^{0 \text{ perché } E \text{ int del cond} = 0} = V(R)$$





$$E = \begin{cases} +\dfrac{\sigma}{2\varepsilon_0} & z > 0 \\ -\dfrac{\sigma}{2\varepsilon_0} & z < 0 \end{cases}$$

$$\Delta V = V(z) - V(rif) = -\int_{rif.=0}^{z} E\,dz = -\frac{\sigma}{2\varepsilon_0} z$$

$$z_{rif.} = 0$$