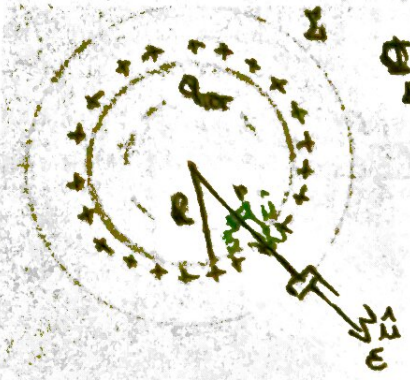
RIPASSO FISICA TLM 3.

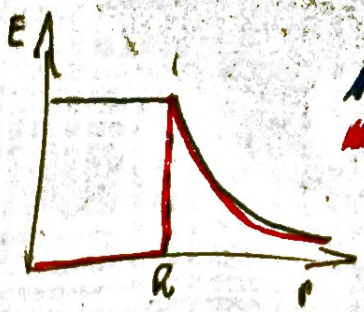
= APPLICAZIONI TLM. GAUSS

∴ SFERA CONDUTTRICE



$$\Phi_\Sigma(E) = \int_\Sigma E_n \, d\Sigma = E 4\pi r^2 = \frac{Q_{tot}}{\varepsilon_0}$$

$$E_{tot}^{esterno} = \frac{Q}{4\pi\varepsilon_0 r^2}$$



P = POTENZ.
V = E

SE Σ INTERNO → $r<R$ (:)

$$\Phi_\Sigma(E) = \int_\Sigma E \, d\Sigma = E 4\pi r^2 = \frac{Q_{int}}{\varepsilon_0} \rightsquigarrow 0 \rightarrow \text{TLM. GAUS}$$

$$E^{INT} = 0$$

∴ SFERA CARICA

$$\rho = \frac{Q}{\frac{4}{3}\pi R^3}$$

$$E = 4\pi R^2 = \frac{Q}{\varepsilon_0} = \frac{\rho \frac{4}{3}\pi R^3}{3\varepsilon_0 \pi R^2} = \frac{\rho R}{3\varepsilon_0}$$

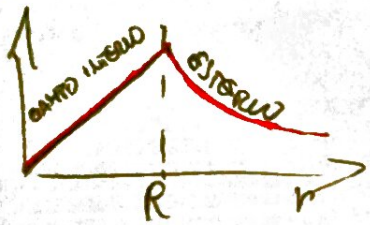
$$\Phi_\Sigma(E) = \int_\Sigma E \, d\Sigma = E 4\pi r^2 = \frac{Q_{int}}{\varepsilon_0}$$

$$\rho = \frac{dq}{d\tau} \Rightarrow dq = \rho \, d\tau = Q_{tot} \frac{4\pi R^3}{3} \rightsquigarrow q_{int} = \int_0^r \rho (4\pi r^2) dr$$

$$\Phi_\Sigma(E) = \frac{\int_0^r \rho (4\pi r^2) dr}{\varepsilon_0} = \frac{\rho \left(\frac{4}{3}\pi r^3\right)}{\varepsilon_0} \quad (\text{VOLUME INT.}) = E\Sigma = E 4\pi r^2$$

$$\rightsquigarrow E^{INT} = \frac{\rho r}{3\varepsilon_0}$$

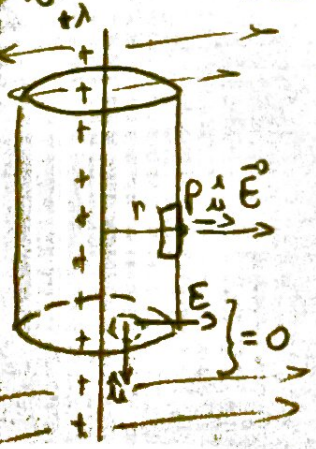
SE E^{EST} → SI COMPORTA COME UNA CARICA PUNTIFORME $\rightsquigarrow E^{EST} = \frac{Q}{4\pi\varepsilon_0 r^2}$

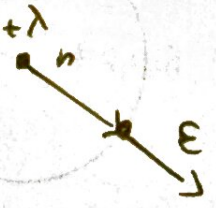


$r<R$ $E_{INT} = \frac{\rho}{3\varepsilon_0} r = \frac{Q_{tot}}{4\pi\varepsilon_0} \frac{r}{R^3}$ $V_{INT} = \frac{Q}{4\pi\varepsilon_0} \frac{R^2 - r^2}{2R^3} + V_{EST} = \frac{Q}{4\pi\varepsilon_0} \frac{R^2 - r^2}{2R^3} + \frac{Q}{4\pi\varepsilon_0 R}$

$r>R$ $E_{EST} = \frac{Q_{tot}}{4\pi\varepsilon_0 r^2}$ $V_{EST} = \frac{Q_{tot}}{4\pi\varepsilon_0 r}$

∴ FILO EST. INDEFINITO





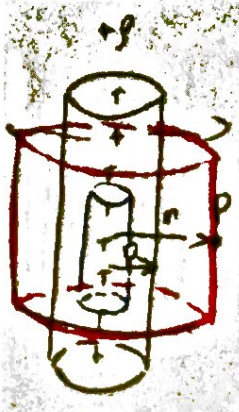
$$\Sigma = S_L + 2S_B$$

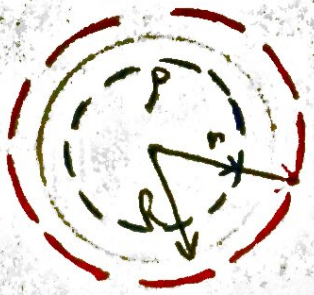
$$\Phi(\vec{E}) = \int_{\Sigma_L} E \, d\Sigma = E \int_{\Sigma_L} d\Sigma = E 2\pi r h = \frac{q_{int}}{\varepsilon_0}$$

$$E = \frac{\lambda h}{4\pi r h \varepsilon_0}$$

λh

CILINDRO INDEFINITO CARICO UNIFORM.





$$\Sigma = \Sigma_L$$

$$\Phi_\Sigma(\vec{E}) = E \int d\Sigma = E\, 2\pi R h = \frac{q_{tot}}{\varepsilon_0}$$

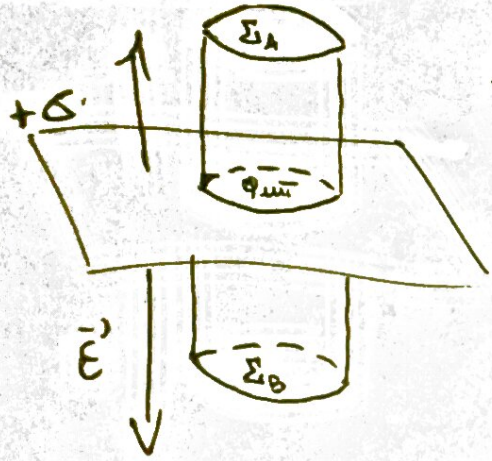
$$q_{tot} = \rho \pi R^2 h$$

$$E^{est} = \frac{\rho \pi R^2 h}{2\pi r h \varepsilon_0} = \frac{\rho R^2}{2\varepsilon_0 r}$$

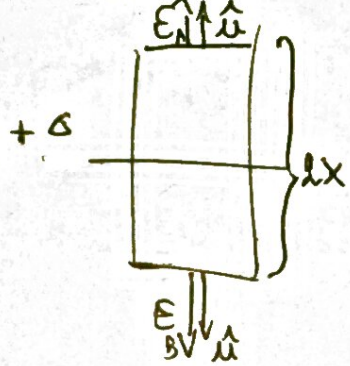
ALL'INTERNO

$$\Phi_\Sigma(\vec{E}) = E\, 2\pi r h = \frac{q_{int}}{\varepsilon_0} = \frac{\rho \pi r^2 h}{\varepsilon_0} \quad \rightsquigarrow \quad E^{int} = \frac{\rho}{2\varepsilon_0} r$$

STRATO UNIF. CARICO



$$\Sigma = \Sigma_A + \Sigma_B + \Sigma_L$$



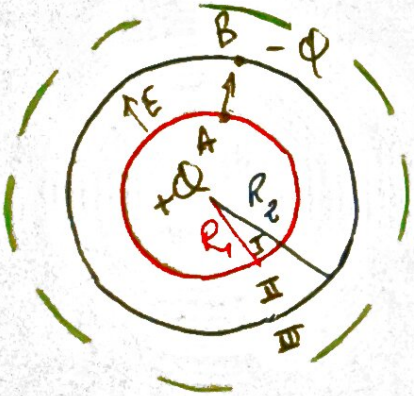
$$\Phi(\vec{E}) = \Phi_{\Sigma_A}(\vec{E}) + \Phi_{\Sigma_B}(\vec{E})$$

$$= E(x) \int d\Sigma_A + E(-x) \int d\Sigma_B$$

$$= E(x)\Sigma_A + E(+x)\Sigma_B = \frac{q_{int}}{\varepsilon_0} = \frac{\sigma \Sigma}{\varepsilon_0}$$

$$= 2E = \frac{\sigma}{\varepsilon_0} \quad \rightsquigarrow \quad E = \frac{\sigma}{2\varepsilon_0}$$

CONDENSATORE SFERICO



/ GAUSS

/ CONDUTTORE +Q → SI FORMA DELLA CARICA +Q SU QUESTO CONDUTT.

/ CONDUTTORE -Q → ATTRAVERSO L'INDUZIONE COMPLETA -Q

$$\Phi(\vec{E}) = E\Sigma = \frac{q - q}{\varepsilon_0} = 0 \quad \text{III EQUA}$$

$$\begin{cases} r < R_1 & E_I = 0 \\ R_1 < r < R_2 & E_{II} = \dfrac{Q}{4\pi\varepsilon_0 r^2} \\ r > R_2 & E_{III} = 0 \end{cases} \qquad V_A - V_B = \int_{R_1}^{R_2} E_{II}\, dr = \frac{Q}{4\pi\varepsilon_0} \frac{R_2 - R_1}{R_1 R_2}$$