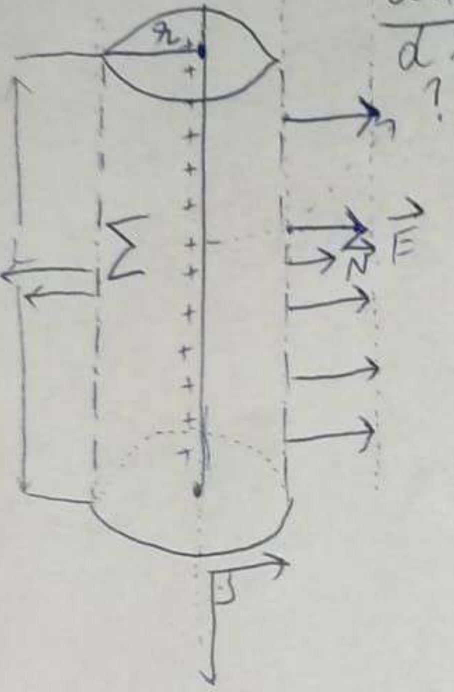
Curs Electricitate 5

Câmpul creat de o distribuție liniară infinită uniformă de sarcină electrică



$\frac{dq}{dl} = const. = \lambda$ (~~distribuția~~ liniară a sarcinii)

Teorema lui Gauss

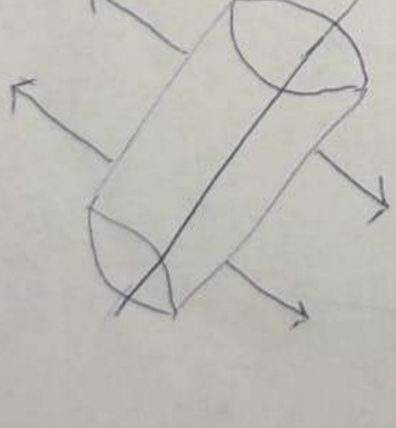
$$\oint_{\Sigma} = \frac{q_{int}}{\varepsilon_0}$$

$$q_{int} = L \cdot \lambda$$

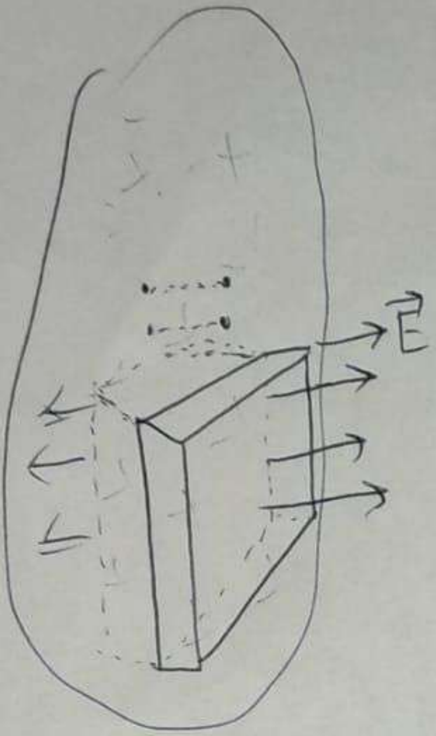
$$\phi_{\Sigma} = \underbrace{\phi_{sus}}_{=0} + \underbrace{\phi_{jos}}_{=0} + \phi_{lat}$$

$$\phi_{lat} = |\vec{E}| = 2\pi r L$$

$$|\vec{E}| \cdot 2\pi r L = \frac{L\lambda}{\varepsilon_0} \Rightarrow \quad |\vec{E}| = \frac{\lambda}{2\pi\varepsilon_0 r} = \frac{2k\lambda}{r} \sim \frac{1}{r}$$



$$|\vec{E}| = \frac{2k\lambda}{r}, \lambda > 0$$



$$\sigma = \frac{d\phi}{dS} \left(\frac{C}{m^2} \right) = \text{cnst}$$

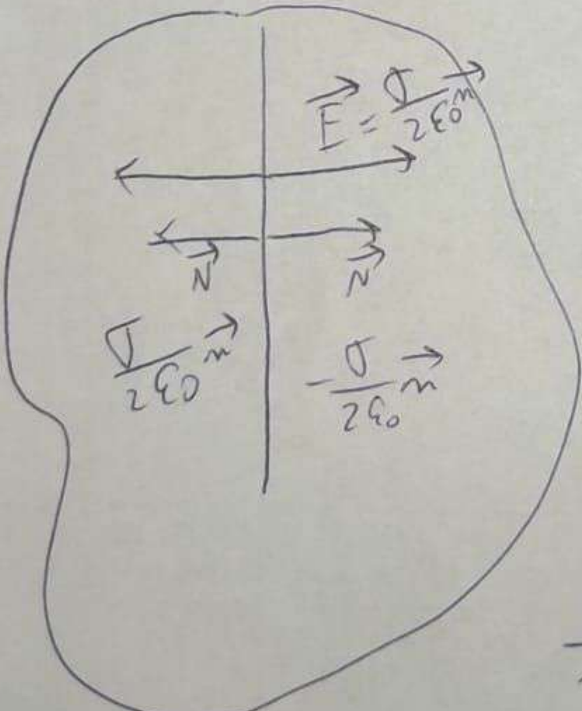
$$\phi_{int} = \sigma \cdot S$$

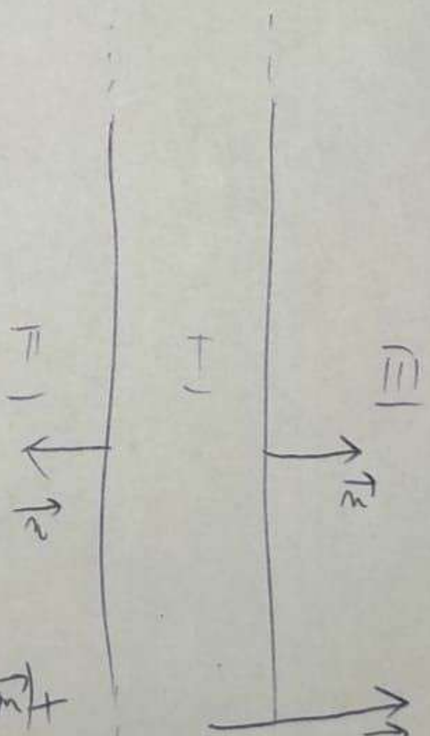
$$\phi_{\Sigma} = \frac{\phi_{int}}{\varepsilon_0}$$

$$2\sigma S = \sigma S$$

$$\phi_{\Sigma} = \phi_{sus} + \phi_{jos} + \phi_{stânga} + \phi_{dreapta} + \underbrace{\phi_{fata}}_{0} + \underbrace{\phi_{spate}}_{0}$$

$$2ES = \frac{\sigma S}{\varepsilon_0} \qquad E = \frac{\sigma}{2\varepsilon_0}$$





$$\frac{\sigma}{2\varepsilon_0}(-\vec{n}) + \frac{-\sigma}{2\varepsilon_0}(-\vec{n})$$

$$\frac{\sigma}{2\varepsilon_0}\vec{n} + \frac{-\sigma}{2\varepsilon_0}\vec{n} = 0$$

$$\vec{E} = \frac{\sigma}{\varepsilon_0}\vec{n}$$

$$|\vec{E}| = \frac{|\sigma|}{\varepsilon_0}$$