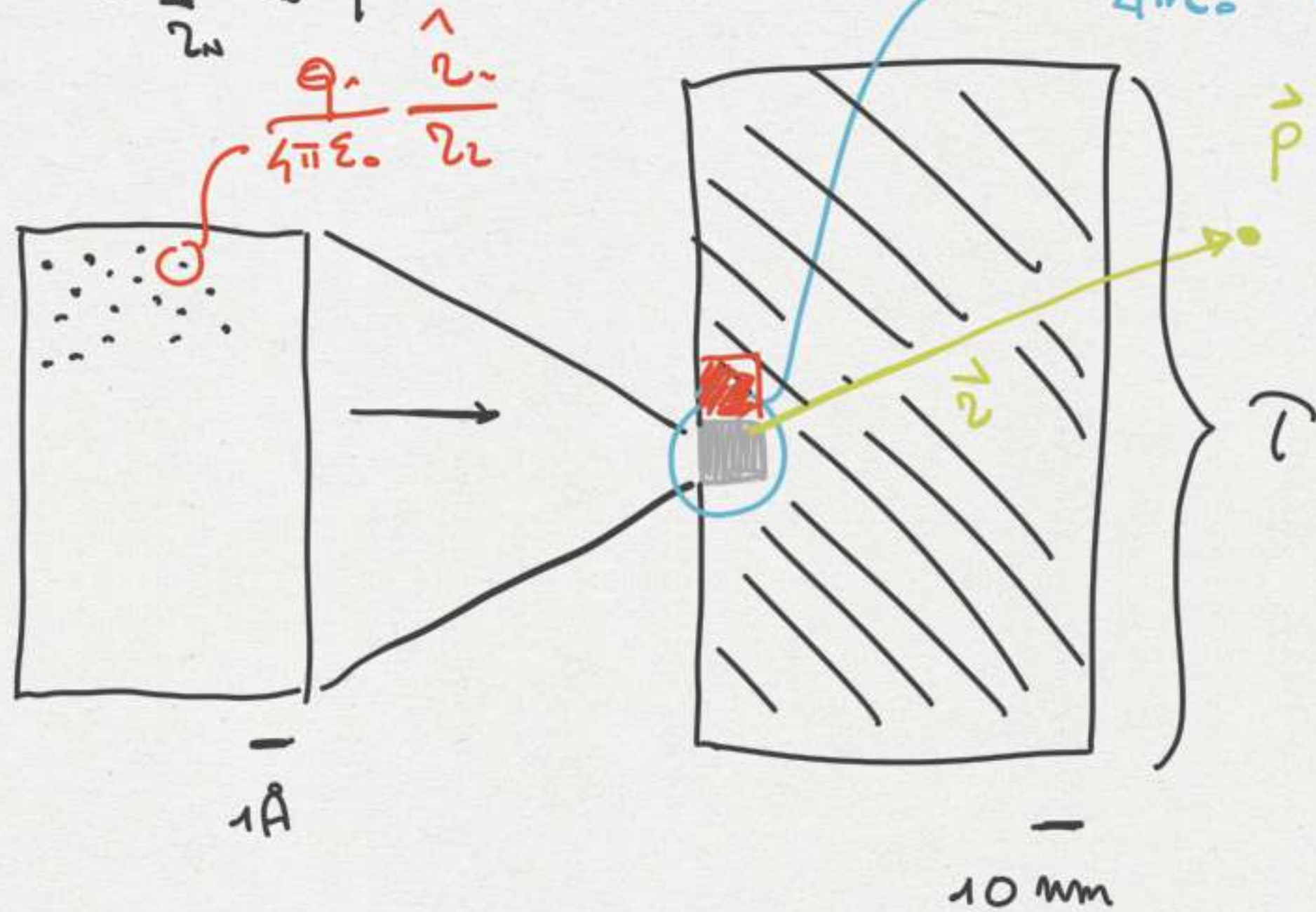


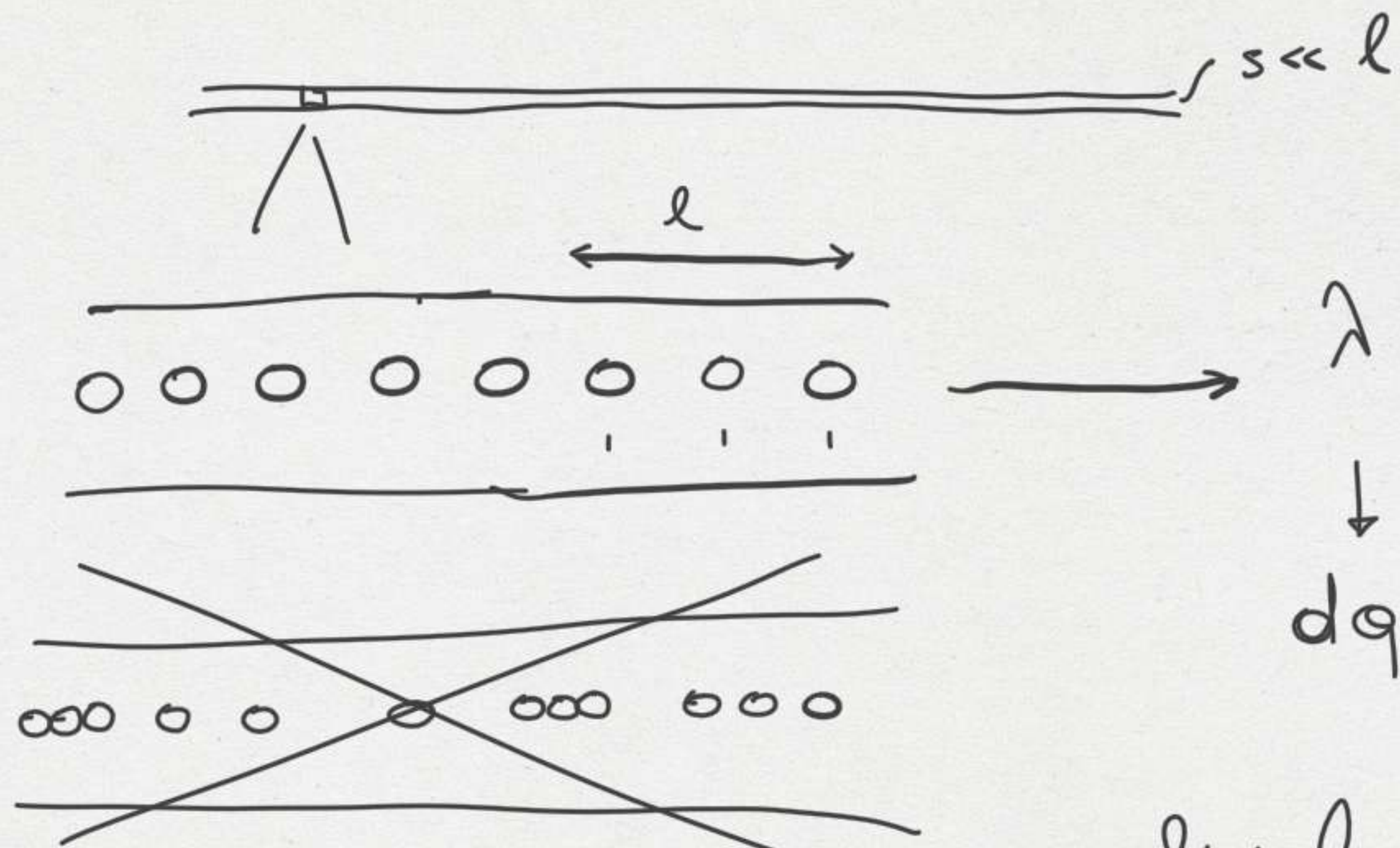
$$\vec{E}(\vec{r}) = \frac{1}{4\pi\epsilon_0} \sum_{i=1}^N \frac{\hat{r}_i q_i}{r_i^2}$$

$$\frac{dq}{4\pi\epsilon_0} \frac{\hat{r}}{r^2} = d\vec{E}(\vec{r}) \Rightarrow$$

$$\vec{E}(\vec{r}) = \int_{\tau} d\vec{E} =$$

$$= \int_{\tau} \frac{dq}{4\pi\epsilon_0} \frac{\hat{r}}{r^2} = (E_x, E_y, E_z)$$





$$\lambda = \frac{q}{l} \Rightarrow \text{se l'oggetto è lungo } h \Rightarrow q = \lambda h$$

$$dq = \lambda dl \quad \text{densità di carica lineare} \quad [\lambda] = \frac{C}{m}$$

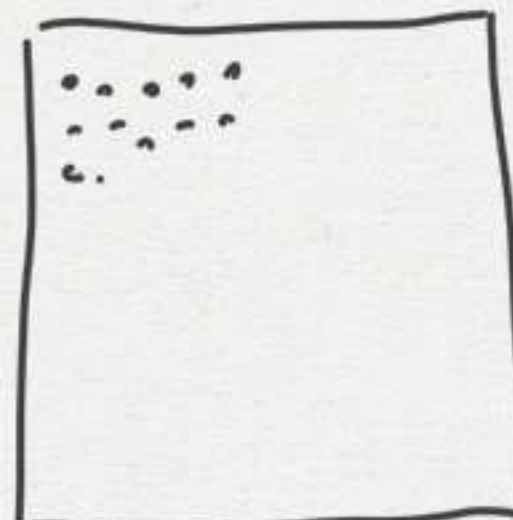


Diagram illustrating surface charge density. A rectangular surface is shown with a grid of dots representing charges. A double-headed arrow indicates the length l . Below it, a crossed-out diagram shows a different configuration of charges.

$$dq = \sigma d\Sigma \quad \text{superficiale}$$

$$[\sigma] = \frac{C}{m^2}$$

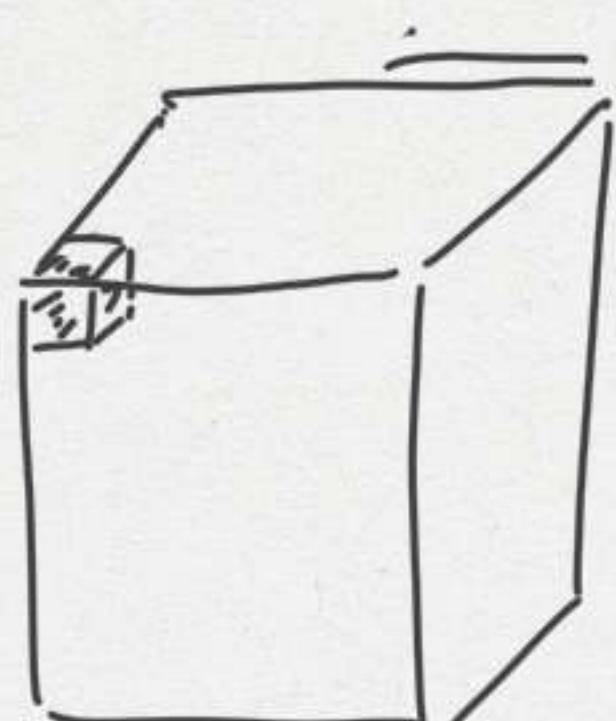
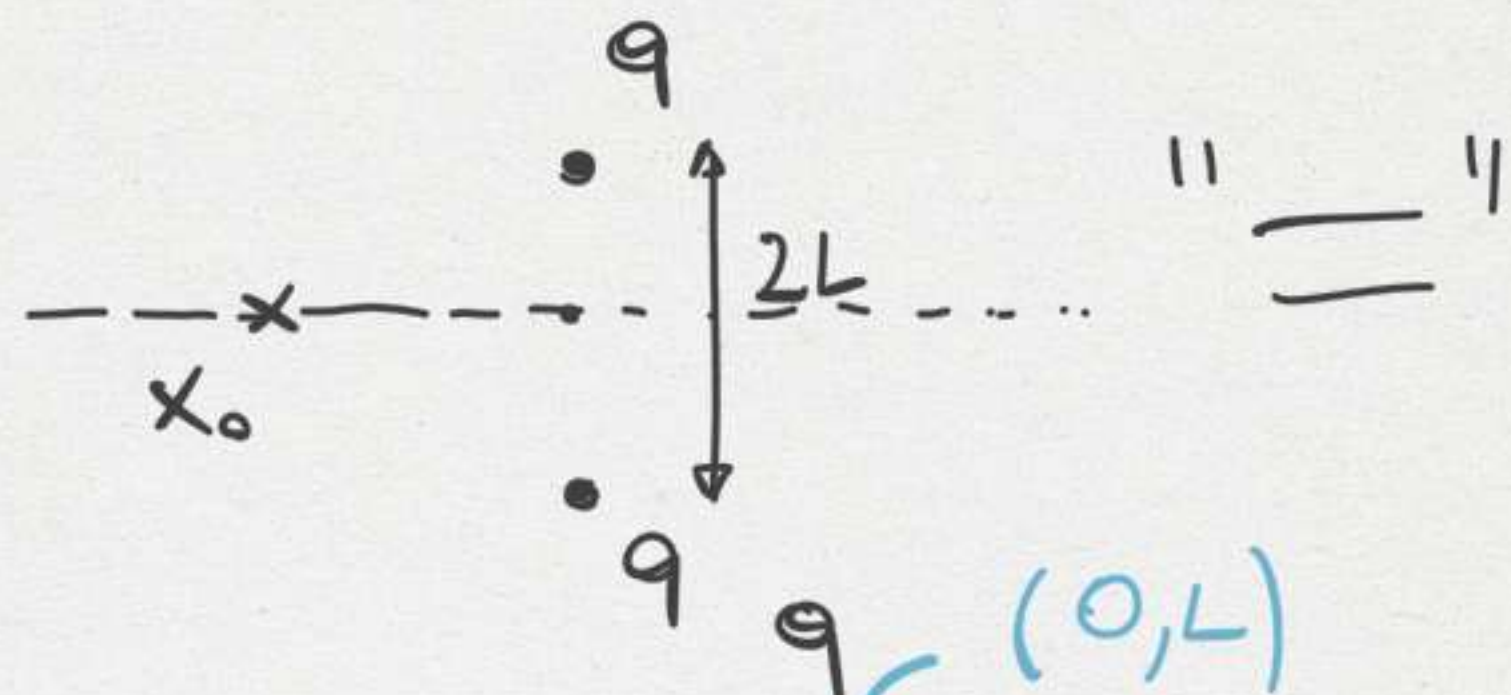


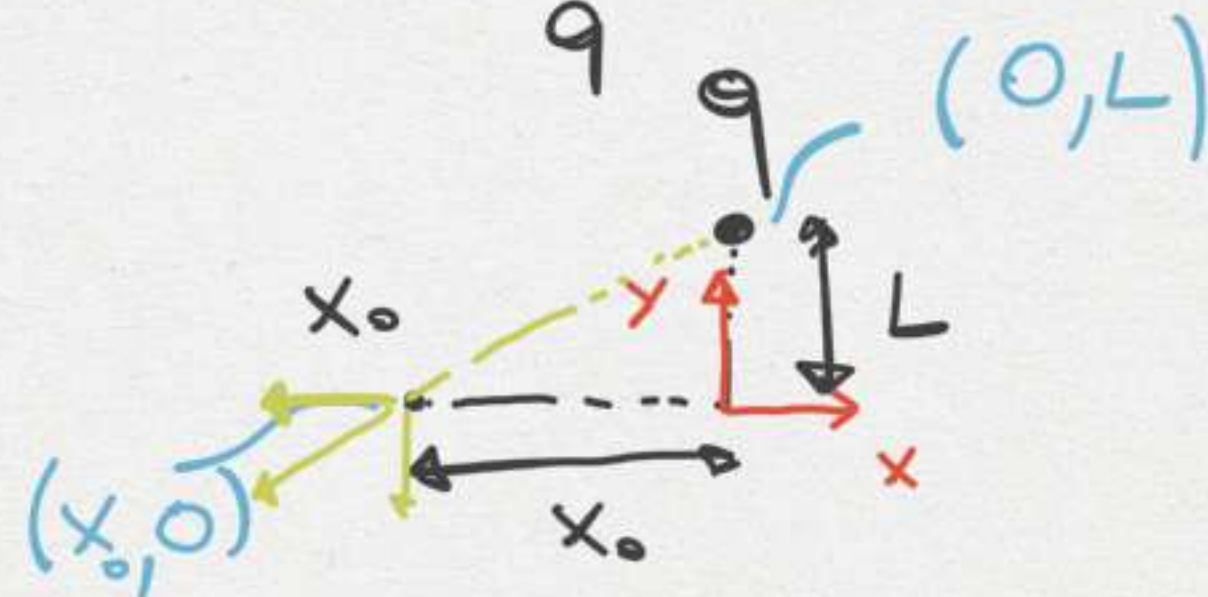
Diagram illustrating volume charge density. A rectangular volume is shown with a small cube inside representing a volume element $d\tau$.

$$dq = \rho d\tau$$

$$[\rho] = \frac{C}{m^3}$$



①

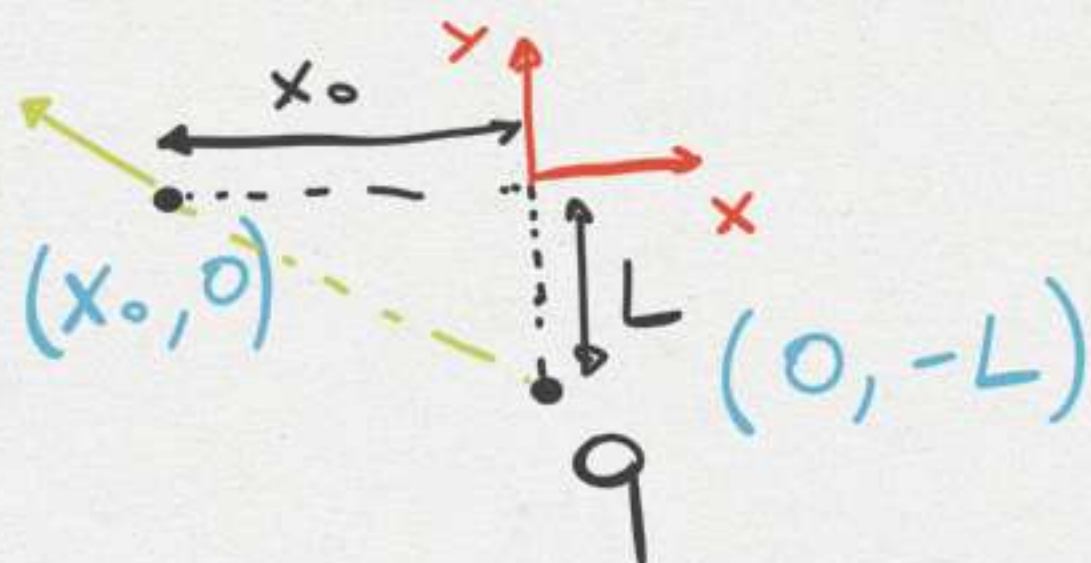


$$\vec{r} = (x_0, 0) - (0, L) = (x_0, -L), \quad \vec{E}_1 = \frac{q}{4\pi\epsilon_0} \frac{1}{r^3} (x_0, -L) = (E_x, E_y)$$

$$r = \sqrt{x_0^2 + L^2}$$

$$\hat{r} = \frac{\vec{r}}{r} = \frac{1}{r} (x_0, -L)$$

②



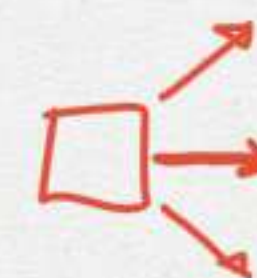
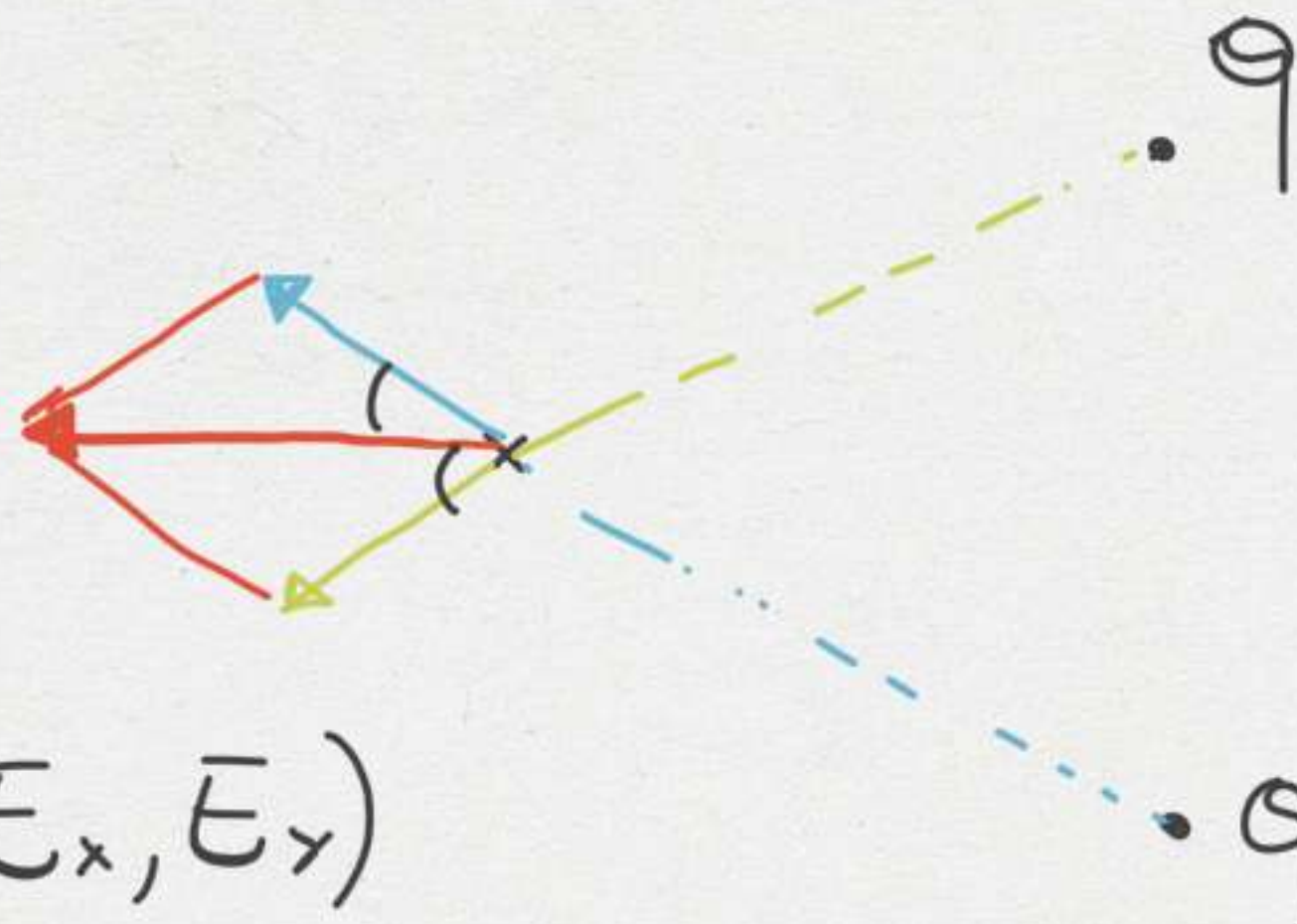
$$\vec{r}_2 = (x_0, 0) - (0, -L) = (x_0, L)$$

$$r_2 = \sqrt{x_0^2 + L^2} = r$$

$$\hat{r}_2 = \frac{1}{r} (x_0, L)$$

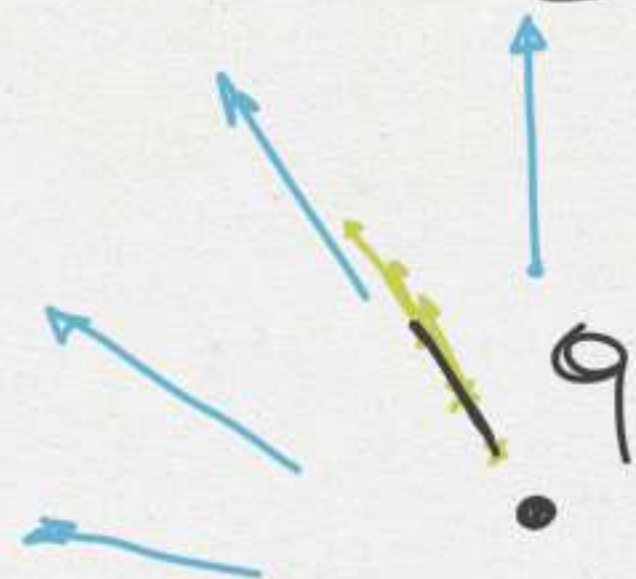
$$\vec{E}_2 = \frac{q}{4\pi\epsilon_0} \frac{1}{r^3} (x_0, L)$$

$$\vec{E} = \vec{E}_1 + \vec{E}_2 = \frac{q}{4\pi\epsilon_0} \frac{1}{r^3} [(x_0, -L) + (x_0, L)] = \frac{q}{4\pi\epsilon_0} \frac{1}{r^3} (x_0, 0)$$

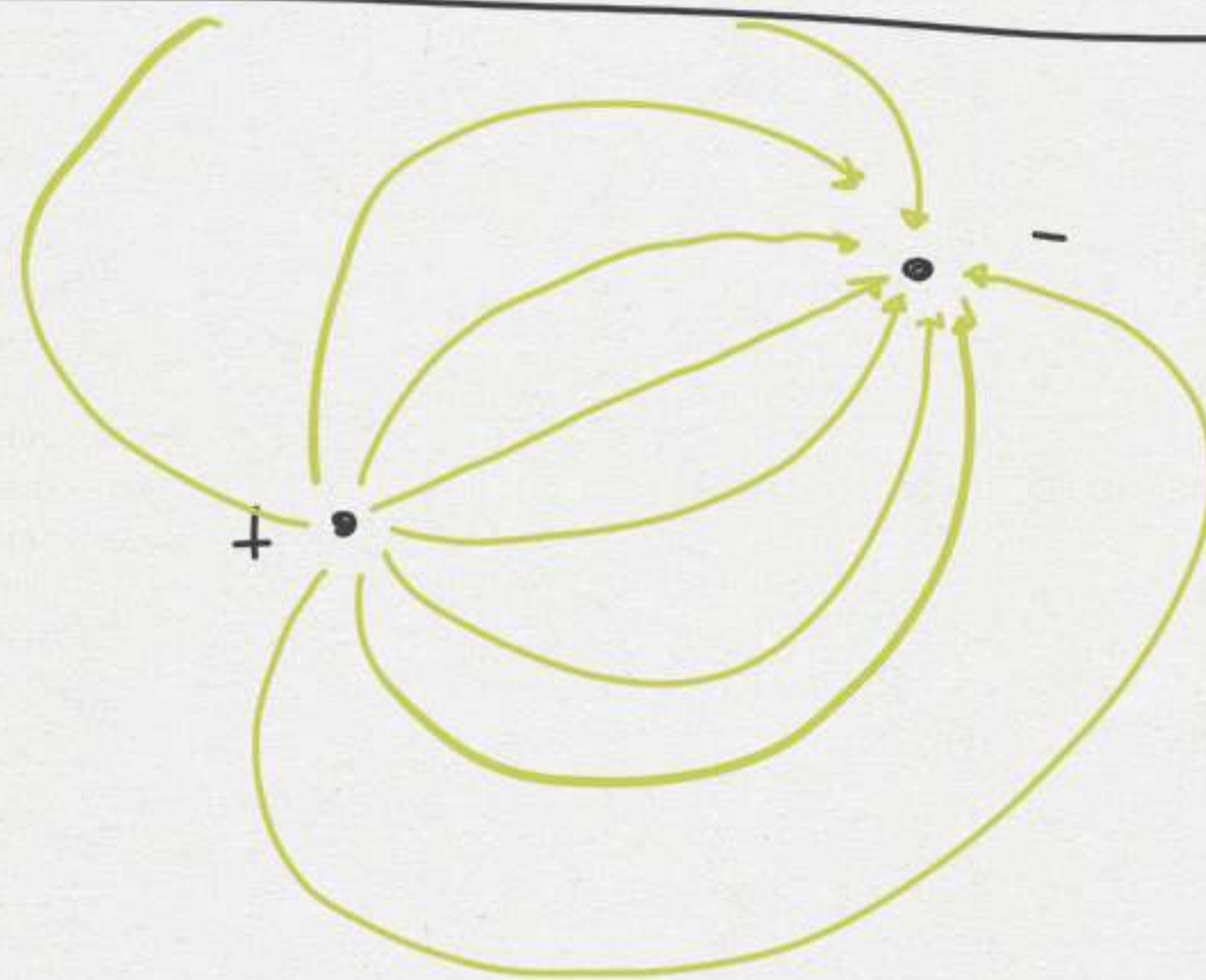


LINEE DI CAMPO

DI FORZA (SOLO PER \vec{E})
 $\vec{E} \parallel \vec{F}$



q



PROPRIETÀ

- ① le linee hanno stessa direzione e verso di \vec{E}
- ② più le linee sono dense \rightarrow più il campo è intenso
- ③ le linee non si incrociano
- ④ le linee partono da $+$ e arrivano a $-$

