TALLER 2

Campo Eléctrico:

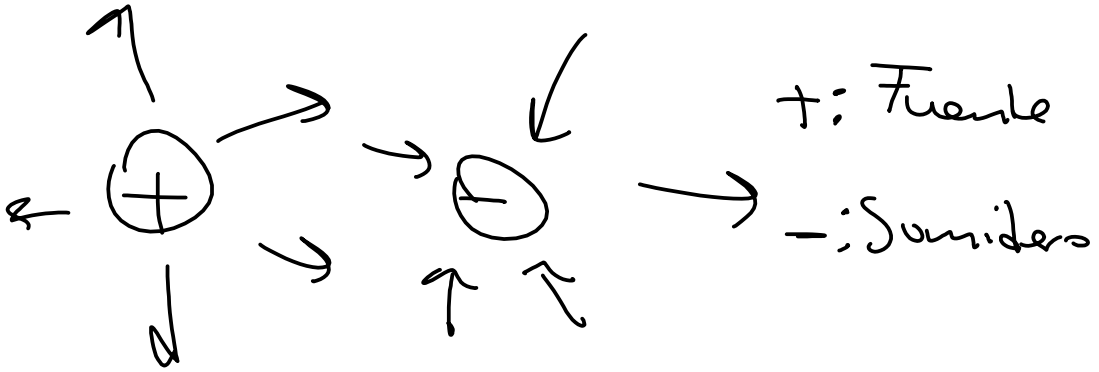
↳ Región donde actúa F_e.

$$\vec{E} = \frac{\vec{F}}{q_0} \qquad [E] = N/m = V/m$$

$q_0 \rightarrow$ prueba.

↳ Para una carga Puntual

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \frac{q}{r^2} \hat{r}.$$

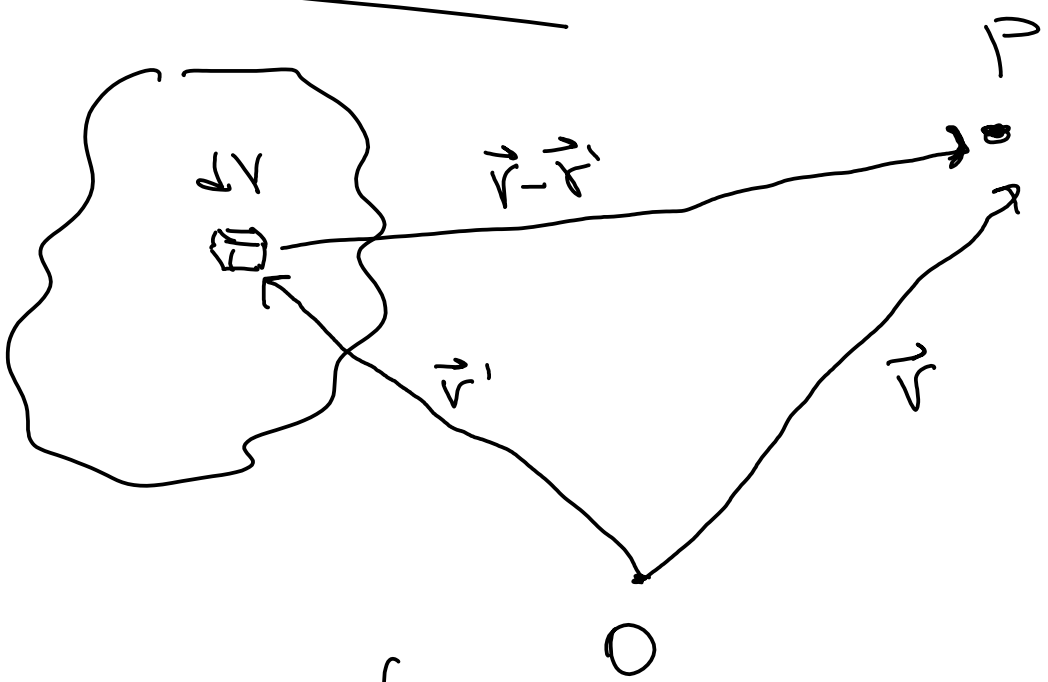


$\vec{E}$ cumple el Principio de Superposición.

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \sum_i \frac{q_i}{r_i^2} \hat{r}_i$$

Para una distro. continua

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \int \frac{dq}{r^2} \hat{r}$$

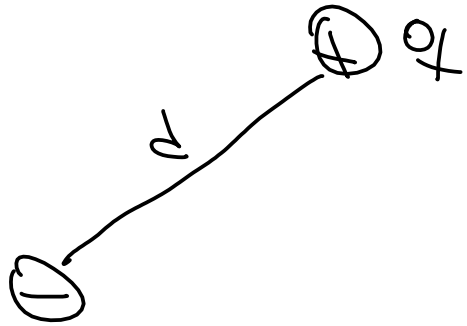


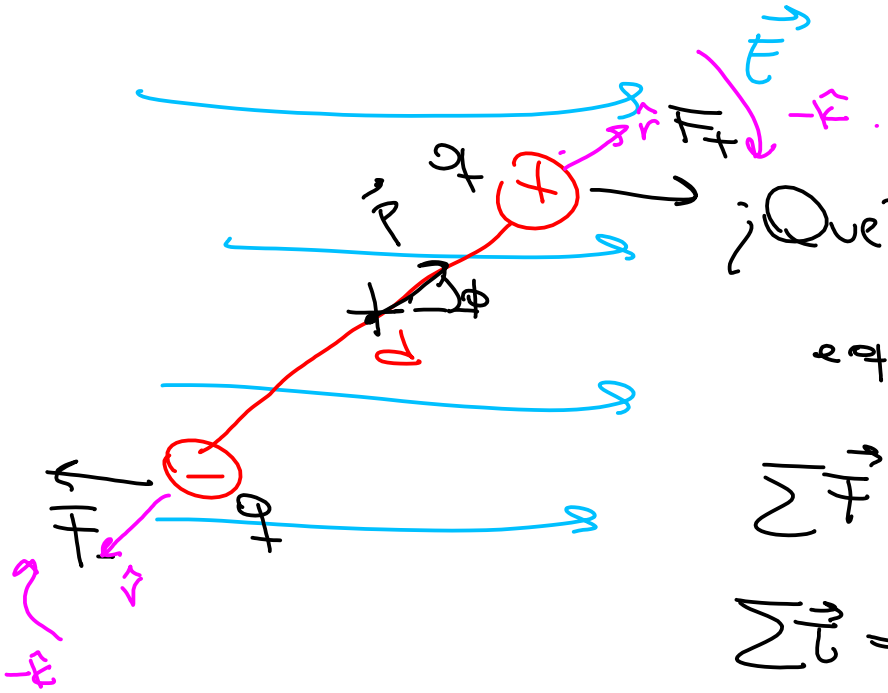
$$\vec{E}(\vec{r}) = \frac{1}{4\pi\epsilon_0} \int \frac{\vec{r} - \vec{r}'}{|\vec{r} - \vec{r}'|^3} dq$$

dq → $\rho(r')\,dV$ o $\sigma(\vec{r}')\,dS$ o $\lambda(\vec{r}')\,dl$

$$\frac{\hat{r}}{r^2} \longrightarrow \frac{\vec{r}}{|\vec{r}|} \longrightarrow \frac{\vec{r}}{|\vec{r}|^3} = \frac{\hat{r}}{(r^2)}$$

Dipolos





¿Qué es estar en equilibrio mecánico?

$$\sum \vec{F} = \vec{0}$$

$$\sum \vec{\tau} = \vec{0}$$

$$\sum \vec{\tau} = \vec{r} \times \vec{F}_+ + \vec{r} \times \vec{F}_-$$

$$|\tau| = \frac{d}{2} F_+ \operatorname{sen}\phi + \frac{d}{2} F_- \operatorname{sen}\phi$$

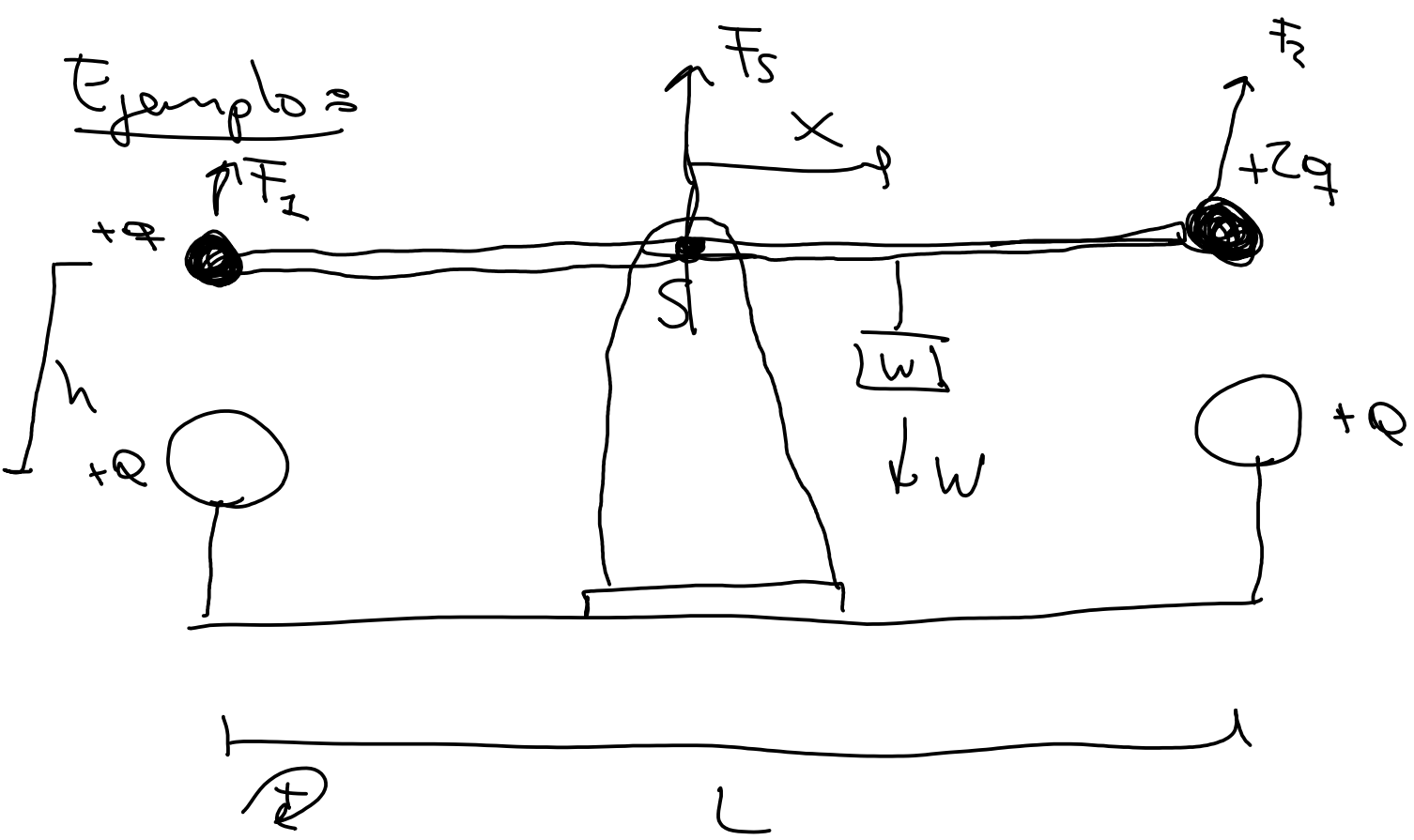
$$= \frac{d}{2} qE \operatorname{sen}\phi + \frac{d}{2} qE \operatorname{sen}\phi = \underbrace{dqE \operatorname{sen}\phi}$$

$$\vec{p} = dq\,\hat{d}_+$$

momento dipolar

$$\boxed{\vec{\tau} = \vec{p} \times \vec{E}}$$

Ejemplo:



$$\sum \vec{\tau} = 0$$

$$F_1 \frac{L}{2} + W x - F_2 \frac{L}{2} = 0$$

$$x = \frac{L}{2W}(F_2 - F_1)$$

$$\frac{1}{4\pi\varepsilon_0}\left(\frac{2qQ}{h^2} - \frac{qQ}{h^2}\right)$$

$$\therefore x = \frac{qQL}{8\pi\varepsilon_0 W h^2}$$

b) $\sum \vec{F} = 0$

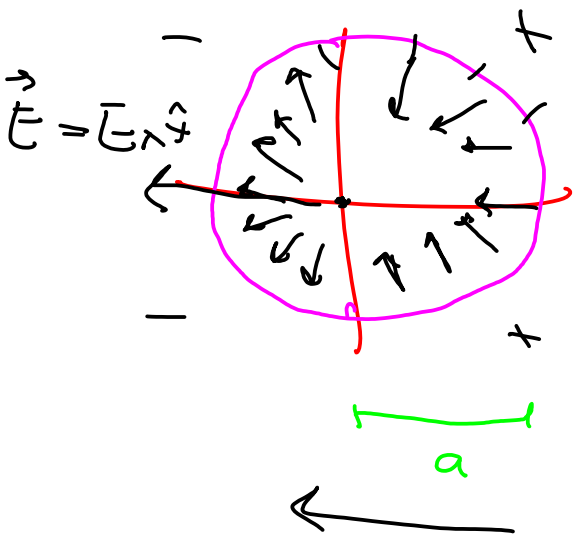
$$F_1 + F_2 + \cancel{F_s}^{\,0} = W$$

$$\frac{1}{4\pi\varepsilon_0}\frac{qQ}{h^2}+\frac{2qQ}{4\pi\varepsilon_0 h^2}=W$$

$$h=\sqrt{\frac{3qQ}{4\pi\varepsilon_0 W}}$$

Ejemplo 2:

$\lambda(\theta)=\beta\cos\theta$ $\quad [\beta]=\frac{C}{m}$



$$dE_x=\frac{1}{4\pi\varepsilon_0}\frac{dq}{a^2}\cos\theta$$

$$\frac{dq}{ds}=\lambda(\theta)=\beta\cos\theta$$

$$dq=\beta\cos\theta\, ds$$

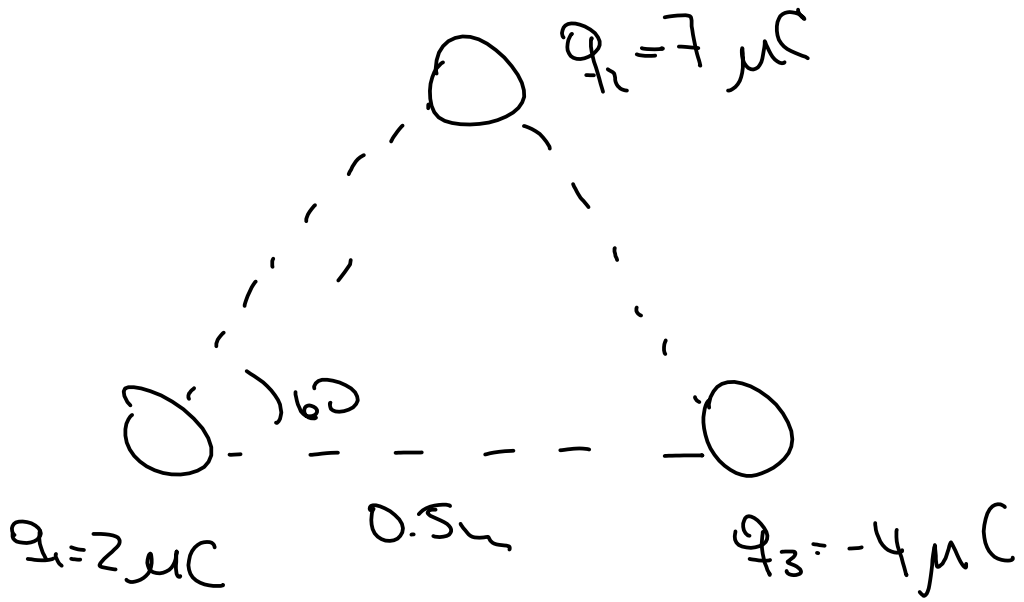
$$ds=a\,d\theta$$

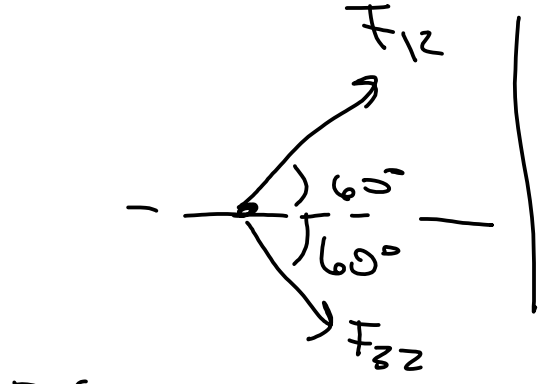
$$dE_x=\frac{1}{4\pi\varepsilon_0}\frac{\beta a\cos\theta\, d\theta}{a^2}\cos\theta$$

$$E_x(x)=\frac{\beta}{4\pi\varepsilon_0 a}\int_0^{2\pi}\cos^2\theta\, d\theta$$

$$\boxed{E_x(x)=\frac{\beta}{4\varepsilon_0 a}(-\hat{x})}$$

TAREA 2





$$\vec{F}_{12} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}\cos 60^\circ \hat{x} + \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}\sin 60^\circ \hat{y}$$

D.C.L.

$$\vec{F}_{32} = \frac{1}{4\pi\varepsilon_0}\frac{q_2 q_3}{r^2}\cos 60^\circ \hat{x} + \frac{1}{4\pi\varepsilon_0}\frac{q_2 q_3}{r^2}\sin 60^\circ (-\hat{y})$$

$$\vec{F} = 0.755\,N\hat{x} - 0.436\,N\hat{y}$$

$$(0.872\,N, -30^\circ)$$