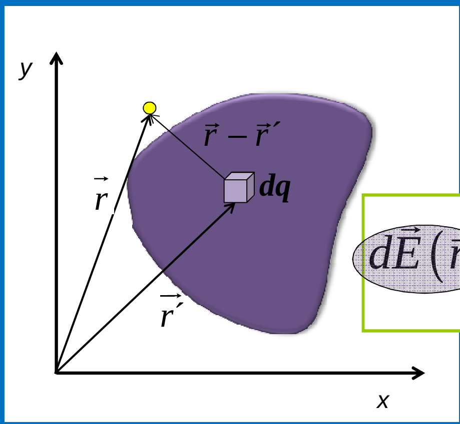
Distribuciones contínuas de carga

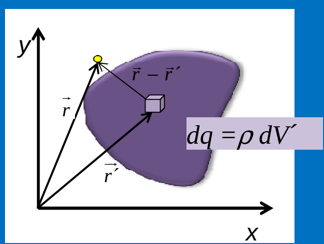


$$\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\frac{Q}{|\vec{r}-\vec{r}'|^3}\vec{r}-\vec{r}'$$

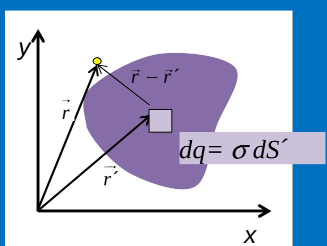
$$d\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\frac{dq}{|\vec{r}-\vec{r}'|^3}(\vec{r}-\vec{r}')$$

$$\boxed{\vec{E}(\vec{r})=\int d\vec{E}(\vec{r})}$$

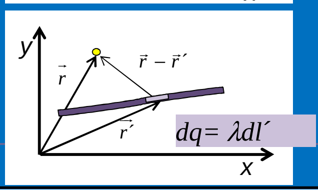
$$d\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\frac{dq}{|\vec{r}-\vec{r}'|^3}(\vec{r}-\vec{r}')$$



$$\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\int_V\frac{\rho dV'}{|\vec{r}-\vec{r}'|^3}(\vec{r}-\vec{r}')$$

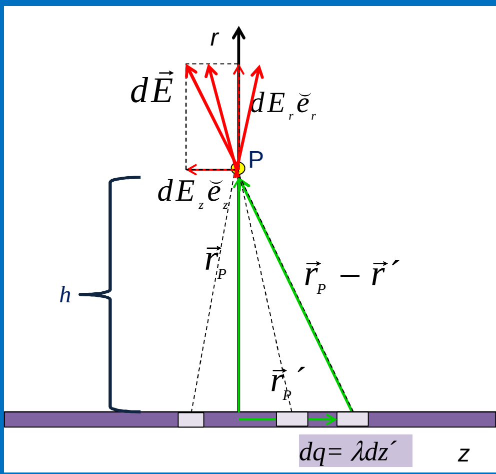


$$\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\int_A\frac{\sigma dS'}{|\vec{r}-\vec{r}'|^3}(\vec{r}-\vec{r}')$$



$$\vec{E}(\vec{r})=\frac{1}{4\pi\varepsilon_0}\int_L\frac{\lambda dl'}{|\vec{r}-\vec{r}'|^3}(\vec{r}-\vec{r}')$$

Campo E de una línea de carga infinita



$$\vec{E}(\vec{r}_P) = \frac{1}{4\pi\varepsilon_0}\int_L \frac{dq}{|\vec{r}_P - \vec{r}\,'|^3}(\vec{r}_P - \vec{r}\,')$$

$$\left.\begin{array}{l}\vec{r}_P = h\breve{e}_r \\ \vec{r}\,' = z'\breve{e}_z\end{array}\right\} \quad \begin{array}{l}\vec{r}_P - \vec{r}\,' = h\breve{e}_r - z'\breve{e}_z \\ |\vec{r}_P - \vec{r}\,'| = \sqrt{h^2 + z'^2}\end{array}$$

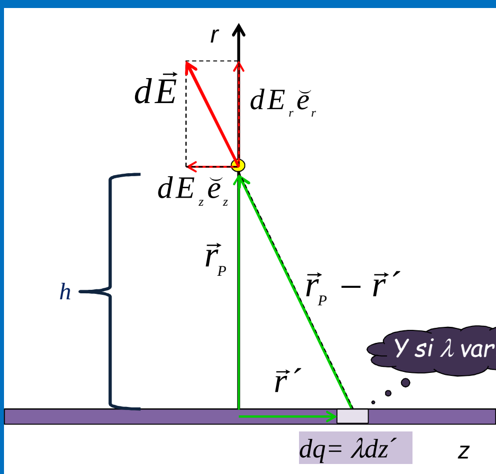
$$\vec{E}(\vec{r}_P) = \int d\vec{E}(\vec{r}_P) = \int dE_r\breve{e}_r + \int dE_z\breve{e}_z$$

$$dE_r(\vec{r}_P) = k\frac{h\,dq}{|\vec{r}_P - \vec{r}\,'|^3} = k\frac{h\lambda dz'}{(h^2 + z'^2)^{3/2}}$$

$$dE_z(\vec{r}_P) = k\frac{-z'dq}{|\vec{r}_P - \vec{r}\,'|^3} = k\frac{-z'\lambda dz'}{(h^2 + z'^2)^{3/2}}$$

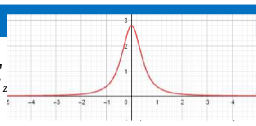
$$\boxed{\vec{E}(\vec{r}) = \int d\vec{E}(\vec{r})}$$

Campo E de una línea de carga infinita

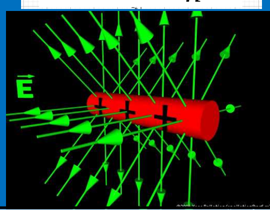


$$\vec{E}(\vec{r}_P) = \int d\vec{E}(\vec{r}_P) = \int dE_r\breve{e}_r + \int dE_z\breve{e}_z$$

$$\int dE_r(\vec{r}_P) = \int_{-\infty}^{\infty} k\frac{h\lambda dz'}{(h^2 + z'^2)^{3/2}} = k\frac{2\lambda}{h}$$

$\int dE_z$  $= 0$

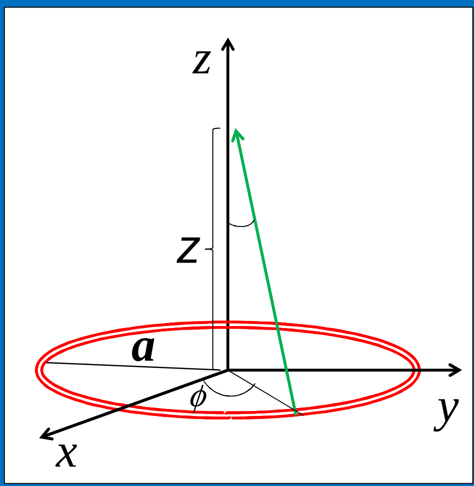
$$\vec{E}(\vec{r}_P) = k\frac{2\lambda}{h}\breve{e}_r$$



Campo eléctrico a una distancia r de la distr. lineal

$$\vec{E}(\vec{r}) = k\frac{2\lambda}{r}\breve{e}_r = \frac{1}{4\pi\varepsilon_0}\frac{2\lambda}{r}\breve{e}_r$$

Campo E de un anillo cargado sobre el eje de simetría



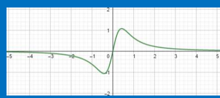
$$\vec{E}(\vec{r}_P) = \frac{1}{4\pi\varepsilon_0}\int_L \frac{dq}{|\vec{r}_P-\vec{r}\,'|^3}(\vec{r}_P-\vec{r}\,')$$

$$dq = \lambda dl = \lambda a d\phi$$

$$|\vec{r}_P-\vec{r}\,'| = \sqrt{z^2+a^2}$$

$$\boxed{\vec{E}(z) = E_z\breve{e}_z = \frac{1}{4\pi\varepsilon_0}\frac{\lambda z\, 2\pi a}{(z^2+a^2)^{3/2}}\breve{e}_z}$$

Si z=0?
Si z>>a?
Si λ varia?
Si quiero ver qué pasa en otro lugar?
Si se tratara de un disco?



Campo eléctrico de un plano infinito