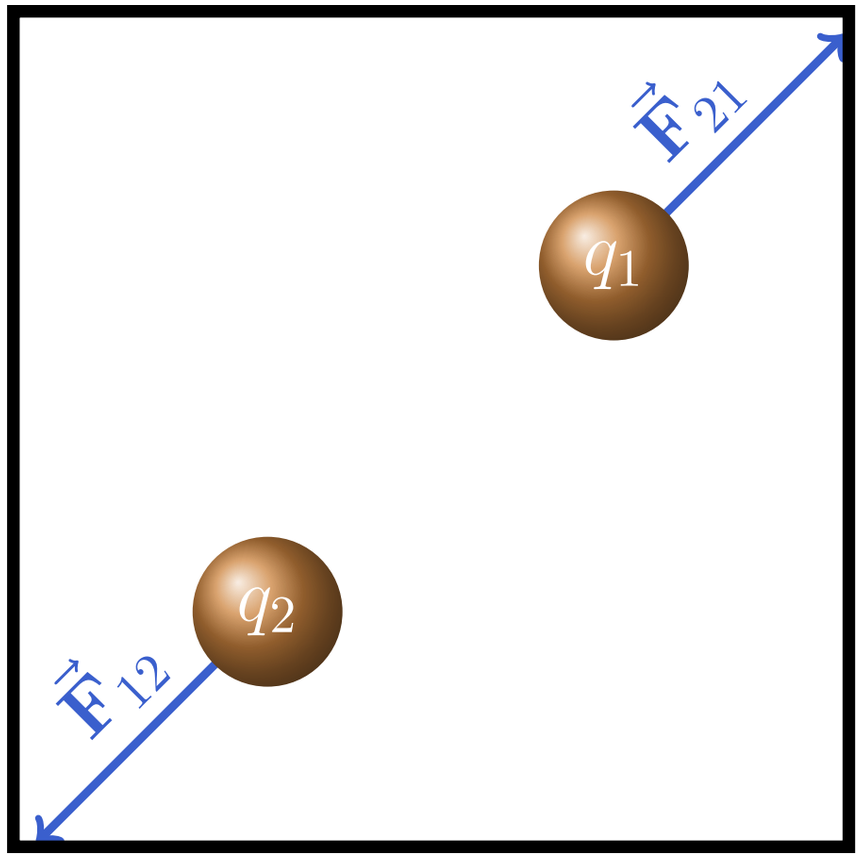
Eletromagnetismo

14 de março
Eletrostática

Lei de Coulomb



$$\vec{\mathbf{F}}_{12} = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r_{12}^3}\vec{\mathbf{r}}_{12}$$

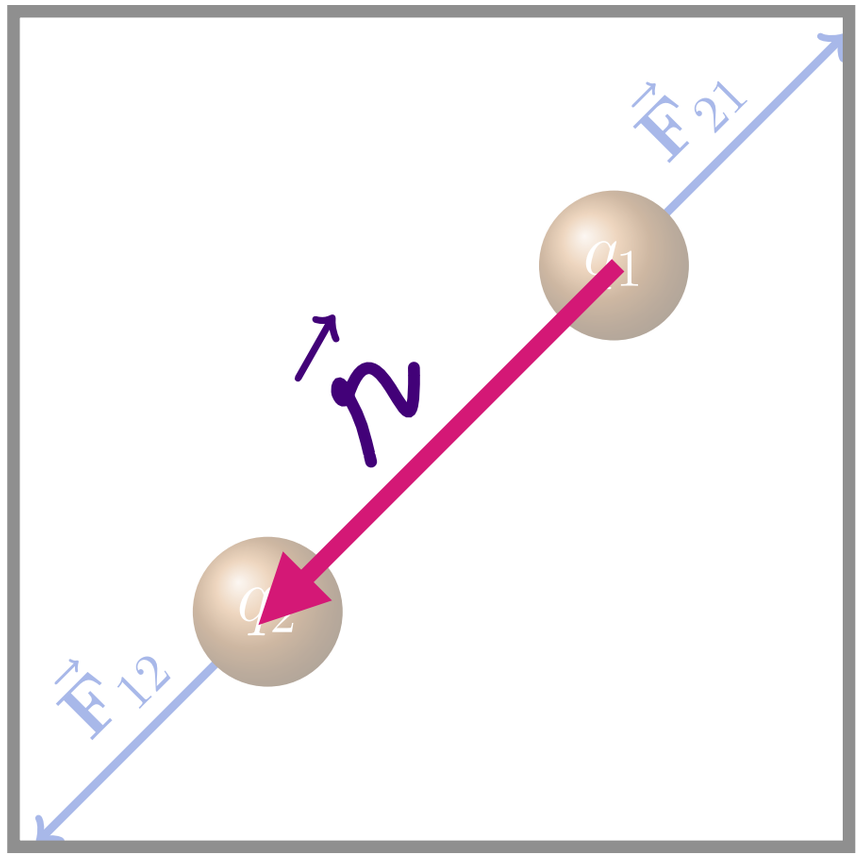
$$\epsilon_0 = 8.85 \times 10^{-12} \quad \text{(SI)}$$

Campo elétrico

$$\vec{\mathbf{E}}(2) = \frac{1}{4\pi\epsilon_0}\frac{q_1}{r_{12}^3}\vec{\mathbf{r}}_{12}$$

$$\vec{\mathbf{F}}_{12} = q_2\vec{\mathbf{E}}(2)$$

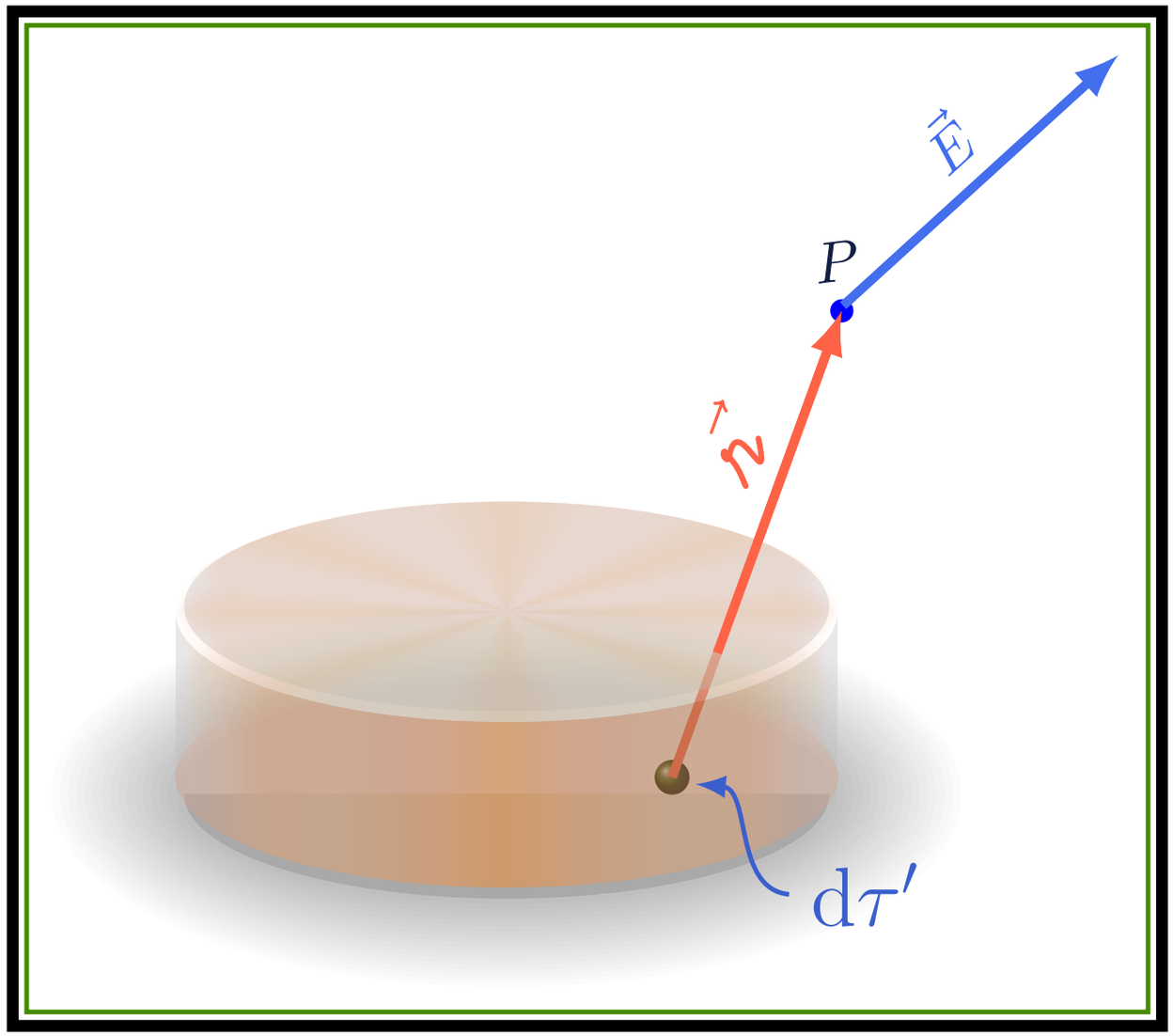
$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\frac{q}{r^3}\vec{r}$$



Campo elétrico de distribuição de cargas

$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\sum_j \frac{q_j}{\mathcal{r}^3}\vec{\mathcal{r}}$$

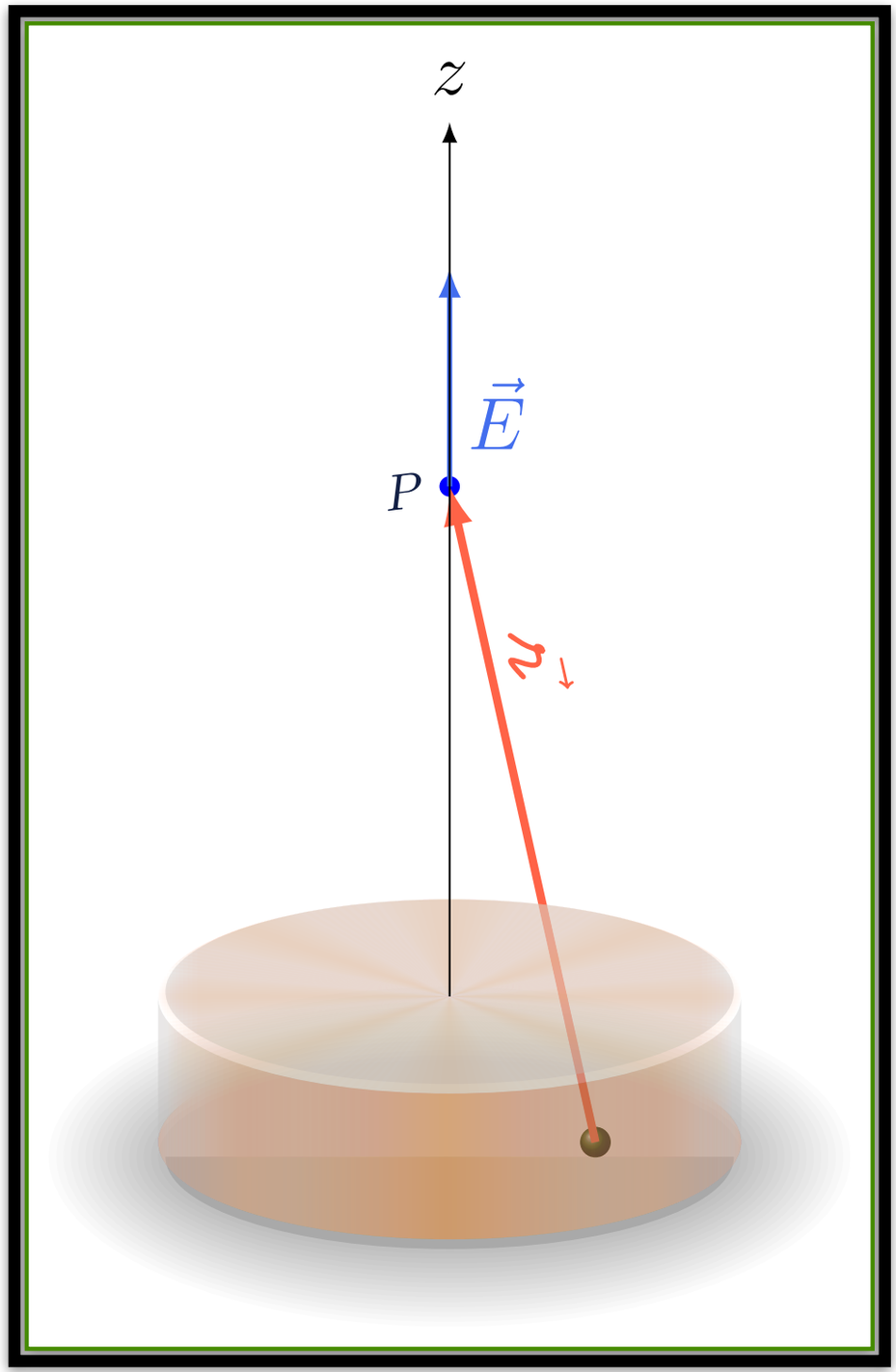
$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int_{\mathcal{V}} \frac{\rho(\vec{\mathbf{r}}')}{\mathcal{r}^3}\vec{\mathcal{r}}\,\mathrm{d}\tau'$$



Pratique o que aprendeu

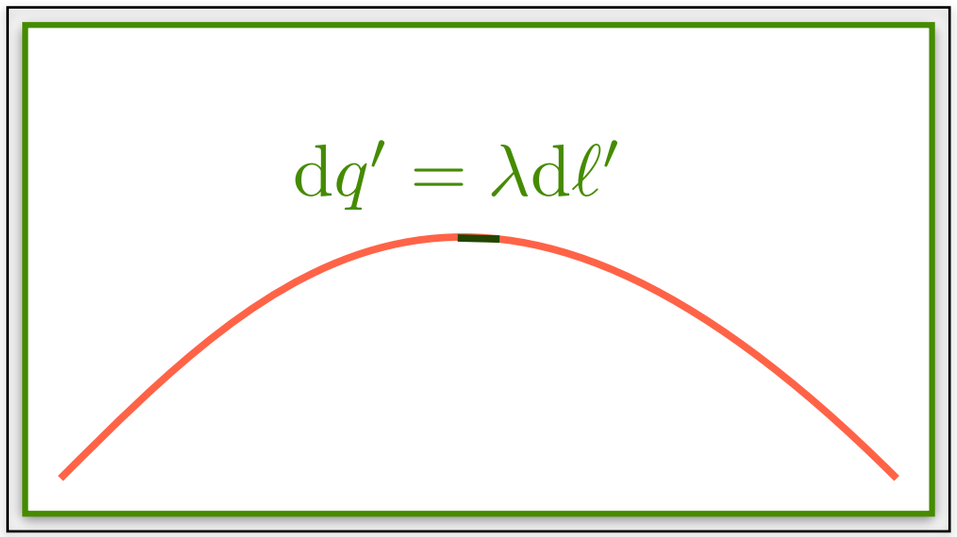
$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int_{\mathcal{V}} \frac{\rho(\vec{\mathbf{r}}')}{\boldsymbol{r}^3}\vec{\boldsymbol{r}}\,\mathrm{d}\tau'$$

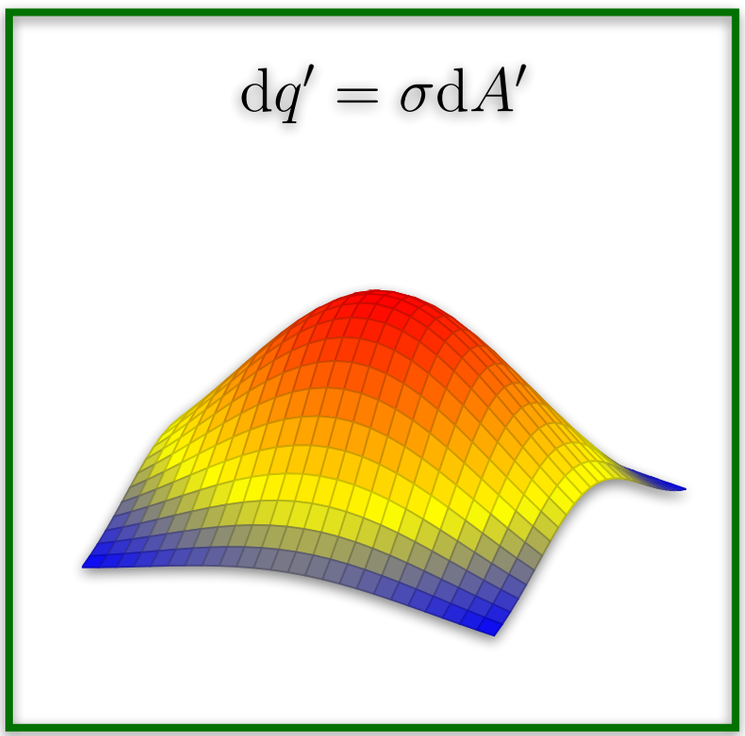
- Disco uniformemente carregado
- Raio R, altura a, base em $z = 0$
- $P = (0,0,h)$
- $\vec{E}(P) = ?$

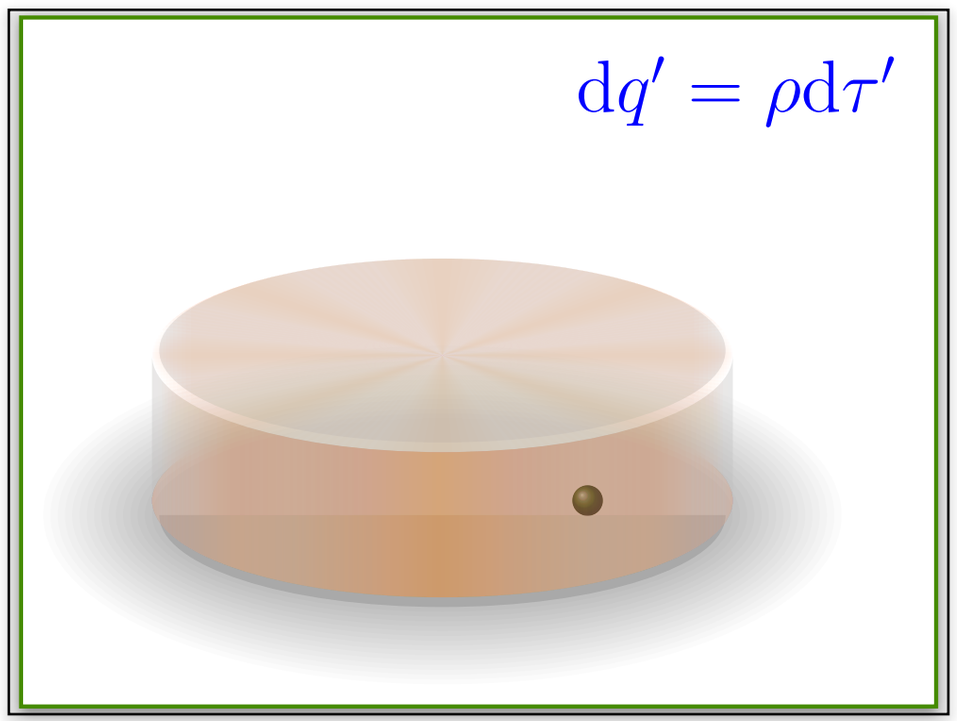


Campo elétrico de distribuição de cargas

$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int \frac{\mathrm{d}q'}{r^3}\vec{r}$$

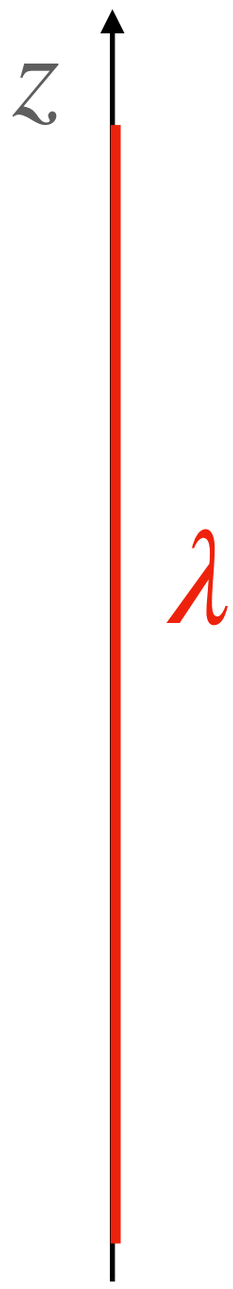


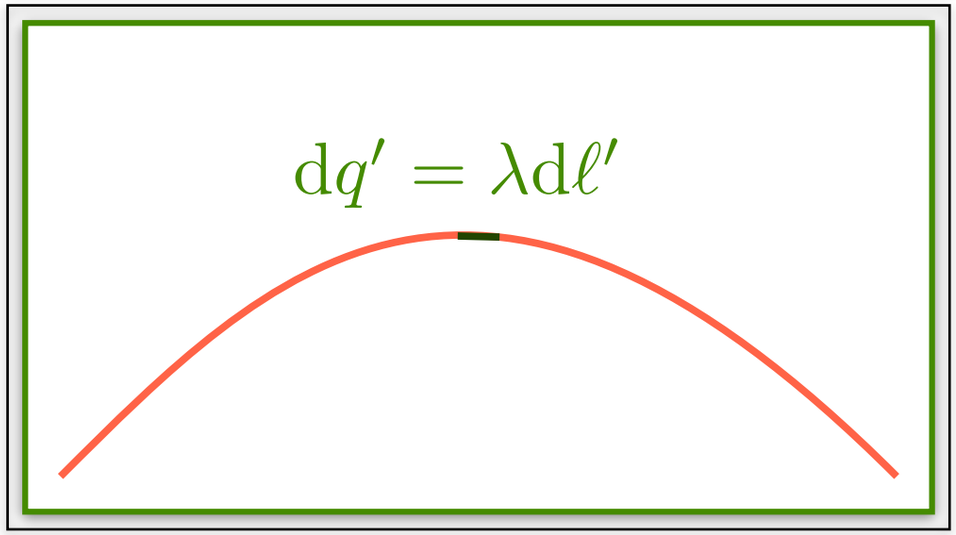




Pratique o que aprendeu

$$\vec{\mathbf{E}}(\vec{\mathbf{r}}) = \frac{1}{4\pi\epsilon_0}\int \frac{\mathrm{d}q'}{r^3}\vec{r}$$





- Comprimento $L \gg s$
- Densidade uniforme
- $P = (s, 0, 0)$
- $\vec{E}(P) = ?$